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Improvement in Cotton and Hay Presses.

Some screw presses are so constructed that the operating arms, being fixed to the screw, rise and fall as the press is worked. This is a serious objection, as the operating power, whether men or horses, must be adapted to this change of level.

The engravings present views of a simple press adapted for cotton, hay, or other fibrous products requiring compression or baling. One of the engravings represents the press as adapted to man power, and the other as arranged for horse power, the change being effected simply by an inversion of the apparatus. This change can be effected in a few minutes. The platform sustaining the press is used, whether the machine is operated by hand, or by animal power. Its construction is evident from the engravings. It may be made in sections, so as to allow of being taken to pieces either for facility in transportation when desirable, or for changing the machine from a hand apparatus to one worked by animal power. The posts of the frame supporting the platform may be of wrought iron, connected together by cross beams, and properly braced. A floor may be fixed to the lower cross beams, when the apparatus is to be operated by manual power, and on this floor the packing tube or press may rest.

Fig. 1

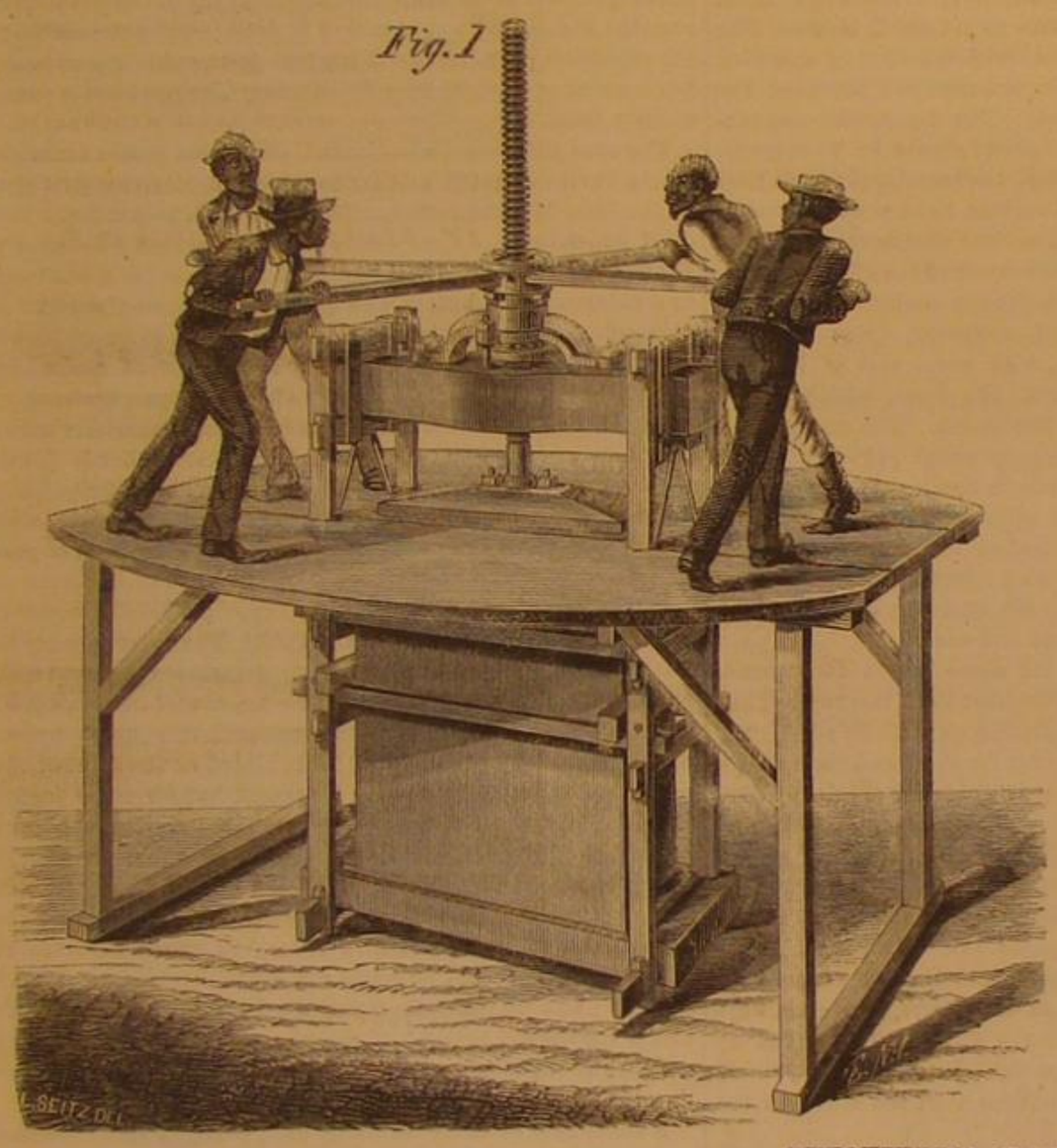
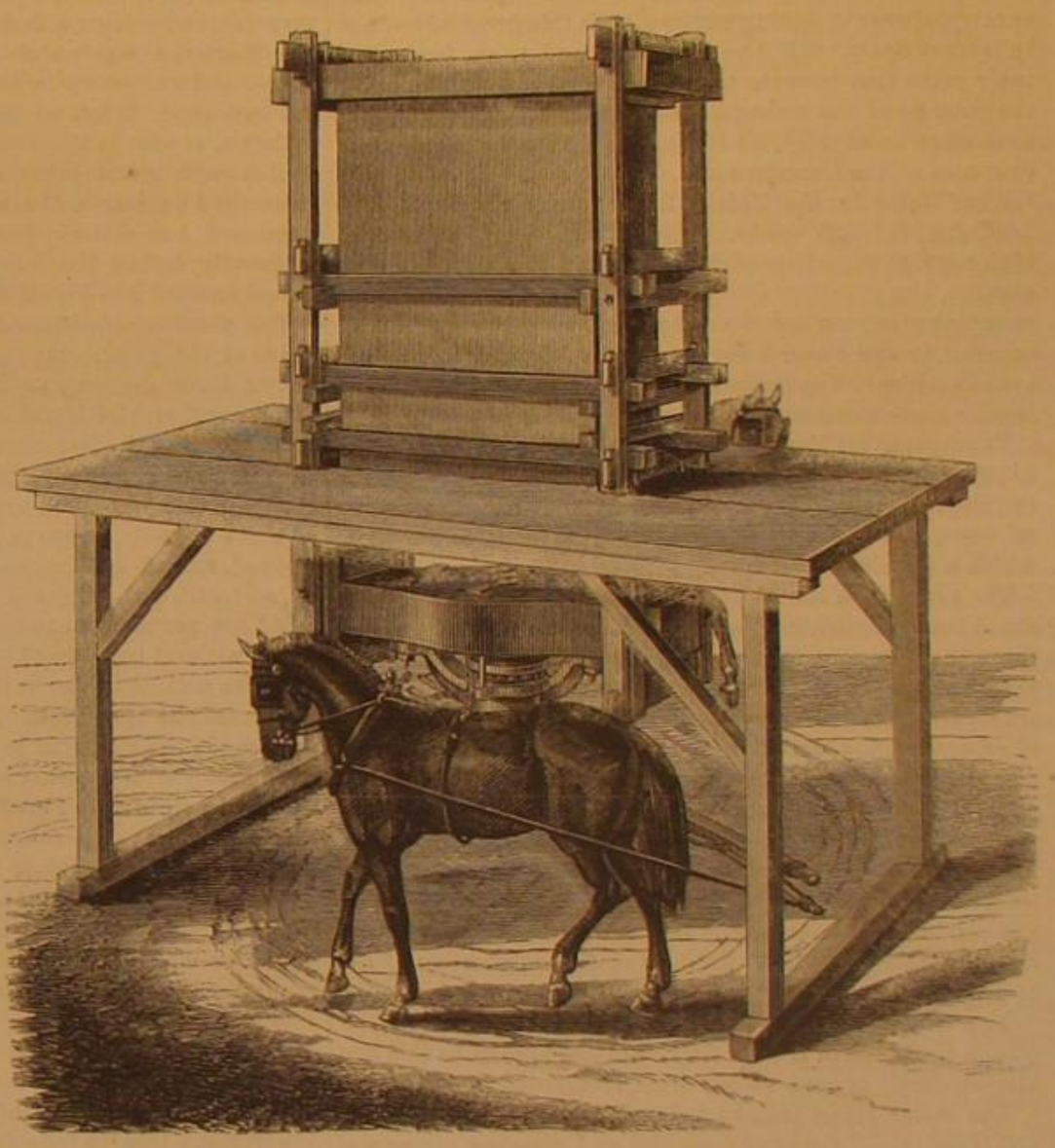


Fig. 2



SCHOFIELD'S PATENT COTTON PRESS.

A strong beam passes across the operating end of the box, or packer, and to this is attached a yoke or arch of iron, or other metal, which sustains the nut of the screw, the friction disk, and the hub of the operating arms. The screw passes through the beam and the rings. Inside the metallic yoke is a cup disk surrounding the screw, and holding between it and the yoke a number of balls, intended to reduce friction. On the other side of the yoke is the double hub for receiving the operating arms. This hub is made in two parts, the disks being bolted together. Inside this hub is the nut for the screw. On that end of the screw which works in the compressing box is a piston which fits loosely the box and compresses the cotton or hay, its surface, as also that of the receiving end of the box, being scored across for the reception of the bands for securing the bale. That portion of the compressor furthest from the arms has the sides of the box removable for the reception of the material to be pressed.

This machine is simple in construction, easy in operation, and presents the advantage of being driven either by hand or by horse power. Patented through the Scientific American Patent Agency, Sept. 3d, 1867, by J. S. Schofield, Macon, Ga.

The rights for all States except Georgia are for sale by the patentee.

Silvering Glass Mirrors.

The process we propose to describe has for its author Prof. Henry Draper, of this city, and may be divided into five operations, viz., the cleaning of the glass, the preparation of the silvering solution, the warming of the glass, the process of silvering, and the polishing. The description is for a 15½ inch mirror.

1. Rub the glass plate thoroughly with aquafortis, and then wash it with plenty of water and set it on edge on filtering paper to dry; then cover it with a mixture of alcohol and prepared chalk and rub it in succession with cotton flannel.

2. Dissolve 560 grains of Rochelle salt (tartrate of soda and potassa) in 2 or 3 ounces of water and filter; dissolve 800 grains of nitrate of silver in 4 ounces of water. Take an ounce of strong ammonia of commerce and add nitrate solution to it until a brown precipitate remains undissolved. Then add more ammonia and again nitrate of silver solution. This alternate addition is to be carefully continued until the silver solution is exhausted, when some of the brown precipitate should remain in suspension. Filter. Just before using, mix the Rochelle salt and add water enough to make 22 ounces. The vessel in which the silvering is to be performed should be a circular dish of ordinary tin plate and coated with a mixture of equal parts of beeswax and rosin. At opposite ends of one diameter two narrow pieces of wood are cemented to keep the face of the mirror from the bottom of the vessel.

3. The glass is slightly warmed by putting it in a tub or other suitable vessel and pouring in tepid water to cover the glass; then hot water is gradually stirred in.

4. Carry the glass in the silvering vessel, into which the silvering solution has been poured, place the whole apparatus before the window and keep up a slow rocking motion. Leave the mirror 20 minutes in the liquid or half an hour, and wash with plenty of water.

5. When the mirror is perfectly dry, take a piece of the softest buckskin, stuff it with cotton, and go gently over the whole silver surface to condense the silver. You may use some of the finest rouge. The best stroke is a motion in small circles; rub an hour. The thickness of the silver thus obtained is about $\frac{1}{200000}$ of an inch.

Vegetable Soap.

There are certain plants distributed all over the world yielding a saponaceous juice which, to those who are desirous of having a white, delicate skin, must be far preferable to the finest "ambrosial," "milleflower," or "basket of fruit" soap. No doubt the ancients used such plants instead of soap; perhaps they were the same still used for the like purpose in Italy and other neighboring countries. Pliny, in giving the description of one of them, says:—"It grows on a rocky soil and on the mountains, and its leaves are prickly like those of the thistle." If this is the *gypsophila struthium* of Linnée, a plant still used for washing in the southern parts of Italy and Spain, and for which the description corresponds remarkably well, we must leave the botanists to decide. Suffice to say that besides this, the soap root of Europe, the aloe of Jamaica, the soap tree from the coast of Coromandel, and the horse chestnut, yield said juice, some by their leaves, others by their roots. Its peculiar principle—as chemistry teaches us—is the saponin, a body belonging to that class of organic substances which, upon being treated with certain acids or alkalies, yield glucose or starch sugar among their products of decomposition. The saponin is in its pure state a white solid, of a sweet but acrid aftertaste, it leaves, when spread over a plate, a fine looking varnish, but the most peculiar property is the viscosity of its solutions; when they contain camphor or resin, they will bear the heavy mercury.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

EDITORIAL CORRESPONDENCE.

Annoyances of Spanish Travel—Valencia, Its Huerta, People, Curious Sights—Old Tarragona by Moonlight—Ancient Churches—Barcelona, etc.

MARSEILLES, Dec. 31, 1867.

A trip from Northern Spain may not inaptly be compared to entering a large animal trap. It is quite easy to get in but it is not so easy to get out unless the tourist is content to do nearly the whole thing over again. From Bayonne to the Mediterranean stops can be made at several stupid but interesting places, which break up the monotony of the trip; but there are no completed lines of railway along the sea, therefore the choice lies between poor coasting steamers or a return over the railway as far back as the junction at Alcazar, a station a few hours south from Madrid where another line branches off to Carthagena, Alcante, and Valencia.

We left Malaga for Valencia at six in the morning, and returned to Cordova where we took another train northward to the Alcazar Junction which we reached at two hours past midnight—nearly an hour behind time. Here we found the Valencia train in waiting, and as it was necessary to purchase tickets and get our luggage weighed and changed there was no time to be lost, and what added to the peril of our situation the agent refused to take French gold, the first instance of the kind we have met since we commenced our travels on the continent in June last. What were we to do in such a dilemma? We had not quite money enough to pay our baggage and buy our tickets to Valencia. It was cold midnight: no bankers, no hotels, no nothing except Spanish insolence accompanied by a downright refusal to take some forty francs

in gold simply because it chanced to have been coined in Paris instead of Madrid. Very fortunately for us a Frenchman standing near saw the fix we were in and true to his native instincts he relieved our situation by exchanging money which enabled us to pursue our journey as comfortably as we could on a cold, windy night in a slow Spanish train. But for this providential interposition there is no knowing exactly how we should have contrived to stop long at Alcazar or to have got away from that desolate place. The rural hotels in Spain are not intended to accommodate any body and nothing seems to surprise the proprietor more than to have a foreigner apply for lodging. The houses have no fireplaces, but warmth is supplied by the use of an old-fashioned brazier, which resembles a huge warming pan, into which burning charcoal and ashes are placed. Between the horrid diet and the fumes of the brazier if the guest succeeds in escaping with his life he may consider himself a special favorite of a kind Providence.

The railways in Spain are usually very expensive works as owing to the mountainous character of the country there is much deep cutting, tunneling, and heavy grading. The cars are divided into three classes, very similar, though generally much inferior to the French. The first-class cars are supplied with cylindrical-shaped vessels, covered with carpet and filled with hot water, which serve the most excellent purpose of keeping the feet warm. The cars are usually dirty, a national habit, scrupulously observed. The management of railways in Spain is more slipshod than in any other country, always excepting our own, with this great advantage in favor of Spain. All the highways and most frequented mule paths that cross the track are carefully guarded during the passage of the trains, a precaution not so necessary here as in our own country, for the reason that few carriages are ever seen on the common roads. To tell even a Spaniard that railway trains in the United States are permitted to dash headlong through towns, villages, and cities, and across highways, so regardless of life, limb and property, and you astonish him greatly. One of them said to me "you permit such things in your country and yet you boast of a civilization superior to our own. I do not believe it would be allowed even in Africa. The instincts of self-preservation alone would require some necessary precaution."

Throughout all Europe railway companies are compelled to pay strict attention to the lives of the people, hence the excellent discipline that marks the management of European railways, and the very general feeling of safety and comfort which a traveler experiences.

The route from the Alcazar Junction to Valencia occupied about twelve hours, and was generally dull of interest, and through realms of poverty and apparent barrenness until we passed a long tunnel near the old town of Montesa, above which stands one of those ruined castles once the safe retreat of robber knights who came down like vultures upon their defenceless prey. The scenery now changes to a valley of oriental beauty and exotic vegetation, abounding in orange, mulberry and palm groves which grow in wild luxuriance. The hillsides are terraced up in masonry for the purposes of irrigation and the fertile valley is watered by countless rills and conduits, the same as the Moors arranged them centuries ago, the whole constituting a most skillful application of the hydropathic treatment.

The Water Tribunal of Valencia sits once every week within the porch of the old Cathedral and applies to this day the same code of laws which were introduced by the Moors.

The valley lying back of Valencia is called the "Huerta" and offers one of the most beautiful and glowing pictures of fertility to be found in Europe, the sight of which almost compelled us to overlook all the shortcomings of decripit old Spain.

So far as mere sight seeing is concerned, Valencia cannot detain a traveler very long. It is a thriving city of over one hundred thousand inhabitants, and very cheerfully situated about two miles back from the Mediterranean. There are fewer beggars in the streets than in some other of the large Spanish cities, and as a general thing the people have a better look. They are said to be proud, honest, industrious, revengeful and superstitious, hospitable to strangers, fond of love making, pigeon shooting, cock fighting, and bull tormenting, and of every thing else that leads to fighting and bloodshed.

The Plaza de Toros (Place of Bulls) built in 1850, is probably the finest in Spain. It resembles the Roman Coliseum, and has a very imposing substantial look. There are also some very fine public and private botanical gardens. The markets are well supplied with luscious fruits, nuts, and vegetables, but my experience is that the guests of the hotels do not get very much of the good things to be found in the markets. There is here a large cathedral somewhat barren, however, of intrinsic architectural interest compared with others in Spain, but it contains some singular religious pictures. One of them represents the martyrdom of an old saint whose bowels are being drawn out and wound upon a windlass. In strange contrast to this example of human butchery, which has been practised to perfection in Spain, there is a most exquisite head of the sorrowing Virgin painted by Sassoferrato, an Italian painter, whose style was as soft as the finest velvet. It is said that good artists spend a month's time in endeavoring to produce a copy of this surprising little work of art. The sacristy of the church contains, as Capt. Cuttle would say, the *dietical* cup from which our Saviour drank wine at the Last Supper, and which can be seen for a fee on any afternoon about three o'clock if the gentleman can be found who carries the key. He wears a long black robe with girdle about the waist, low-quartered shoes with silver buckles, head surmounted by a black felt hat, very broad brim, which rolls over at the sides like a layer of birch bark. The cup exhibited is of fine silver, neatly made and genuine, of course, as it is said to resemble the one shown in the great painting of Leonardo da Vinci, at Milan. Seriously, I have no doubt that Christ drank from a cup at the Last Supper with his disciples, and it is barely possible that the identical cup is still in existence, but how these ecclesiastics can attempt to palm off upon enlightened travelers so much nonsense and rubbish without laughing is a mystery to me. We have already seen wood enough of the true (?) cross to build a small dwelling house, and we are not half through yet.

Valencia has also a picture gallery that contains a tolerable collection of paintings chiefly by old Spanish artists, nearly all religious subjects. Those old painters must have been a very pious set of men as all their productions show that they had neither taste nor skill for any other class of subjects. We were advised to visit the Church of the Patriarch, founded two centuries ago by Archbishop Ribera, and to witness a dramatic religious ceremonial enacted every Friday, at which time a series of dissolving views are introduced into the service the church being purposely darkened to add impressiveness to the ceremony. We happened to enter at the wrong time and as we were about to commence to exercise the stranger's privilege to see the sights we were told by the sacristan that we could not go round as some one was praying. There were no worshippers, no attendants upon the ceremony except ourselves and the official, but the voice of a human being, as if in the act of chanting prayer, came forth very musically from a dark alcove near to the high altar. The language was unintelligible to us but it seemed like prayer and we quietly withdrew, without having gratified our curiosity. When we were in Granada we attended the cathedral service in the afternoon. The ceremonial was conducted with great pomp and circumstance by twenty-one priests and assistants. I counted all the worshippers and they numbered but sixteen; but all seemed to be very sincere as frequently during the service I noticed that several of them leaned forward and kissed the pavement of the church.

The peasants of Valencia, who labor under the grateful shade of the palm, orange, and mulberry, dress in wide, brown linen drawers, or kilts, with some sort of leggins, and a handkerchief bound around the head, which makes them look like the Bedouins of the desert. The donkeys are the same meek, quiet, patient, unconcerned, perfect pictures of repose that you find everywhere in Spain. We passed one of these animals, however, the other day, and he actually stopped, turned half round, looked at the train as it passed by, and with some signs of emotion; but his brutal master could not permit him to gratify his curiosity even for a moment, without pounding his head and ears.

I have noticed in Spain that for some reason the women look more cheerful, healthy, and robust than the men. They promenade the streets in long dresses, or "street sweepers," and usually with no other covering for the head than a lace veil, and a light shawl or silk mantle thrown carelessly over their shoulders. The men have a cross, dyspeptic look, and wrap themselves up either in the folds of a cloak or shawl, with a woolen muffler tied about the neck and lower part of the face. They are usually inveterate smokers of strong cigars, or cigarettes made of paper and tobacco, which accounts for their bloodless, haggard, and listless appearance. The use of tobacco is so universal that boys, and even children, are often seen smoking in the streets. They pick up the stumps of cigars and convert them into cigarettes, which are certainly quite as cleanly as those that are made in the government tobacco factories.

The climate and soil of Spain are well suited to the growth of tobacco, but its cultivation is prohibited, as I was informed, chiefly with a view to benefit Cuba. Upwards of sixteen million pounds are smoked and snuffed annually, which affords a good idea of the baleful and subtle influence which has so much impaired the manhood of the Spanish race. Some satirist has said that real progress in Spain will not begin until a decree comes forth prohibiting the use of cloaks, knives, and cigarettes. There are, however, heavier clogs than these which drag down the people of Spain, and it will require several violent earthquakes in the social, moral, and religious element of the country before it can begin to regenerate.

The governing classes are unquestionably proud, haughty, and overbearing, destitute of sound principle, and unfit to rule. The next class are the governed, the honest, industrious, working, priest-ridden people, who are mere hewers of wood and drawers of water to the priests and the aristocracy. There is no middling class, as in France and Prussia, to energize the whole mass, and maintain a happy equilibrium between the legitimate powers of the government and the rights of the people. Spain was always financially poor, the slave of expediency, and never poorer than now; and unless something extraordinary turns up, and that very soon, the government will find it very difficult to control the elements which threaten its ruin.

A railway is now building, and is nearly completed, from Valencia to Barcelona, but about half way between the two cities it is necessary to diligence some three hours. Here we underwent another pressure, as every seat was taken, and no provision is made for persons above the ordinary size. However, we lived through it, but upon arriving at Tarragona we were an hour behind time again, and the Barcelona train had gone off and left us; therefore we had no other alternative but to look for lodgings, which we succeeded in finding in the top story of a hotel, where we found comfortable quarters and a very civil Italian landlord, who devoted himself to making our stay agreeable. We thought at one time that he intended to pay us something for stopping with him; but our minds were disabused on that point the next morning. We were glad, on the whole, of the break, as it enabled us to see by beautiful moonlight one of the oldest cities in Europe —Tarragona—founded by the Phenicians, colonized by the Carthegenians, captured by Scipio, and the birth place, it is said, of Pontius Pilate. The historian says it once contained a million of inhabitants; but most likely this referred to a province, and not to a city merely. There is abundant evidence, however, that it was a city of considerable magnificence under the Roman Emperor Augustus, who used to reside here in winter, as the climate was preferable to Rome. The church of San Pablo is so old that the Tarragonese declare that it was built by the Apostle Paul. The Cathedral is also very ancient. It is not known by whom or when it was built, but it is a lofty, noble building, and possesses a very elaborately decorated front, with niches for statues of the apostles and prophets, some of which have disappeared. Tradition says that at one period these niches were full; but that once in a hundred years one of these worthies, getting tired of the repose of the situation, quietly comes down and walks off. Noticing a procession of lighted candles passing into the cathedral, we followed on, and upon entering found that it was lighted up, and a few worshippers were kneeling around the altars. The lighted candles all vanished through "the long-drawn aisle and fretted vaults," and we were left to wonder and speculate upon its significance. Within these old churches there is often met an incongruous mixture of sacred and profane objects. The cloisters of the cathedral of Tarragona, among other curious things, have sculptures of cock fighting, battles between gladiators, and a very curious one that represents some mice solemnly bearing to the grave the remains of a cat, who pretends to be dead; but upon reaching the sepulchre puss throws off her incognito and is up and after her mourning friends, who fly in every direction before the ghastly form.

The road between Valencia and Barcelona passes through a very barren country, and for much of the distance in sight of the blue Mediterranean. The olive tree seems to be the chief dependence of the people in this section. It grows abundantly throughout all Southern Spain, and is much used as a substitute for butter and grease. The people make a dish called *migas*, which is a mixture of crumbs of bread fried in oil, salt and pepper. They also eat bread soaked in oil. Aliens do not usually hanker after these preparations.

Barcelona is the most interprising city in Spain. Its manufactures are very extensive; its excellent harbor is filled with vessels; its public buildings are large and usually fine; its streets are thronged with a busy, bustling people, and everywhere there are visible evidences that it is a city of progress.

It was here that Blasco de Garey launched his steam vessel of two hundred tuns, Jan. 17th, 1543. The records now in the royal archives at Simancas state that the experiment took place in the presence of a committee appointed by Charles V. and Philip II. The invention consisted of a large boiler, which moved by steam two wheels placed at the sides of the vessel. The experiment was a success, but for some reason the king's treasurer, who had conceived a personal spite against the inventor, drew up a report to his royal master, in which he stated that the speed did not exceed two leagues in three hours; that the machinery was complicated, and the boiler liable to burst. Charles V. was so much involved in political schemes that he could not examine the matter with any care, but he paid De Garey all his expenses, and made him a handsome present of money, when the whole thing ended, and the secret, whatever it was, died with the inventor. So runs the narrative.

A short ride of three hours by cars, brought us to Gerona, a strongly fortified place, which some wag has said belongs to Spain in time of peace, and to France in time of war. Here we were booked for a ten-hours diligence ride.

At the frontier, the Spanish official gruffly demanded our passports. Not supposing that they would be required, we had them locked up in our trunks. The conductor of the diligence assured the officer that we were Americans, not Catalonian revolutionists, and as it would make a good deal of trouble to unload the baggage, he hoped we might be permitted to pass on. After some parleying and growling, we were permitted to go on, soon to reach the French frontier and French civility. The officer approached us, touched his hat, and said, "Pardon, monsieur Have you passports?" We replied, "Yes; they are in our trunks." "Excuse me," he said, "of what country are you?" Our answer satisfied him, and we were civilly permitted to proceed, and happy to feel ourselves once more in France, prepared to take a more cheerful view of the condition of bodily life.

Forty days spent in Spain satisfies me that to the artist, the antiquarian, the ecclesiologists, the lover of architecture, and for the mere curiosity-hunter, it is a country of abounding interest. Even its timberless mountains, plains and valleys, and its waterless rivers, are curious to behold; but there is also a loneliness, an absence of homelike feeling, which soon becomes oppressive to those accustomed to the comforts of domestic life in our own country. It is said that even the birds forget their songs in old Spain.

S. H. W.

Aluminum for Mathematical Instruments.

MESSRS. EDITORS: In your issue of Vol. XVIII., page 3, I find an article suggesting the advantage of using aluminum, on account of its lightness, instead of brass or German silver, as material for mathematical and surveying instruments. Being a mathematical instrument maker, and knowing the great discomfort of carrying heavy instruments, I have often reflected upon reducing the weight of our usual instruments without impairing their accuracy and strength, but have never fully satisfied myself how it could be accomplished, as their construction is such that any further reduction of the material would be detrimental to the accuracy.

I agree with your correspondent of Helena that aluminum will not only fill the place of brass, but will in many respects be superior to it, and that all mathematical instruments should, if not wholly, be at least partially made of this metal, or of a compound containing it. Aluminum has already been used by Messrs. T. Cook & Sons, of York, England, for their astronomical instruments When I was there last year there were two large transit telescopes in process of construction, of which the heaviest parts were made of a compound of aluminum and copper, in order to reduce the weight of the telescopes (they being about seven feet long by an opening of the object glass of about six inches), there being no counterpoise, which is generally necessary in order to attain accuracy and an easy management. As at the present the cost of aluminum is too great for general use, until we discover a cheaper and more rapid process of extracting this metal, we must content ourselves by using a compound as above mentioned, which reduces the cost greatly and materially lessens the weight. The cost of working this metal will most probably be somewhat greater than that of brass, and as screws require great strength, in proportion to size, they should be made of German silver.

Aluminum has also proved of great advantage as a material for the smaller weights used in chemical analyses, on account of the greater difference in their sizes and consequent ease of handling.

If "Aluminist" desires to correspond on this subject of constructing instruments of this metal, I should be greatly pleased to answer any inquiry. L. BERGER.

Roxbury, Mass.

[It seems as though the attention of our chemists and practical metal workers might be profitably directed to the subject of a cheap and ready means of extracting aluminum. If procured cheaply it could be applied with great profit and advantage to various manufactures. The failures hitherto of compassing this object should not deter the enterprising and persistent inventor.—EDS.

Bessemer Steel Rails--Homogeneousness of Metals.

MESSRS. EDITORS:—Your notice of the London *Engineer's* article on steel rails, or more particularly, the breaking of the steel rails at the Camden and Chalk Farm stations, may possibly, unless explained, have a tendency to mislead such persons as are not acquainted with the properties of the two metals for railroad and other purposes. I am glad to find that you do not agree with the *Engineer* in its opinions of steel rails.

It seems to me that engineers think that it is a matter of impossibility to make inferior pneumatic steel. It is true, it is not so easy to make poor steel rails as it is to make poor iron rails, for we can box up in a pile an inferior material for rolling into iron rails. But with regard to steel rails there is no piling. The ingots are cast to suit the weight of rail or bar. It is true you can by the use of cast iron, contaminated with sulphur, phosphorus, and other destructive elements, produce an inferior quality of steel. You can also produce an inferior quality of steel by not thoroughly decarbonizing your iron, or by the use of an inferior carburizing material. But with the use of suitable materials, a skillful converter, and the Bessemer machinery, you can produce a homogeneous material with more economy and more certainty than by the old process. In fact I doubt very much if any of the commercial iron produced by the old process could be strictly called homogeneous. and you will, I think, admit that it is not so tough as pneumatic steel or iron, Chalk Farm rail notwithstanding.

Then if the iron is not homogeneous it must be heterogeneous, and a heterogeneous metal is a poor one for rails, for it is a law of physics that if two bodies impinging against each other are heterogeneous (or if one of them be so), the result will be electricity, and this electric current has a magnetic action in a direction cutting its own at right angles.

Then, Dufour says the tenacity of iron (homogeneous) is increased by the passage through it of an electric current. Thus, iron wire, 0·009248 m diameter, which sustained only 2,545 kil., held 2,898 kil. after the action of a current of Bunsen cell during 263 hours. This proves the assertion of Robert Mushet, Esq., that pneumatic steel, in all probability, will gain in toughness by exposure to the atmosphere and to the impact of locomotive wheels, and that the notion of their becoming brittle from the latter cause is a mere phantom of the imagination, in confirmation of which not a single valid argument or proof can be adduced. This is true, and with due respect to the editor of the *Engineer*, my opinion is that Mr. Mushet is a better authority on this subject than he is.

As you say, it is well understood that cold hammering will produce crystallization; but it is not proved that the iron acted on was homogeneous—on the contrary it is more than probable that it was heterogeneous. We have proof that there is no alteration in the molecular structure of homogeneous steel by impact, unless it is that improves its toughness.

When iron is broken with great rapidity there is no time allowed for the exercise of the property of ductility, and the fracture will naturally be crystalline. But if time is given for the metal to exercise this property of ductility the fracture will be fibrous. I have seen the wool drawn over the eyes of inspectors of railroad bars in this way. Take, for instance, two pieces of iron from the same bar, fibrous or otherwise; nick each of them where you want them broken; then bend one of them slowly round a sharp angle, and it will show a fibrous fracture; then let the other be broken short under a monkey, and you will find the fracture highly crystalline. If makers of iron rails who want to get a crystalline head and a fibrous flange from the same kind of iron would take the hint that this idea suggests to them in piling, they would improve the value of their rails very much. But then the day of iron rails is passed; no railroad company that consults its own interest will lay any more iron rails on their lines.

What did the fracture of the broken steel rail that the *Engineer* writes so much about prove? Did it prove it to be uniform in quality, or in other words, did it prove it to be homogeneous? Not at all. Then why, in the name of common sense, condemn steel rails because of the maker's fault? We are aware that some of the makers of iron rails, and especially those that do not feel like going to the expense of putting up pneumatic steel works, will do all they can to impede the progress of the pneumatic process in this country, and probably join issue with such of the English railroad capitalists and free traders as have a large number of puddling furnaces and its machinery in the shape of invested capital, that would of course depreciate in value should the process become more adopted. "Birds of a feather will flock together," as they say; but the day is passed to make a retrograde movement with regard to pneumatic steel in this country. It is all very well for those old fossils who would not read the handwriting on the wall a few years ago, and who have built works for the production of iron rails, to chuckle at this so-called failure of steel rails; but before it can be called a failure let us have some proof of it in such a way that it can be understood.

In view of the late frightful railroad accidents, the public demands that tough, homogeneous steel rails, steel tires, axles, etc., be used in the construction of railroad plant. Alteration of molecular structure by impact is a bugbear—a humbug. Impact improves the tenacity of homogeneous steel rails. And with the aid of this last beautiful invention of Mr. Saxby's of testing iron by magnetism, an imperfect bar can be detected at the mill and of course rejected, so that there need be nothing used but perfectly homogeneous bars, which will increase in toughness the longer they are in use. W. G. JR.

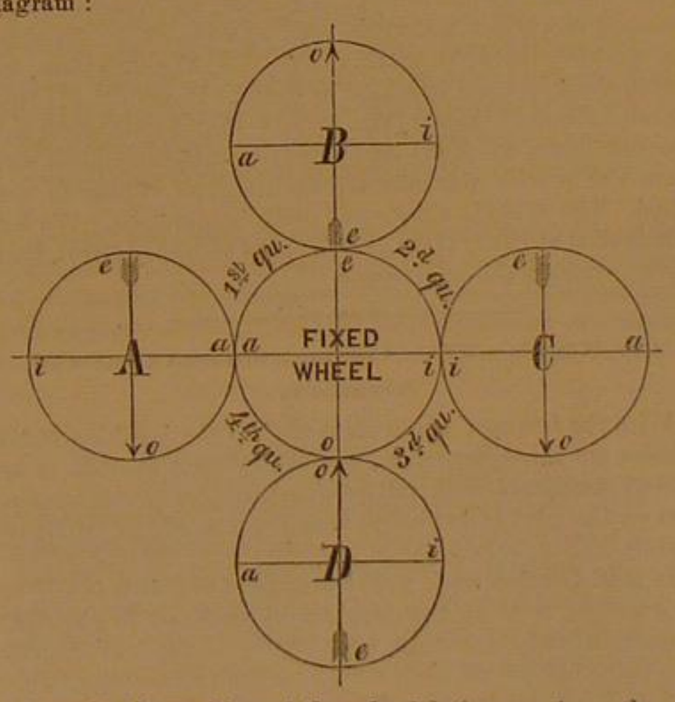
Pottsville, Pa.

Turning a Movable Wheel Around a Fixed Wheel.

MESSRS. H. M. T., Vol. XVI., page 347, inquires:—"How many revolutions, on its own axis, will a wheel make in rolling once around a fixed wheel of same size?" You answer "one."

D. S H., Vol. XVII., page 39 says "two." You dissent, and adhere to "one."

Now, premising the self-evident fact, that two diametrically opposite points on the periphery of a wheel cannot exchange places without a half revolution of the wheel, I think the question will be definitely solved by the showing of this diagram:



A marks the position of the wheel before moving—the opposite points on its periphery being shown by the arrow, now pointing *downward*. Roll the wheel over one quadrant of the fixed wheel, and it takes the position, B, the arrow pointing *upward*. The opposite points have exchanged places, therefore the wheel has made a half revolution. Rolling over the second quadrant brings it to the position, C, the arrow pointing *downward*. Here the points are again reversed, indicating another half-revolution, and the two halves constituting *one* complete revolution in rolling over *half* of the circumference of the fixed wheel. Rolling it over the remaining half will of course duplicate the above results. Therefore, the number of "revolutions, on its own axis, that a wheel will make in rolling once around a fixed wheel of same size," is *two*. Don't you think so? L. M.

Germantown, Phila.

[No, we don't think so! We still adhere to "one," and our correspondent, by his diagram, proves himself wrong. The true starting point is at *a a*, and by observing the several positions of *a*, in the diagram, it will be noticed that the moving wheel makes just one revolution in rolling around the fixed wheel.—EDS.

Raising Water Through Tubes.

MESSRS. EDITORS:—On page 387, Vol. XVII., SCIENTIFIC AMERICAN, your correspondent under the head of "Relative Size of Pump Barrels and Tubes," entertains and communicates erroneous ideas. He says, "1st, The pressure upon piston valves of different sizes in *sustaining* water at the same hight is in proportion to their areas." The pressure on any valve is just the same when in the pump at work as when out of the pump, that is, equal on all sides. As to the sustaining of a column of water in the feed pipe of a pump, all persons conversant with philosophy know it to be by atmospheric pressure on the surface of water from whence it is fed—not by any valve. This will also apply to his second statement.

"3d. The pressure upon valves generally must be in proportion to the products of their areas into the hights at which the water is sustained or raised, etc." Generally! why not always? The laws of nature are unyielding and inevitable. Again, "the greater the amount of friction of the water against its sides in delivering the same quantity of water, and the larger the pump, the greater the quantity of water required in the same time, which would also increase the friction, etc." The first statement is true, but the one following it is erroneous. If we take two pumps, one of double the area of cross section of the other, and the same length of stroke, and run the small one just twice the velocity of the large one, it will require the same amount of water and deliver it with no more ease. In the next place, it matters not how a vacuum is formed at the head of the pipe, the friction is limited by atmospheric pressure. The mechanism used in forming the vacuum at the top of a pump pipe has nothing whatever to do with the quantity of water passing through; the size of the pipe only can govern the quantity. If water be throttled by the incapacity of the feed pipe or the valve opening (which is quite as apt to be the case) so that the water does not follow the piston of a pump as fast as it travels, the speed of the pump should be reduced to the capacity of the supply, or the pipe or valve opening should be increased, as the case may need. A knowledge of natural philosophy with a little common sense to apply it will make all pump difficulties vanish.

A. K. SMITH.

Nebraska, Ohio.

Influence of Artificial Illumination on the Quality of the Air in Dwelling Houses.

MESSRS. EDITORS:—Carbonic acid gas is known to be very injurious to health, and it is, probably, the prevalent cause of bad air. This gas is constantly generated by the various contrivances for artificial light; but no experiments have until lately been made as to the value which this factor of the impurity of air may reach under different circumstances. Dumas states the important fact, that in gas illumination, both the consumption of oxygen and the production of carbonic acid is very considerable. In the *Journal for Biology*, of 1867, Dr. Zoch, a Hungarian chemist, communicates a series of determinations on the increase of carbonic acid in illuminating a room of a known capacity with gas, kerosene, and rape seed oil. Consumption of the lighting material, time, and intensity of light were self-evidently taken into account. In the following table the reader will find the increase of carbonic acid gas in the three modes of illumination calculated for the space of 100 cubic meters (131 cubic yards), and upon a lighting effect of 10 normal flames (1 normal candle = a stearin candle of ⅛ lb.), at the time of 1, 2, 3, and 4 hours.

Increase of C O_2 per thousand:

Burning Time.	Kerosene.	Street Gas.	Rape Seed Oil.
1h	0,929	0,708	0,537
2h	1,456	1,342	1,038
3h	1,779	1,513	1,190
4h	1,811	1,562	1,229

From this table it may be seen that rape seed oil illumination generates the smallest amount of carbonic acid gas, and and kerosene most. As this mode of illumination is not very general, it is of no great practical importance that kerosene contributes most to vitiate the air, but it is a very different affair with gas illumination. Who has not noticed of late years in the illumination, of the stores, theaters, concert, and political halls of our great cities the fact that each attempts to rival his neighbor in the glaring effect of gas light, but at the same time who has not also made the observation that the greater the light the greater the oppressiveness and vitiation of the atmosphere. It is certain that this sentiment of discomfort is partly to be attributed to the radiant heat emitted by the flames, but the carbonic acid gas is nevertheless to be considered as its chief cause. The normal amount of this gas in the atmosphere is 0·50 to 0·65 per thousand, and an amount of from 2·75 is only to be met with in hospitals, prisons, and garrisons, where the process of respiration of many individuals is going on.

Artificial Writing Slates and Blackboards.

MESSRS. EDITORS:—On page 391, Vol. XVII., a correspondent asks the best recipe for painting blackboards or plastered walls; allow me to communicate the recipe I prescribed for painting more than 2,000 square feet of blackboard on the plastered walls of the class rooms in the Cooper Institute in this city, when it was organized in 1859; and also several hundred square feet in Girard College, Philadelphia, when I was connected there, as it gave perfect satisfaction and is still used in these institutions.

I first have the place of the wall intended to be covered, surrounded by a narrow wooden molding, which may be covered by paint. Japan or varnish is necessary in the paint, as with benzine alone the lampblack rubs off; but as varnish makes the board too smooth to write on, I mix a little fine emery in it, to make it slightly gritty, like a slate; too much emery or a quality of too coarse a grade makes the removal of the chalk marks difficult. For the last purpose I take sheepskin with the wool on, nailed on a small piece of board and always used dry; it is much better than any thing else. From time to time, however, the whole blackboard is cleaned with a wet sponge. The best substance for fixing the common lampblack and emery, is shellac dissolved in alcohol; the quantities are regulated by the circumstances. In warm weather it requires more alcohol. Too much shellac makes the solution too thick; too little causes it to come off. It is to be put on with a flat brush as rapidly as possible, as it dries at once. The blackboard may be used in less than half an

hour after being coated. I never noticed the exact proportions used, but had it mixed, and tested it by putting a little on the wall, and added any of the necessary ingredients till it answered the purpose intended.

New York City. P. H. Vander Weyde, M. D.

Saws and their Capabilities.

Messrs. Editors:—In the Scientific American of November 2d, 1867, Mr. Emerson, in answer to some remarks made by Mr Lamar Foss, concerning the power necessary to cut lumber, says that one horse power will cut 1,000 feet of lumber in ten hours running. It appears to me that Mr. Emerson takes exception to a general rule; claiming to do that amount of work with nice, clear, soft, and picked timber. Such is not generally the case; a mill must cut good, bad, and indifferent, hard and soft timber; and I would have supposed that Mr. Emerson would have aimed at giving us a unit power, if I may say so, for cutting 1,000 feet of lumber in a given time, answering the wants of the country at large, instead of making it a sectional affair. The first statement made about that big saw was such that it would induce the reader to believe that fifty horse power would drive it four hundred revolutions in a minute, with six inches feed, through a cut forty-one inches deep. Such a thing is impossible. At that rate, 50,000 feet of lumber in ten hours, with such a speed and feed, would be a very poor day's work. If 50,000 feet of lumber is considered a good day's work, such a big saw is not necessary. I am now running a fifty inch saw, and can cut 50,000 feet of Oregon fir (Douglas pine) in ten hours. One filing lasts us from four to six hours. My rule for applying power to circular saws is the following, the result of experience:

Taking seven-eighths of an inch for maximum feed for each single tooth, and two horse power being the power necessary to drive such tooth through a bolt six inches in thickness, at the rate of 500 revolutions a minute, it would follow that if I wanted to run a saw at such a speed and feed through eighteen inches, using sixteen teeth, or two inches feed, I would have $16\times2\times3=96$ horse power, to be directly applied to the saw. If more or less feed is required, more or less power must be applied in proportion. From the foregoing rules, if the charge of applying power to that big saw was entrusted to me, and if it was really expected from me to run it with the feed and speed before mentioned, allowing only 36 inches cut, I would want $48\times2\times6=576\times4=460\frac{80}{100}$ horse power; and with suitable timber as regard to size and length, I would expect to cut over 200,000 feet of inch boards in ten hours, if the whole could be handled fast enough.

As a last remark, I would say that I believe, from my observations, that it requires fully three horse power to cut 1,000 feet of lumber in ten hours; two for the main saw, and one for the edger, that I have supposed to be at hand for the purpose. These conclusions come from trials made, where a dynamometer was used to ascertain the amount of the motive power, and the timber used was Oregon fir, which I suppose might be considered of average hardness as regards timber generally. It would be well for those engaged in manufacturing lumber to know rather than guess, and a few communications through your valuable paper, no matter how contradictory they might be, would not fail to throw more light on a subject that is yet not well understood. It would be well, if any communication is made, to have the motive power tested, and that on the saw mandrel. J. A. Lesourd.

Oak Point, Washington Territory.

Electrical Phenomenon.

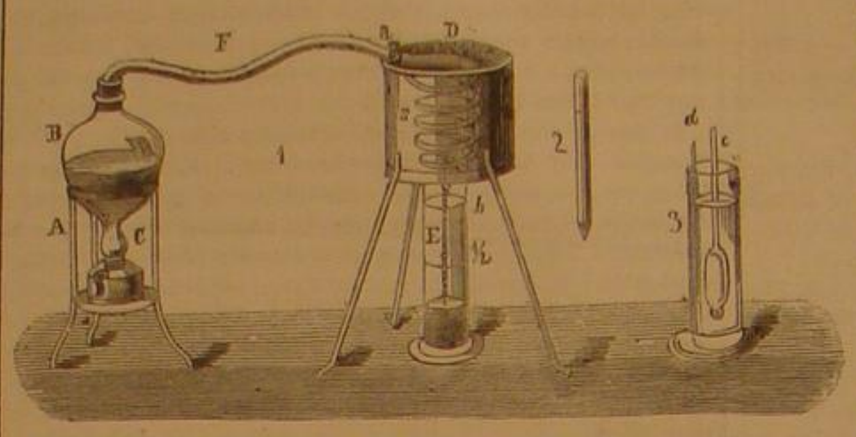
The Rochester *Union* says that one of the most beautiful electrical phenomena imaginable was lately witnessed in the office of the Atlantic and Pacific Telegraph Line. Wire No. 1 of this line was down between this city and Syracuse. Suddenly it was discovered that neither wire would work. A continuous current of electricity was then observed to be passing over the wires through the several instruments, and this while the batteries were detached. The current seemed to be of the volume of a medium-sized pipe stem, and it gave the several colors of the rainbow, beautiful to behold. With the key open, the current flowed in waves or undulations, and from the surcharged wire it would leap over the insulated portions of the key and flow along the wires beyond. The same phenomenon was observed at Buffalo and at Cleveland. The gas in the office here was lighted without difficulty by holding the end of a wire within an inch or two of the gas burner. The current was intense enough to shock one holding the wires or instruments—indeed, one of the employés of the office had his fingers scorched by the current. With closed keys the current was continuous, as before stated.

The theory advanced by an experienced electrician is this. The electrical equilibrium of the atmosphere had become disturbed by the sudden and extreme cold of the past two days—and we may say here that this phenomenon has never been witnessed except when cold weather prevails extensively—the electricity, instead of descending to the earth as in a thunder storm or in warm weather, ascends in the atmosphere, thus destroying the equilibrium and producing these magnificent displays. The broken wire spoken of, which rested on the ground, was the point of communication for the current from the earth. The electrician advances the theory that Aurora Borealis is produced from the same causes, and we submit that it is not an improbable theory. Every one has seen, undoubtedly, the wavy or undulating motions of the Aurora Borealis, and the wavy motions of the current last night with the batteries off and the key open were precisely the same.

Here we may notice one thing not generally known. A portion of the Irrepressible Conflict speech of Wm. H. Seward in this city, a few years since was telegraphed to New York and from Boston to Portland by the electrical influences of the Aurora Borealis—all the batteries on the line being detached. This feat, it is said, has never been repeated.

Apparatus for Determining the Amount of Alcohol in Fermented Liquors.

For the quantitative determination of alcohol in simple alcoholic mixtures the specific gravity plan is generally made use of. This method being based upon the difference which exists between the specific weights of the liquids, recommends itself for correctness and simplicity, and is therefore most applicable for practical use. For liquids, however, in which the alcohol is associated with several substances, this method cannot be employed, for the alcoholic strength bears no distinct relation to the specific gravity of the same. But as it is of great importance for wine and cider manufacturers, as well as for brewers and distillers, to be enabled to determine at any time, during and after the process of fermentation, the exact amount of alcohol of the respective liquids, a practical method for obtaining this end must be considered as of great value, and such appears to be the form



of apparatus first described in the "Chemistry of Wine," by Dr. F. Mohr, of Coblenz, Prussia, and represented in the annexed cut.

A brass frame, A, supports a glass reservoir, B, having a capacity for holding about seven liquid ounces. In the brass water receptacle, D, is a coil of cooling pipe, connected with the glass reservoir and terminating just above the cylinder, E.

To ascertain the proportion of alcohol in any liquor, the cylinder, E, is filled with it, full up to mark, *b*, and this entire quantity being emptied into receptacle, B, heat is applied beneath. Cooler, D, having been filled with cold water, the vapors conducted through pipe, F, are condensed, and drop into the cylinder, E.

The distillate having collected therein precisely up to mark, ½, the alcohol lamp is to be extinguished, and cold distilled water or rain water added thereto, up to mark, *b*. In order not to transgress said mark, the pipette, Fig. 2, is used, by which the water can be added by drops. If then the indications of the hydrometer (Fig. 3) and the thermometer are marked down, the tube accompanying the apparatus will show the precise alcoholic strength of the substance distilled. The table is simple and easily understood. We are informed that Henry Guth, optician, 104 Delancey street, New York, furnishes these apparatus.

Car Wheels---Their Composition and Causes of Breakage.

With the frequent accidents caused by the breaking of car wheels, we know, says the *American Railroad Journal*, of no subject connected with railways demanding greater attention on the part of engineers than the use of the strongest wheels.

In most treatises on iron, the texture of cast iron is said to be granular, it is in fact crystallized as found by chemical experiment and microscopic investigation. Crystals of gray iron being octahedral, their maximum limit when cubic, being $\frac{1}{15000}$ of an inch in linear dimension, and about $\frac{1}{2000000000}$ of a grain in weight; crystals in white or chilled iron are smaller, and most frequently occur in six sided prisms, sometimes connected in fascicles by their ends, at other by their sides, in a sort of stellated or radiated arrangement, as may be readily observed in a fragment from the tread of a chilled wheel.

The density of cast iron is from 7.1 to 7.5 of a porous nature, under hydraulic pressure water having been forced through four inches of metal. By remelting in an air furnace, its strength has been increased up to twelve meltings, though the same result has not been found with the cupola.

The purer the iron is from foreign particles the greater cohesion its crystals have with each other, which constitutes the difference between strong and weak irons. So great is its affinity for other substances, that its ores are seldom found pure, and as the foreign matters form the quality of the metal smelted from the ores, it is evident that each peculiarity of the ore is imparted to the iron made from it.

The best qualities of charcoal pig iron give, by analysis: Iron, 96,992 per cent; carbon, 2,800; silicon, 0,208, with traces of manganese and copper. The tensile strength of the pig, from 18,000 to 28,000 pounds per square inch. Remelted iron from 31,000 to 41,000 pounds.

Charcoal, the fuel with which the ores are smelted, when new and pure, consist of carbon 97 parts, ashes 3 parts. When old, carbon 85 parts, water 12 parts, ashes 3 parts. The best qualities of ores and the fuel show an entire freedom from either sulphur or phosphorus.

The effect of sulphur on iron is to cause brittleness at all temperatures, red shortness when hot, to such a degree that experiment has shown that even $\frac{1}{3000}$ of sulphur is enough to produce brittleness, and $\frac{1}{10000}$ red shortness.

Phosphorus imparts the quality of shortness at low temperatures, and there are but few irons in which a trace of this substance cannot be found. One per cent of phosphorus rendering iron to be of a very bad quality and of limited use.

In the manufacture of car wheels, the pig metal is melted with anthracite coal in the cupola. Anthracite coal contains carbon 88.50 parts, volatile matter 7.50 parts, ashes 4.00. Average specimens of white ash anthracite coal from Pennsylvania contains in 100 parts sulphur 0.91 per cent. All varieties of hard coal contain sulphur in a more or less degree, combined with iron in the form of iron pyrites, disseminated through the coal. Anthracite iron, or iron smelted with anthracite coal, from its want of strength owing to the sulphur and other impurities in it, is never used for car wheels.

Having noted the peculiarities of the best charcoal irons, and charcoal, as compared with anthracite iron and anthracite coal, it becomes a matter of much importance to inquire how far these elements effect the car wheels as generally supplied to railroad companies.

But few, if any, railroads would be willing to risk the use of car wheels made from anthracite iron, even if a proper chill could be put on them to insure wear. The general practice is to remelt the old car wheels with anthracite coal, using from one third to two thirds of new metal. With each remelting the affinity of the iron for foreign substances absorbs the sulphur from the coal, resulting, with each remelting of the old wheels, in a weaker iron, and thus the process goes on from year to year.

How near the mixture thus made, claimed to be pure charcoal iron, is the genuine article, can readily be conjectured; but with this process comes poor wheels, breakage, and loss of life.

Cast iron, when in constant vibration, as in a car wheel in use under express cars, soon wears out, or "become tired," the granular formation is disturbed by the repeated jar of continued motion, as is evident by the failure of wheels under express cars, with less mileage than wheels under cars or engines with frequent stops or long periods of rest.

Another great cause of breakage is due to the extreme pressure used in pushing the wheels upon the axle; a pressure of 10 to 12 tuns per wheel holding it fast, as well as 30 or 40 tuns as is frequently used, which strains the wheel, ending in a cracked wheel after a short time in use.

With a knowledge of these facts one year ago, an extensive car wheel works was established at Ramapo, N. Y., on the Erie railway, for the purpose of making wheels entirely of pure metal from the Richmond and Salisbury mines.

The Richmond iron, famous for ordnance—the United States Government having used not less than twelve thousand tuns for guns—and recently so successfully tried in the Rodman Gun trial at Shoeburyness, England, having a tensile strength of from 31,000 to 41,000 pounds per square inch, has proved itself to be one of the strongest of cast irons for guns.

To ascertain its relative strength in car wheels, experiments were made by the Pennsylvania Railroad Company, July 17th, 1867, in comparison with the wheels in use on this road as follows:

No.	Maker.	Size. in.	Weight. lbs.	*Blows on each wheel.			Total No. of blows.
1	Omitted	33	496	49	24	13	86
2	"	32	631	21	21	45	87
3	"	33	546	9	7	23	39
4	Ramapo	33	519	59	152	80	291
5	Omitted	33	549	36	28	—	64
6	"	32	513	51	43	—	94
7	"	33	510	20	9	12	41

* Each wheel was tested in three places, if not destroyed by previous blows.

By the first set of blows given, all of the wheels, with the exception of the Ramapo wheel, were entirely destroyed, the subsequent blows being given to test various portions of the remaining plates.

The Ramapo wheel, with each trial, was only dented or crushed in, and after many repeated blows on the rim, a portion was broken out to show the texture of the iron.

As to the wearing qualities of the Ramapo wheel, the Erie Railway Company report them equal to any in use. On the Morris and Essex railroad out of 700 wheels in constant use over nine months, with a constant load of 10 tuns per car, running 400 miles a week, but one wheel has failed, and that caused by accident. Similar results are reported from other roads using them. The cost is somewhat higher than the ordinary class of wheels, but the wear and great security amply repay it.

Action of Ozone on Sensitive Photographic Plates.

Dr. Emerson Reynolds stated before the Dublin Chemical and Philosophical Club that he had been performing some experiments upon the above subject, and that he had found that when the latent image (i. e., the image before it was developed) was submitted to the action of ozone it was completely obliterated—not only was it impossible to develop the image, but a second image might be retaken in the camera upon the same plate. The author remarked that this was against the theory which might be called the mechanical theory of photographic images, and proved conclusively that it was due to chemical change in the sensitive film. He also thought that many of the disputes in connection with the length of time dry plates might remain sensitive, was probably owing more or less to the quantity of ozone present in the air.

The ozone used in these experiments was in some cases procured by passing atmospheric air over phosphorus, and in others by the silent discharge, viz., by attaching one of the platinum wires of the reservoir to the prime conductor of a machine, and turning it slowly, the other wire being in communication with the ground.

HOUSEHOLD HINTS.

REMOVING CORKS FROM BOTTLES.—Sometimes a cork is pushed down into the bottle or vial which it is desirable to remove. A very effectual way to do it is to insert a strong twine in a loop and engage the cork in any direction most convenient. It can then be withdrawn by a "strong pull," the cork generally yielding sufficiently to pass through the neck.

LOOSENING GROUND GLASS STOPPLES.—Sometimes the ground glass stopples of bottles become, from one cause or another, fixed in the neck and cannot be removed by pulling or torsion. An effectual method is to wrap a rag wet with hot water around the neck and let it remain a few seconds. The heat will expand the neck of the bottle, when the stopple can be removed before the heat penetrates the stopple itself. Or, wind a string once or twice around the neck, and, holding the bottle between the knees, pull alternately on one and the other end, thus creating friction and consequently heat. Or a little camphene oil dropped between the neck and stopple of the bottle will often relieve the stopple.

SHARPENING LEAD PENCILS.—A narrow blade—a pen blade—should be used for this purpose, as the back of a wide blade is almost certain to break the lead point just before the point is finished. A little thought will readily show the reason of this.

REMOVING A TIGHT FINGER RING.—It is seldom necessary to file off a ring which is too tight to readily pass the joint of the finger. If the finger is swollen apply cold water to reduce the inflammation, then wrap a small rag wet in hot water around the ring to expand the metal, and soap the finger. A needle threaded with strong silk can then be passed between the ring and finger, and a person holding the two ends and pulling the silk while slowly sliding it around the periphery of the ring may readily remove the ring. If the ring is a plain hoop this process is easy; if it has a setting or protuberance more care will be required. Another method is to pass a piece of sewing silk under the ring and wind the thread, in pretty close spirals and snugly, around the finger to the end. Then take the lower end—that below the ring—and begin unwinding. The ring is certain to be removed unless the silk is very weak. The winding compresses the finger and renders the operation less difficult.

CRACKING GLASS BY SUDDEN HEATING.—Probably more articles of glass in daily use are broken by being suddenly heated than by blows or other acts of carelessness. Glass is a very poor conductor of heat, and when hot water is poured suddenly into a tumbler or goblet, it is almost certain to break unless the glass itself is quite warm. Tepid water should be first used, or a little cold water be poured into the glass on which the hot water may be drawn. Lamp chimneys frequently crack when placed upon the lighted lamp, especially if taken from a cold room. The proper remedy is to turn up the flame slowly or by degrees.

INJURY TO MARBLE AND VARNISHED ARTICLES.—Marble being a carbonate of lime and the two substances not having a very great affinity, care should be taken in the use of marble furniture and ornaments, as tables, mantels, statuary, etc. Acids of any kind will more or less affect marble, and they should not be allowed to touch it. The slabs on which acids are allowed to stand soon lose their polish and are liable to a degree of disintegration which impairs their beauty. Fruits, sauces, vinegar, etc., should not be allowed to come in contact with a marble-topped table or shelf. All varnishes used on woods are to a certain extent soluble in alcohol; therefore all liquids containing alcohol, as wines or spirit, should be kept from varnished furniture.

OIL STAINS IN MARBLE.—Stains in marble caused by oil can be removed by applying common clay saturated with benzine. If the grease has remained long enough it will have become acidulated and may injure the polish, but the stain will be removed.

Number of Useful Plants.

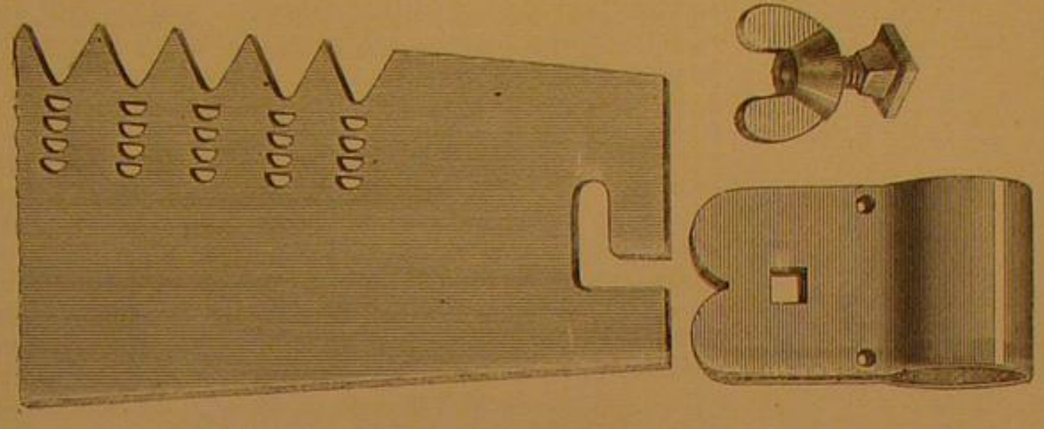
A German author states that the number of useful plants has risen to about 12,000, but that others will no doubt be discovered, as the researches yet made have been completed in only portions of the earth. Of these plants there are 1,350 varieties of edible fruits, berries, and seeds; 108 cereals, 37 onions; 460 vegetables and salads; 40 species of palms; 32 varieties of arrowroot, and 31 different kinds of sugars. Various drinks are obtained from 200 plants, and aromatics from 266. There are 50 substitutes for coffee, and 129 for tea. Tannin is present in 140 plants, caoutchouc in 96, gutta-percha in 7, rosin and balsamic gums in 387, wax in 10, and grease and essential oils in 330; 88 plants contain potash, soda, and iodine; 650 contain dyes, 47 soap, 260 weaving fibers; 44 fibers used in paper making; 48 give roofing materials, and 100 are employed for hurdles and copses. In building 740 plants are used, and there are 615 known poisonous plants. One of the most gratifying developments is, that out of 278 known natural families of plants, there are but 18 species for which no use has yet been discovered.

Cask-Boring Beetles.

Beer drinkers in India complain that the quality of the pale ale now sent out to them is inferior to that supplied a few years ago; and the importers are crying out loudly about the ravages of a beetle which eats holes in the casks and sets them leaking. Through and through, and up and down, and in all directions, this mischievous little borer makes its way into the staves until they become a mere honeycomb, held together by the hoops. In one of the casks, which was taken to pieces and examined, it was calculated that there were 134,000 perforations communicating with the outer surface, and long processions of beetles were found in the holes. No wonder that assistant commissary generals report a waste of beer by leakage of from twenty-five to fifty per cent. No one seems to know when the pest first appeared in India, but it had been complained of in Burmah before 1855. Since then it has been observed in other places, is equally destructive in all, and was last heard of at Secunderabad. Some people think the germ of the insect is in the wood before it leaves England; others, that it is a variety of the bamboo beetle, which effects a lodging in the casks during conveyance to depots. It can be killed and dislodged only by boiling water. Can none of our naturalists suggest a way of preserving the casks from attack.—*Athenæum.*

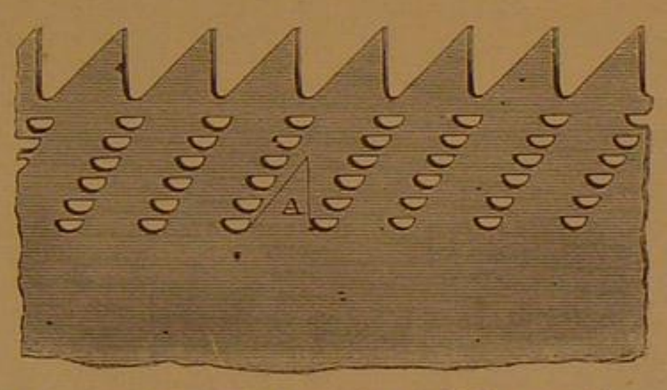
Improvement in Circular Saws.

The engravings present views of an improvement in saws which was patented through the Scientific American Patent

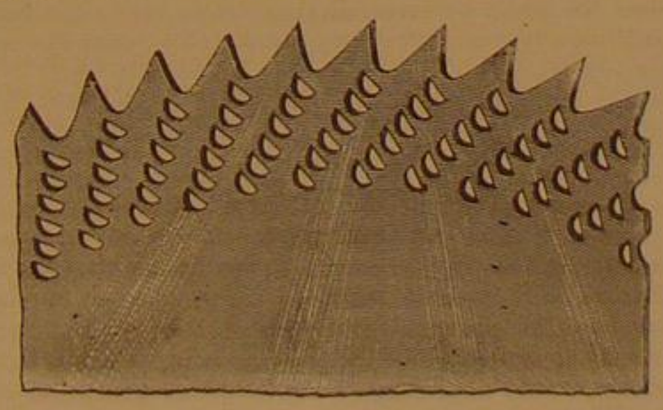


EMERSON'S PATENT PERFORATED SAW PLATES.

Agency in this country and Europe by J. E. Emerson, July 16, 1867. Its advantages will be apparent to practical sawyers from the following description: The engravings represent sections of long and circular saws showing the application of the improvement. The semi-circular perforations are intended to obviate the necessity of frequent gumming, as it is well known that three times gumming costs nearly the original price of the saw. In filing, the bottom or space between the teeth is frequently left in an angular form, tending to the rupture of the saw; but in these saws the bottom

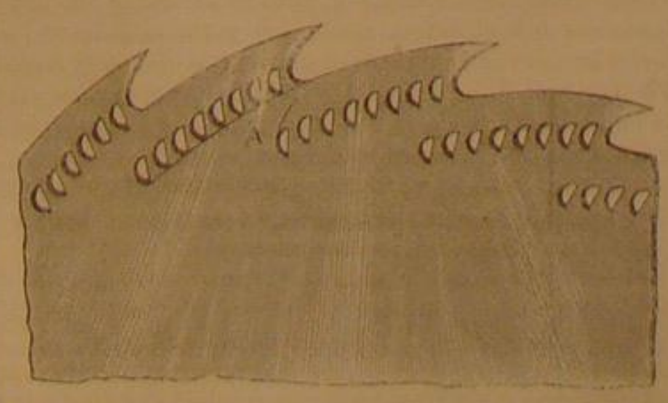


will be always of a semi-circular form, which serves the same purpose as a round hole drilled at the end of a crack, so often used to prevent the extension of the break. The aperture serves as an excellent guide in filing, and enables the workman to keep the teeth of an uniform size and shape and at a



relative distance apart. It will save files, as all practical sawyers know that the first part of a saw file that wears is the corner, which sometimes is entirely worn out before the face is one fourth worn.

In these saw plates the material left between the apertures is softer than the teeth, so it can be easily filed. In hardening—which is done by immersing the plate in a tank of oil—



the plates are cleaned off with sawdust, which is wiped from the surface with a piece of leather. The mixed oil, and sawdust lodges in the holes and when the plate is subjected to the drawing or tempering process this takes fire and by its combustion softens the edges of the holes while the teeth retain their proper temper. The number and position of the holes vary with the size and variety of the saws. By filing the underside of the tooth only, 1¼ inch of wear may be obtained in a splitting circular saw 16 inches in diameter, while the saw has been reduced only three fourths of an inch in diameter, cutting only three eighths of an inch less than when new. The lines, A A, show the shape of the teeth when filed to the last row of holes. These perforations tend greatly to prevent the saws from heating and aid in their cooling if by friction they become warm.

The larger engraving shows a method of attaching the handle socket for a cross-cut saw. It adds nothing to the cost and is exceedingly handy. Its operation is sufficiently plain without particular reference to the parts of the engraving. All communications should be addressed to the American Saw Company, No. 2 Jacob street, New York city.

Discovery of Roman Remains.

About the commencement of November a mere accident—the plowing up of the upper stone of a Roman mill—induced examination of a field situated on the glebe farm in the township of Amotherby and parish of Appleton-le-Street, with surprising results. The Rev. James Robertson, of Appleton, is the explorer, and this gentleman has up to the present time laid bare a series of large paved floors, varying from 6 inches to 2 feet 6 inches below the surface of the land. Beyond the fact that an occasional piece of Roman pottery was picked up in the soil, there was no indication of any remains in the field, and the present discoveries have, therefore, come upon the antiquarians in the neighborhood most unexpectedly. The place is very near the supposed junction of two great lines of Roman road—one from Derventio to Isurium, the other from Eboracum to Prætorium; of the former, the affix "in the street" marks the route, and the latter is defined by a line of small camps and the name "Roman-road." The field in question has been tried in various places, and the pavements have been found over a wide area. So far no trace of walls or foundations has been found; they are simply pavements. These are irregular in outline and varying in size, one being 150 feet across. Some are detached, while others have paved pathways as connections. The floors are paved with blocks of oolite limestone and sandstone (the latter mostly burnt quite dark in color) and sea pebbles, in some parts flat slabs of limestone being paved edgewise. The floors are not level, but fall off to the sides. Under the crown there is generally a deposit of ashes, charcoal, and burnt animal bones. Below this is a second pavement. All round the edges the burnt matter extends—a sort of breccia, which yields quantities of broken Roman pottery of various kinds—wheel-made and otherwise. Some bits of Samian ware have been found. The hand-made pottery is very rude. Singularly, nearly the whole of it—nine pieces in every ten, certainly—consists of the rims of various vessels. A few necks and handles of amphoræ have turned out. The major part of the pottery is found round the edges of the floors, and somewhat below their level. The teeth present are those of the ox, deer, hog, dog, and bones of birds. Nearly a complete skull of the wild boar was found. Two upper stones of mills (querns) have been found, several fragments of the nether millstones, but not a perfect one. Between the paving stones much Roman pottery has turned out. Of implements, none have been found of metal, but a remarkably fine red flint "scraper," a flint "drill," and some other flints have been picked up, with a "spindle whorl" of Samian pottery and another similarly formed (unpierced) of stone. Some scraps of iron—one half of a very small horseshoe, not grooved—have also been found. One illegible silver coin, and two small brass Roman coins of Constantine have been picked up. Several peculiarly rubbed sea pebbles and other stones, some grooved, have been found. The full examination of the field will occupy a length of time. The floors found are left bare for inspection. The excavations were suddenly stopped on Saturday by heavy rains, and the places cut out in the clay, in which the floors are, are now full of water, on which there is a thick cover of ice. The nature of the ground is such that the water will be retained for a long time, and it is thought no further digging can now take place till next summer.—*London Times.*

The American Mountain Railway.

Essentially the system of Dr. Fontaine's mountain railway was illustrated and described on page 197, Vol. XVI. We are now in receipt of a large diagram and descriptive pamphlet showing the embodiment of some improvements on the original plan. As now constructed an ordinary balloon is to furnish the ascensive and motive power; a platform midway between the passenger car and balloon is provided with wheels which run on an elevated inclined railroad provided with sets of double rails. The ascensive tendency of the balloon, being in part restrained by the rails, is resolved into two forces, one of which is perpendicular to the inclined plane, the other acting parallel to that plane; the former causes the wheels to adhere to the upper rails, the latter drawing the elevator upward obliquely. When the summit is reached, water is pumped into a compartment of the car and the extra weight causes the balloon to gradually descend. The action of the wind upon the balloon is counterbalanced by the weight of the cars which by their traction act as counterpoises, and conjointly with the buoyancy of the balloons, prevent the bending of the elevators on their axes. The advantages claimed by the inventor over the Fell or other mountain railways, are safety, a high rate of speed, cheapness of construction, and the superiority of an elevated over surface roads during the winter months.

USE OF SCREW PLATES---TEMPERING SAWS FOR MACHINISTS' USE.

Screw plates and screw dies are often ruined by being used upon iron and steel rough from the forge, and covered with scales, which from their hard, gritty nature, grind away the threads. In all cases the rough scale should be removed from the iron or steel, either by the turning tool, file, or grinding stone, previous to screwing it with the screw plate or the dies. It is not an uncommon practice with some workmen, after they have finished forging a piece of iron work, and while the iron is at a red heat, to immerse it in water and partly cool it, with a view of giving the work a cleaner appearance; but this is a very bad custom, especially when the forging requires to be screwed. It very often happens that the iron contains veins of steel, which harden by immersion; and, though the metal may not be so hard as to prevent its being cut with a hard turning tool, still, when it comes to be screwed with the stocks and dies, or with the dies belonging to the screwing machine, or with the screw plates (which tools are always less hard than the turning tools), it will spoil the dies or the screw plates; and because this hard place or places do not happen to be detected when turning the work (on account of using a very hard tool), the steel the dies or screw plate is made of will be thought bad, or badly tempered. The fact is, the work should always be annealed rather than hardened. In all cases when an impure iron is made use of for forgings, and which will subsequently require to be screwed, either with the screw dies or the screw plate, or which may require to be cut with circular cutters or with circular saws, the forgings should always be annealed previous to leaving the smithy. The forgings, of course, will be the better for being annealed, supposing they are to be screwed with the screw tools belonging to the turning lathe; though it is not of so much importance as when they are to be screwed with the dies, or the screw plate, or cut with circular cutters, or circular saws, because the screw tools belonging to the turning-lathe can be ground again, provided they chip from being very hard; whereas, the generality of screw dies, screw-plates, and circular cutters, and even circular saws, when very hard, and once spoilt, will not admit of being again sharpened, but will be practically useless, until they have been annealed, and cut up again, and subsequently hardened. Annealing makes the iron more uniform in temper, and will save much subsequent trouble; it will greatly facilitate the work when fiting it up.

When it is required to harden a large quantity of stout circular saws at once (for cutting metals), they may be enclosed in a sheet-iron case, or box; they will require to be surrounded on all sides with either wood or animal charcoal. Sufficient space, of course, must be left every way for the expansion of the saws; otherwise they will become buckled in heating. After the saws are inclosed and the box luted with clay or loam, the whole may be placed in a suitable furnace or hollow fire and the saws heated to a cherry-red heat (the fire of course must not be urged.) As soon as the whole arrive at the proper uniform temperature, the box must be drawn towards the mouth of the fire, the lid taken off and the saws taken out separately. They may either be taken out of the box with the pliers or by a small rod of iron, having a small hook turned upon one end of it. The saws will require to be immersed edgeways in a trough containing water, the surface of which must be covered with a film of oil. The oil will float of itself upon the surface of the water and burn upon the saw as it passes through it. The burnt oil forms a coating of coal upon the saw, which protects it from the direct action of the water, and lessens the risk of fracture.

Though saws are the better for being inclosed in a box and surrounded with charcoal when heating them, still, when a single saw is required to be hardened in a hurry, it will be more expeditious to place it upon a piece of cold sheet-iron, and then to heat the iron and the saw in the midst of the ignited fuel of a hollow fire; and when it arrives at the proper temperature, it must be taken off the plate and immersed in the hardening fluid. By placing the saw upon a piece of cold sheet-iron, it causes the heat to be very slowly applied, and it has a tendency to prevent the saw buckling in heating. Oil alone, or oil in which tallow has been dissolved, is sufficient to give the thinnest kinds of saws a sufficient degree of hardness; but those of a medium thickness are the better for being hardened in solid tallow (the saws may be placed separately between two flat lumps of tallow). Tallow differs from oil in the absorption of heat for its fusion; consequently, a more considerable degree of hardness is given to the steel by the tallow than by the oil; besides, it hardens the steel to a greater depth than oil. Very thin blades of steel may be made sufficiently hard for some purposes by heating the blades to a red heat and then placing them between two heavy surface plates; the surface plates will be better if they be smeared with tallow, previous to putting the blade between them. When the saws are removed from the hardening trough, they are generally brittle and warped; consequently, they will require to be tempered and hammered flat. The tempering may be performed in a variety of ways, depending of course upon the size, shape, and quantity. Circular saws, which are required for sawing hard substances (such as iron or steel), and which have a round spindle hole, about one inch in diameter in them, will require to be tempered to a light straw color. These may be tempered by first brightening their surfaces, and then placing them upon a piece of hot iron. The piece of iron which will be required for tempering these kinds of saws may be made by the following method. Take a piece of round bar iron, one inch in diameter and eight or nine inches in length; heat one end of it and hammer it so as to make it fit into the small square hole in the anvil; at the opposite end of this piece of iron and at about two inches from the extreme end, weld a moderate sized iron collar; the collar should be made of half round iron, so that it will, after it is welded upon the piece of round bar, form a large lump, the shape of a round ball. The object of this large lump is to retain the heat for a considerable time, so that several of the saws may be tempered before the iron will require to be reheated. If two of these lumps were made, one of them could be in the fire becoming heated, whilst the other lump is being used; so that, if it were necessary, a continuance of the process may be kept up. The object of having this lump the shape of a round ball, is that it may not supply the heat too suddenly to the saw. If this lump was made flat, it would supply the heat too suddenly, unless it was used at a very low temperature; it is evident it would not then temper more than one or two of the saws before it would require to be reheated. The object of having this round lump welded upon a piece of round bar, is for the convenience of keeping the lump in position upon the anvil, and to prevent the operator from always being in a stooping position when tempering the saws. The iron being finished, it is now ready to be heated for tempering the saws. The large lump will require to be heated to a red heat, after which the opposite end of the iron must be placed in the hole in the anvil. The saws may now be placed (one at a time) upon the lump; a slow rotary motion must be given to the saw, by the use of a small stick of wood, in order to equalize the heat. The end of the round bar at the top of the lump will help to supply heat and keep the saw in position whilst it is being turned round upon the lump. As soon as a light straw color appears upon the saw, it must be taken off the iron and cooled, either in water or oil; or, if the heat has not been too suddenly applied, the saw may be allowed to cool in the air of its own accord. These kinds of small circular saws are generally, after hardening, convex on one side and concave on the other. This imperfection is owing to the outer part of the saw becoming too small to contain the central part. When the practice of securing the saws upon the spindle by circular plates screwed firmly against each side is adopted, a small degree of regular convexity is not very detrimental, because the plates bring the saw straight; but, when they are convex in a greater degree they will require to be slightly hammered. The outer part of the saw is the part which requires to be hammered, in order to expand the outer part and bring the middle flat.

These kinds of saws may be tempered, and the trouble of brightening their surfaces spared, by smearing them with oil or tallow and holding them one at a time over a slow clear fire until the oil or tallow begins to smoke, after which the saw must be immersed in oil and partly cooled; it must then be held over the fire a second time, until the oil again begins to smoke. If the saw is immersed in the oil and held over the fire a third time, it will ensure a more regular degree of temper. Care must be taken each time the saw is heated not to raise the temperature beyond that which is necessary to cause the oil to smoke; otherwise the saw will become too soft for the purpose it is intended for—namely, cutting hard substances. By this method the saws acquire the same temper as that which they acquire when tempered to a straw color. A large quantity of these kinds of saws may be tempered more expeditiously by threading them upon a piece of iron wire, and then placing them in a proper vessel with as much oil or tallow as will cover them (the wire is for convenience in lifting the saws out of the vessel), and then to place the whole over a small clear fire, or over a gas flame, until the oil or tallow begins to smoke, after which the saws must be taken out. They may then be cooled in water or oil, or they may be allowed to become cool in the air. This indicates the same temper as that called a straw color.—*Ede.*

Preserving Fresh Flowers.

Flowers may be kept in pretty fair condition, say for a week or ten days, according to the species selected for bouquets and the time of the year, by renewing the water every alternate day, and while doing so rejecting decayed flowers and leaves, and taking care to cut off from the stems immersed in water, with a sharp pair of scissors, about from a quarter to half inch of the length; then should be added to the water about a pinch of salt, and a few grains of saltpetre for every pint of fluid; when flowers are very much faded they may be revived by immersion of the stems for two or three minutes in hot water, or better yet in strong spirits of wine, or Eau de Cologne; in some cases liquid ammonia may be advantageously applied to the stems for a few minutes to revive flowers. These recommendations are applied by several of the largest horticulturists of Ghent and other parts of Belgium, and found to answer in practice very well if properly applied. To keep well, flowers should not, after being cut, be placed in localities where there is tobacco-smoke, or bad ventilation, neither should the rooms be too much heated.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

There are ten marble quarries now in successful operation in West Rutland, Vt., and three others in process of development. The entire thickness of the stone in these quarries is nearly fifty feet, and it is so stratified that it can be easily worked in separate layers, ranging from two to six feet in thickness. Successive stratas frequently present a great variety, both in color and quality, from purest white, the marble so valued by sculptors, to the coarsest of colored rocks, the best often lying in close proximity to the poorest.

One of the last and most important events of the year 1867, was the completion of unbroken communication between this city and the Rocky Mountains. A temporary railway bridge thrown across the Missouri railway at Omaha, was the last link of this line constructed.

A gentleman of San Francisco has made arrangements with European capitalists to introduce the cultivation, on a large scale, of the sugar beet, and to establish factories for the production of raw sugar therefrom, in California. The capitalists have agreed to invest $1,500,000 in the enterprise, and to import six or seven hundred skilled laborers. The California beets, it is said, will yield two per cent more sugar than those of France, and as the industry is now so profitable in the latter country, the prospect is encouraging for its growth in the Golden State.

Prof. Whitney reports that of the sixty-four elementary substances existing in nature, so far as known to chemists, there are but thirty-six which have yet been proven to occur in California in mineral combination, and twenty-three elements are wanting on the Pacific coast. Of these, a few are extremely rare, such as didymium, erbium, lanthanum, thorium, but the absence of others is surprising. Fluorine, a substance of very general distribution, in its most abundant source, fluor spar, seems entirely wanting in California, although it may yet be discovered in the micas. Taking the whole Pacific coast, from British Columbia to Chili, the following facts appear. The paucity of species, considering the extent of region as compared with other parts of the world; the remarkable absence of prominent silicates, especially of the zeolites; the wide spread of the precious metals; the abundance of copper ores, and comparative absence of tin and lead; the similarity in the mineralized condition of the silver; the absence as vein stone of fluor; no mineral species peculiar to the coast.

In the United States, at the beginning of the year 1868 there are now, 38,821.81 miles of railway built and actually operated. The aggregate cost of construction has been $1,690,460,809. Pennsylvania has the greatest number of miles in operation, viz., 4,252.19; Ohio ranks next, with 3,397.84 miles; then Illinois, 3,224.49 miles. Oregon has 19.50 miles. The cost of construction for each mile has been greater in New Jersey than in any other of the States, and in California next, being for the former, $70,857; for the latter, $70,824.

The Tucker Manufacturing Company, in Boston, is the originator of a process for bronzing castings, which possess the color and the true aspect of cast bronze, without being galvanized, or covered with an alloy, as ordinarily done. The process consists in coating the articles to be colored with a very thin layer of some vegetable oil, and exposing them to a temperate heat. The oil, on being decomposed, combines with the film of oxide formed on the surface of the metal, thus yielding that peculiar color of bronzed iron. The temperature to which the castings are brought is not so high as to carbonize the fatty matter; it only reaches that point at which the metal for itself is getting blue. The brown layer thus obtained is said to be as durable and protective as that resulting by the method hitherto practised; at least, the process met with great appreciation in Paris.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

Pocket Grain Tester.—B. Martin, Prairie du Chien, Wis.—The object of this invention is to obtain a neat and light instrument by which the relative weight of grain, as compared with its bulk, may be readily ascertained, and which can be made so small as to be conveniently carried in the pocket.

Hand Roll and Twisting Machine.—R. Moxley, Muscatine, Iowa.—This invention consists in a new and more simple and compact arrangement of the parts of a hand roll and twisting machine, by which labor is saved, and the machine more easily operated than heretofore.

Printing Machine.—James McDermott, Frederick, Md.—This is a hand printing apparatus. The type is held in a curved bed, or turtle, and the inking roller has a corresponding shape. The type are made of India rubber, and are retained in their places by the flanges of the adjustable spacing bars, which rest upon the base piece of each letter. At the end of the bed piece is an inking apparatus, consisting of reservoirs of ink of divers colors, if required, with mouths from which it exudes on to the roller.

Cork Extractor.—James Morton, Philadelphia, Pa.—This invention relates to a new device for extracting the cork-screw, with the cork, from the neck of a bottle, and consists of three bars, of which one has a socket or cap fitted to its lower end, to be placed upon and around the upper end of the bottle.

Fountain Inkstand.—N. Gray Bartlett, Keokuk, Iowa.—This improvement is intended to remedy a defect in ordinary fountain inkstands, and consists in the employment of an overflow chamber, so disposed in the inkstand that its bottom or floor stands slightly above the floor of the duct leading from the reservoir to the pen orifice or fountain tube.

Boxed Hone.—Joseph Potter and Olif Abell, Whitehall, N. Y.—This invention consists in encasing the hone, or whetstone, or other grinding material, in a wooden or other box, in such a manner that its grinding surface projects above the box, and so that it cannot fall out or be easily removed from the box, and in providing a cover for the said box, whereby the grinding surface of the hone may be protected from injury.

Change Gate.—John B. Slawson, New York city.—This invention relates to a gate to be arranged in the doors or walls of railroad cars, stages, and other public vehicles, said gate being so arranged that it can be opened on either side, and that it will at once close itself when released, the gate being connected with a bell, which will be struck whenever the gate is opened.

Cultivator.—A. Bennett, Rockford, Ill.—This invention relates to an improvement in corn cultivators, and consists in the combination and arrangement of a sulky frame mounted on two wheels, and double plow beams attached thereto, for the shovels to work on both sides of a row of corn, in such a manner as to be entirely under the control of the driver in his seat.

Mechanical Movement.—Ephraim Soper, New York city.—This invention relates to a new manner of arranging the cranks of machinery, and consists in fitting gear wheels to the crank, so as to obtain from a stationary pinion, mounted on the wrist pin, additional revolutions or parts of revolutions for the shaft.

Device for Raising Casks, Barrels, etc.—Robert Smith, Brooklyn, N. Y.—This invention relates to a device by which casks, barrels, and other similar articles can be easily transported up or down stairs or steps, and also on level ground, and consists chiefly in the use of a frame, which is provided with a series of wheels on its under side. These wheels are arranged in rows in such a manner that when the frame is drawn up steps one wheel will always be on the edge of a step, and the device can thus be drawn up stairs with ease.

Coffee Mill.—W. J. Lane, Washington, N. Y.—This invention relates to a new and useful improvement in that class of coffee mills which are fitted in the upper part of a box provided with a drawer and arranged like an ordinary hand mill for grinding spice. The invention consists in the application of a flange to the lever part of the mill for the purpose of giving a downward direction to the ground coffee and preventing it from flying about or being scattered in its discharge from the mill, a contingency attended with considerable annoyance as the ground coffee finds its way between the sides of the drawer and box and every time the drawer is withdrawn from the box the latter requires to be cleaned thoroughly in order to avoid waste and to admit of the ready insertion of the drawer.

Stamp Mill for Crushing Quartz.—George B. Mitchell, Nevada, Colorado.—The chief difficulty attending the operation of stamp mills for crushing quartz consists in the wearing of the stems and the lower boxes of the same, a result due to the adhesion of pulverized rock or quartz to the stems and the introduction of the pulverized rock or quartz into the boxes by the elevation or upward movement of the stems. This invention fully obviates this difficulty and it consists in introducing into the lower boxes of the stems water from a supply pipe and in such a manner as to keep the stems perfectly clear or free from the pulverized quartz and also keep the stems in a perfectly lubricated state.

Reaping and Mowing Machine.—D. S. Fisher, Cedar Spring, Ind.—This invention relates to a new and improved reaping and mowing machine of that class in which the sickle or sickles are driven by a cam and lever in lieu of the ordinary crank and connecting rod. The invention consists in a peculiar construction of the sickle, driving apparatus, grain-discharging device and adjustable wheels on the main frame, whereby a very superior reaper and mower of the class specified is obtained.

Eye Glasses and Spectacles.—J. J. Bausch, Rochester, N. Y.—This invention consists in constructing and arranging eye glasses or spectacles in such a manner that the two parts which contain the lenses may be adjusted

in such relation to each other and to the eyes of the wearer that the lenses when the eye glasses or spectacles are adjusted on the nose, will have a proper relative position with the eyes.

COMBINED GRAIN DRILL, ROLLER AND PLANTER.—T. S. Mills, Kendleville, Ind.—This invention relates to a new and improved combined grain drill, roller and planter, and consists in a novel construction and arrangement of the parts, whereby several advantages are obtained over other similar combined implements now in use.

BERRY BOX.—Truman Mabbett, Jr., Vineland, N. J.—This invention is designed to supersede the small baskets and boxes now used for conveying berries and small fruit to market. The invention consists in a novel construction of the box, whereby the berries are effectually prevented from being bruised or injured in their transit from place to place, a free circulation of air allowed therein when a series of boxes are packed within a case and the boxes rendered capable of being manufactured at a very moderate cost.

MACHINE FOR POINTING PICKETS.—W. W. Johnson, Nashville, Tenn.—The object of this invention is to point the ends of pickets or fence palings and cut circular sides or edges on other wood work.

HORSE COLLAR.—Thomas Moore, New York city.—This invention relates to an improvement in the construction of horse collars.

ANIMAL TRAP.—James P. Wizal, Henderson, Ky.—This invention has for its object to furnish an improved self setting animal trap which shall be simple in construction, convenient, and effective in operation and not liable to get out of order.

ATTACHMENT FOR HARNESSES.—W. W. Beebe, Dubuque, Iowa.—This invention relates to an attachment for either single or double harnesses, the object of which is to overcome and cure in a horse all inclination to be balky when driven, whether such horse is in single or double harness.

IRON FOR HARNESS PADS.—Heber R. Ridgley, Mansfield, Ohio.—This invention relates to an improved method of forming the frame iron of harness pads, and the attaching of the pad thereto.

GATE.—Ralf Adams, Ottawa, Ill.—This invention is a gate which can be opened from a vehicle or the saddle. It has a rack operated by levers, the rack engaging with a pinion on the bottom of the post of the gate, with other devices perfecting the whole mechanism.

MOVABLE BARREL STAND.—P. J. Skinner, Oswego, N. Y.—This invention, as its name imports, is a movable barrel stand for use in groceries or liquor stores where many barrels are employed and set in rows.

WORM FENCES AND PENS.—John Will, Bryan, Ohio.—This invention relates to an improvement in worm fences, and consists in a fence divided into panels or sections, composed of rails or boards bolted together by upright cleats and having notches at either end, the notches at one end being on the under part of each board and fitting into notches between two cleats on the upper part of the boards of the adjoining panel.

CHURN.—A. J. Heavner, Time, Ill.—This invention relates to an improvement in churns, and consists in a dasher constructed in two parts, one part working within the other, the two dashers being operated by two cranks working simultaneously.

SAFETY PLUG FOR BOILERS.—T. G. Eiswald, Providence, R.I.—This invention consists of small fusible plugs placed at the low water level of boilers, and provided against being prematurely blown out by being located in conical seats. When the water level passes below the plugs they are melted out, and thus announce the state of the water.

CARPET STRETCHER.—Alexander L. Dunbar, Sheldon, Ill.—This invention relates to a novel and useful implement or device for stretching carpets when to be laid or put down by tacking or otherwise, upon floors, which implement is so constructed that it can be applied to the carpet, and suitably operated to stretch it and there hold it.

COMBINED CATHETER AND SYRINGE.—Dr. N. B. Sornborger, Northampton, Mass.—The combined catheter and syringe embraced in this invention is provided with a collar on its body or cylinder, susceptible of adjustment at will, and thus through a stem or rod connecting it with a collar arranged to slide upon the discharge tube or passage of the syringe.

BAGGAGE CHECK.—Edward Flather, Bridgeport, Conn.—This invention relates to an improved baggage check, and consists of a slotted arm or bar revolving on a screw set in a circular disk on which the names of various places or numbers are marked. The name of the place desired to be indicated is seen through the slot in the arm which is secured in place by a pin attached to the arm and fitting into a hole in the disk. Or the required number may be indicated by the pin being set into the hole opposite thereto.

IMPROVEMENT IN GATES.—Lewis Essig, Clinton, Ohio.—This invention relates to a new and improved method of hanging and operating the gates of farms, plantations, &c., whereby the same are easily opened by a rider, without alighting for that purpose.

IMPROVED AIR CONDENSER.—H. J. Bailey, Pittsburgh, Pa.—This invention relates to a new and improved apparatus for condensing air for various purposes, but more particularly for forcing liquids; and the invention consists in an arrangement of vessels, which communicate with each other by pipes or tubes—such communication being controlled by valves or cocks, which are operated by floats and governed by hydraulic pressure, whereby the apparatus is made automatic or self acting.

IMPROVED ANNEALING FURNACE.—W. R. Thomas, Catasauqua, Pa.—This invention consists in the construction of a furnace for annealing car wheels whereby the hubs of the said wheels may be raised to a high temperature without injury to the hardened or chilled rim or tread of the wheel; and also in placing rings of metal between the wheels, as they are placed in the furnace for the protection of the rims.

IMPROVEMENT IN WATER WHEELS.—William Snodgrass, Cold Spring, Wis.—This invention is to so construct a water wheel that the full or nearly the full per centage of power may be obtained, which is due from water under a given head; and the invention consists in providing for a free escape of air from the buckets or floats, and in bringing the full pressure of the water to act upon a given point of the wheel, in a manner similar to the action of water on the piston of a water engine.

IMPROVED ARGAND GAS BURNER.—George Mooney, Providence, R. I.—This improvement relates to the manner in which the burner is formed, and to the method of regulating the flow of the gas; and the invention consists firstly, in forming the burner of one piece of metal; secondly, in forming the gas jet apertures without drilling, and thirdly, checking and regulating the flow of gas by a screw.

IMPROVEMENT IN CRUTCHES.—James C. Rhodes, Stillwater, Minn.—This invention relates to a new and improved device for preventing the end of a crutch from slipping on ice or other slipping places; and it consists in arranging an adjustable spur or point in the end of the crutch.

IMPROVEMENT IN CULTIVATORS.—James B. Sexton, Pella, Iowa.—This invention has for its object to furnish a simple, cheap, convenient and durable cultivator.

INSTRUMENT FOR DRAWING AN ELIPSE.—Franklin Bowly, Winchester, Va.—This invention relates to an improved instrument for describing elipses of various diameters, and consists in a marking rod, on which is a graduated scale for fixing the major and minor diameters of the elipse to be described, which marking rod is connected with two sliding rods that govern its elliptical motion around a common center pin.

BLOCKS OR SUPPORTS FOR THE KEEL AND BILGE TO VESSELS IN DOCKS.—Joseph T. Parlour, Brooklyn, N. Y.—This invention more particularly relates to a block for supporting a vessel by its keel or bilge when laid up in a dock for repairs, which block is made in parts or sections for adjustment, either in a higher or lower plane, as may be desired.

MANUFACTURE OF PENS.—Edwin Wiley, Brooklyn, N. Y.—The present invention relates to that class of pens commonly known as the "Union Pens," and which are made with their nib of gold, and their heel or body of silver or other inferior metal.

CORN HUSKING MACHINE.—H. W. Knowlton, Saratoga Springs, N. Y.—This invention relates to a new and improved machine for stripping Indian corn from the stalks, and taking the husks from the ears. The invention consists of a pair of stripping rollers, one of which is armed with stripping blades, in connection with a series of husking aprons arranged to work over rollers, whereby the ears of corn may be broken or detached from the stalks, and the husks removed from the detached ears with the greatest facility.

STREAM OR RIVER FENCE.—H. A. Kephart, Fletcher, O.—This invention relates to a new fence to be placed across rivers and streams. The invention consists in a novel construction and arrangement of parts whereby due provision is made against the passage of cattle or animals around the ends of the fence when the stream or river is low, and provision also made for the passage of drift wood over the fence without the liability of the same being injured thereby. The invention also consists in a novel construction and application of the fence at the central or deep part of the river or stream whereby said portion of the fence may be readily put up or adjusted, and not be liable to be injured by drift wood or floods.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisemets at $1 00 a line, under the head of "Business and Personal."

☞ *All references to back numbers should be by volume and page.*

J. G., of Canada.—The oil used by woolen manufacturers is either that known as gallipoli, an inferior sort of olive oil, or palm oil, neither of which are very expensive.

J. A. G., of Pa.—We do not know of any chemical which could be mixed with light varnish to make paper water proof. The ordinary varnish to coat maps, however, which you probably require is prepared by pulverizing 1 oz. sandarac, ¼ oz. mastic, ¼ oz. elemi, dissolving them in ½ oz. of venet. turpentine, and adding to it a solution of 1 oz. shellac and 3 oz. oil of lavender in 12 oz. alcohol.

J. B., of Ky.—In reply to your inquiry as to the manufacture of crucibles, you will find in one of the first numbers of this journal of 1867, in an article, "Plumbago and its use," some remarks on the manufacture of plumbago melting pots which perhaps may be useful to you.

G. A. H., of N. Y.—The difficulty you encounter in forming an alloy of platinum and copper may have its reason in different causes, of which we are not aware, not having witnessed your operations. Platinum we suppose you know, can only be melted before the oxy-hydrogen fire. You will find much information about the melting of platinum in referring to the articles of M. Deville, in the back numbers of the "*Annales de chimie et physique.*

J. W., of Mass.—Phenylic alcohol (carbolic acid) in the proportion of about one per cent after having been previously dissolved in water will undoubtedly be an excellent means of preventing mold in flour paste.

C. H. G., of Tenn.—"What cheap material can be mixed with plaster of Paris that will leave it as hard or harder no matter what color it will produce?" Most anything will depreciate the quality of plaster of Paris, which should consist of nothing but sulphate of lime. We remember that at the late fair of the American Institute in New York a premium was refused to an exhibitor of that product because the judge of the group happened to find some carbonates in it.

E. W., of Mass.—Oil when put on boots will scarcely have any protective influence against cold. . . . In painting the outer coating of a Leyden vial you will insulate it. Electricity in the Leyden jar resides on the glass as is shown by the experiment with the three separable pieces (*vide* Silliman's "Principles of Physics," chapter, Accumulated Electricity), but we close the mouth of the jar, as the air itself is a conductor of electricity, particularly when moist. For the stuffing of the rattle snake you speak of we recommend to you crude naphtalin; it is preferable to arsenic soap.

A. P., of Ky.—For the detection of sulphur or better, sulphur compounds in water, heat it in a test tube while holding a strip of paper impregnated with sugar of lead over the orifice. If sulphur is present the paper will be covered with a brownish film. Lime will show itself by adding oxalate of ammonia to the liquid. The iron in the water you speak of must be present as a protoxide and then a blue color will be produced by adding red prussiate of potassa. The sulphur may either be present as H S or Ca S.

B. C., of N. H., asks if the subjection to smoke, as in the baconing process, would have a preservative effect on stakes to be driven into the ground and what substances in burning produce a smoke of the strongest creosoting effect? Mere exposure to smoke will never do for the preservation of stakes, especially if employed for agricultural purposes. For such and other purposes we recommend as the cheapest and best material the so-called pitch or dead oil. Heat the oil in an iron pot and fill a tight barrel to the hight of about two feet and leave the stakes in it for two and a half or three hours. The pitch or dead oil is obtained in the distillation of benzole and other light hydrocarbons and can now-a-days be purchased in every large city.

G. F. W., of Mass.—Provence oil is the *oleum olivarum otim.* of the Pharmacopœia and is obtained from the pericarp or fleshy part of the olive before perfect maturity.

J. L. D., of Mass., asks how to put quicksilver on the back of a looking glass. The coating of a mirror is made by spreading tin foil smoothly on a stone table, rubbing a little mercury (containing tin) over it to amalgamate the surface, pouring a large quantity of mercury on it, pushing the clean glass plate on this, beginning along one edge, pressing it with weights and giving the table top gradually an inclined position to drain off the excess of mercury.

V. D. W., of N. Y., adds to the information given on page 391, Vol. XVII., to "C. S., of Minn.," who asks how to tin a worn copper kettle., the following: A thick coating may be obtained by preparing a tinning solution of zinc dissolved in hydro-chloric or muriatic acid, making the solution as thick or heavily charged with zinc as possible, adding a little salamoniac. Clean the inside of the kettle, place it in a charcoal fire until a piece of block tin placed inside melts, then rub the melted tin, with some of the tinning solution quickly on the copper surface by means of a ball of oakum and a little powdered resin; the tin will readily adhere. Wrought iron and steel may be tinned in the same manner. We know of no effectual method of tinning cast iron.

E. A. L., of Mo., asks if there are any clocks made which are specially designed for use on locomotive engines and calculated to keep time notwithstanding the jars of the machine. We thinks such clocks are quite common. They are what are called "spring clocks." We lately saw a steam fire engine with one attached, and a fire steamer is subject to as many and as severe jolts as a locomotive.

S. A., of Iowa, says he has cleaned his steam boilers with soda and asks if its use is detrimental to the iron. We reply, it is not.

R. S. B., of N. Y., referring to the communication of "C. B.," page 35, current volume, on harmonizing church bells, asks why the plan cannot be introduced in sleigh bells, and recommends the manufacture and arrangement of the "merry sleigh bells" so as to produce concord rather than discord. We have seen several sleigh teams so ornamented, but the owners themselves were compelled to make a selection from many "strings." They were not arranged to hand.

W. W. T., of Mass., asks what sort of a filter he shall use for purifying the water flowing from a spring into his trout hatching boxes. We recommend passing the water through a filter of charcoal and gravel. A little manual entitled "The House," published by G. E. & F. W. Woodward, 37 Park Row, New York city, has an engraving and description of such a filter as W. W. T. needs.

H. H. C., of N. Y., inquires for a method of determining the required amount of lap on a slide valve to cut off at any given point, the stroke of the valve *not* being known! We cannot furnish the information desired.

W. P. G., of N. H.—Potassium and sodium melt below 212 degrees, the temperature of boiling water. Silver requires 1,873 degrees Fah., for fusion while cast iron requires 2,786 degrees.

T. L. S., of Me.—The enamel of iron hollow ware is made of powdered flint, ground with calcined borax, fine clay, and a little feldspar. This mixture is made into a paste with water and brushed over the pots after they have been scoured with diluted sulphuric acid and rinsed clean with water. While still moist they are dusted over with a glaze composed of feldspar, carbonate of sodium, borax, and a little oxide of tin. Thus prepared, the pots are gradually dried and then the glaze is fired or fused under a muffle at a bright red heat. Oxide of lead, although increasing the fusibility of the glaze, impairs its efficiency as it will not resist the action of acids in cooking.

P. J., of Pa.—It is a mistake to suppose that water will not affect the composition of glass. At a high temperature water acts upon glass very rapidly. Turner suspended plate and window glass in the steam of a high-pressure boiler, and in four months the specimens, one-fourth of an inch thick, were completely decomposed. Faraday found that flint glass under similar circumstances was still more rapidly acted upon.

B. A. B., of N. J.—The *kaolin* or porcelain clay used in the manufacture of fine "China" ware is furnished by the decomposition of a granitic rock, the constituents of which are quartz, feldspar, and mica.

Business and Personal.

The charge for insertion under this head is one dollar a line.

For Gas-Pipe Screwing and Cutting-off Machines for Hand or Power, or any tool used by Steam and Gas Fitters, address Camden Tool and Tube Works Co., Camden, N. J.

A Large Marble Factory to rent on the Hudson River. Address Davis' Machinery Yard, 124 Hudson st., Jersey City.

Parties in want of Fine Tools or Machinists' Supplies send for price list to Goodnow & Wightman, 23 Cornhill, Boston, Mass.

Patent Office Reports.—Persons desiring Patent Office Reports can be supplied at low prices. Address Samuel C. Jones, Box 773, New York City P. O.

Wanted—Parties to build the Geiser thresher and separator at Racine, Wis., ground for shops will be donated. Address W. W. Dingee, Racine, Wis.

Parties having shoe lace tagging machinery for sale, new or second-hand, address postpaid, box 106, Toronto, Ontario.

Parties having patterns for cast brass ferrules for chisel handles will receive orders by sending address to S. F. Gold, Cornwall, Conn.

Manufacturers of shingle machines please send circulars and price list to A. J. Shotwell, Montgomery Station, Daviess Co., Ind.

Wanted—A small plainer (bed 5 or 6 feet), new or second-hand, if in good order. Address J. & B. S. Ayars, Greenwich, N. J., with price and description.

Allen's Catalogue of Agricultural and Household Implements and Machinery, Seeds and Fertilizers.—Messrs. R. H. Allen & Co., 189 and 191 Water street, New York, who conduct the largest business in Agricultural and Horticultural Implements, of all American houses engaged in general dealings of the kind, have just issued a new edition of their very complete and handsome Catalogue for the current and coming season. It fills 225 pages, illustrated with nearly 400 engravings, and is sent to applicants for $1—less than the actual cost of production, and this amount is deducted on the receipt of orders from those who have paid it.

EXTENSION NOTICES.

Morris Mattson, of New York city, having petitioned for the extension of a patent granted to him the 4th day of April, 1854, for an improvement in enema syringes, for seven years from the expiration of said patent, which takes place on the 4th day of April, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 16th day of March next.

Carmi Hart, of Bridgeport, Conn., having petitioned for the extension of a patent granted to him the 4th day of April, 1854, for an improvement in machine for cutting veneers, for seven years from the expiration of said patent, which takes place on the 4th day of April, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 16th day of March next.

James McCarty, of Reading, Pa., having petitioned for the extension of a patent granted to him the 4th day of April, 1854, for an improvement in heating skelps for the manufacture of wrought iron tubes, for seven years from the expiration of said patent, which takes place on the 4th day of April, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 16th day of March next.

L. Otto P. Meyer, of Newtown, Conn., having petitioned for the extension of a patent granted to him the 4th day of April, 1854, for an improvement in treating caoutchouc and other vulcanizable gums, for seven years from the expiration of said patent, which takes place on the 4th day of April, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 16th day of March next.

Samuel J. Parker, of Ithaca, N. Y., having petitioned for the extension of a patent granted to him the 11th day of April, 1854, for an improvement in sewing machines, for seven years from the expiration of said patent, which takes place on the 11th day of April, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 23d day of March next.

James L. Cathcart, of Georgetown, D. C., having petitioned for the extension of a patent granted to him the 18th day of April, 1854, for an improvement in attaching propellers to the driving shaft, for seven years from the expiration of said patent, which takes place on the 18th day of April, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 30th day of March next.

James Buell, executor of the estate of James McGregor, Jr., deceased, of New York city, having petitioned for the extension of a patent granted to the said James McGregor, Jr., the 11th day of April, 1854, for an improvement in the construction of tea and coffee pots, for seven years from the expiration of said patent, which takes place on the 11th day of April, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 23d day of March next.

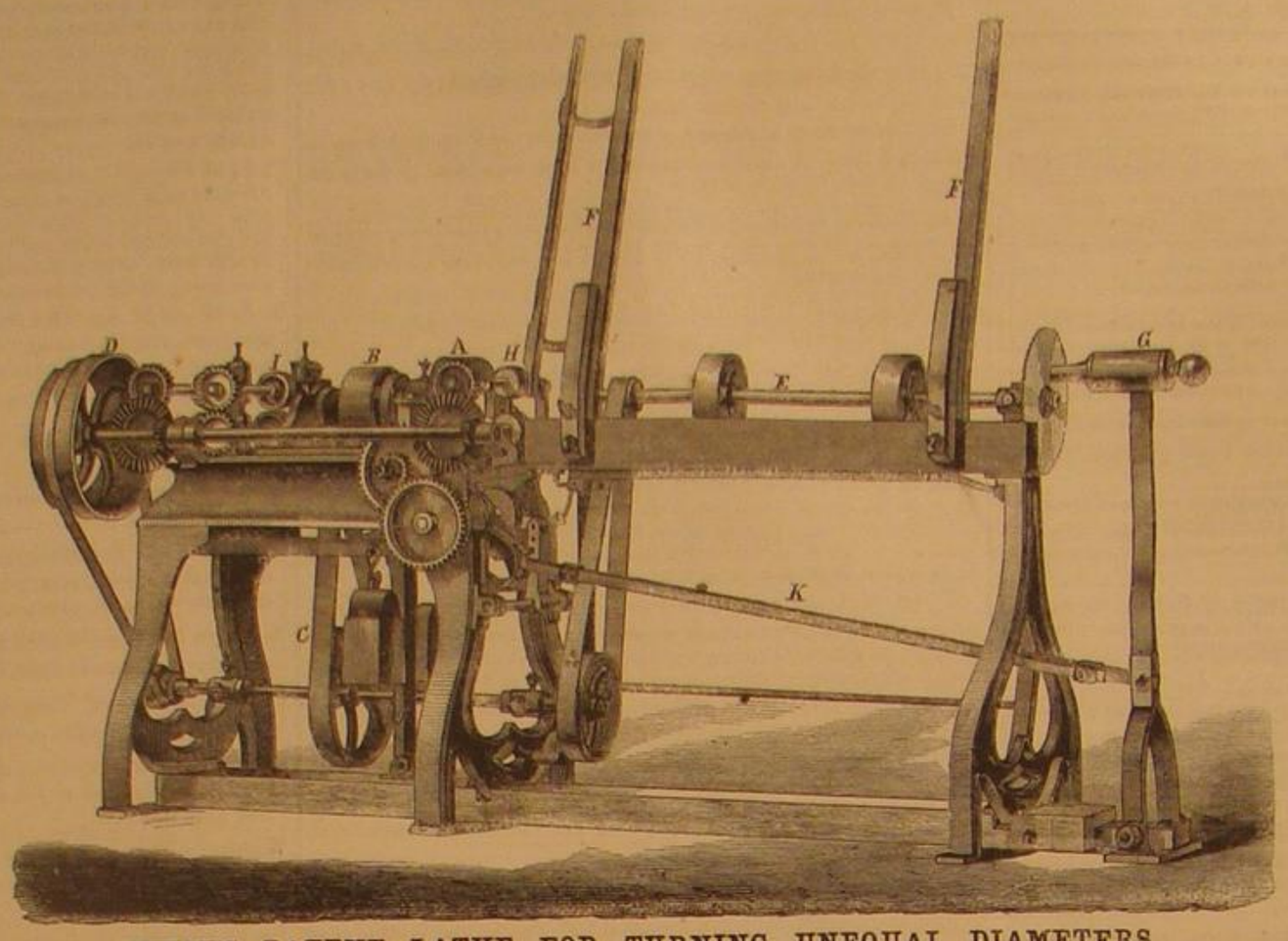
Julia M. Colburn, administratrix, *de bonis non*, of James H. Stimpson, deceased, who was executor of James Stimpson, deceased, of Baltimore, Md., having petitioned for the extension of a patent granted to the said James H. Stimpson as executor aforesaid, the 17th day of October, 1854, and antedated the 17th day of April, same year, for an improvement in vessels for holding liquids, for seven years from the expiration of said patent, which takes place on the 17th day of April, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 30th day of March next.

Stephen Bazin and James A. Bazin, of Canton, Mass., having petitioned for the extension of a patent granted to them the 25th day of April, 1854, for an improvement in machinery for laying rope, for seven years from the expiration of said patent, which takes place on the 25th day of April, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 6th day of April next.

Improved Automatic Taper Lathe.

The rapidity with which many kinds of wood turning can be done by the automatic machinery now so extensively used for this purpose is somewhat surprising, the patentees of the lathe represented in the accompanying engraving, claiming to turn at the rate of from 1,000 to 2,000 running feet per hour.

The power is applied on the cone pulley, A, into which is screwed the cutting head having cutters running in the shavings box, B. The cutter head and cone form a hollow mandrel. A belt, C, leads from a pulley on the cone arbor to the shaft under the bed of the lathe, thus giving motion to the feed cone, D, and saw shaft, E. In turning handles—broom handles for instance—the sawed stuff is piled upon the rack, F, when a cam draws forward the frame, and the saw cuts off the sticks to the required length, while, at the same time, a gimlet at each end bores holes through the sticks. The frame then recedes and the mallet, G, operated by a cam, strikes the lower stick, driving it into the feed rollers, H, which are fluted, and draw the stick into the hollow mandrel, whence it passes, after being turned, to a second set of rollers, I. The rollers are adjusted to the size of the stock to be turned by set screws. The taper, swell, or other irregularity on the work is given by a pattern cam operating the upright lever, J, which actuates the ring case that governs vibrating arms in the cutter head. The connecting rod, K, through which the mallet, G, is operated, is coupled so as to be adjusted to any required length of stuff, and the foot of the lever which holds the mallet can also, be moved as aid to the same result.



WEST'S PATENT LATHE FOR TURNING UNEQUAL DIAMETERS.

The regular size of the lathe turns from five-eighths of an inch to one and a half inches diameter. By having extra heads this limit may be greatly increased. The manufacturers say that one man, with this machine, can do at least the work of four men with the ordinary lathes. It is capable of turning nearly all sorts of handles, chair stuff, billiard cues, map rollers, etc., giving the work an excellent finish.

Patented April 17, 1866. All communications relative to this latter should be addressed to Finley & Co., Geneseo, N. Y.

Picric Acid and Its Properties.

In a lecture delivered before the Society for the Encouragement of National Industry in France, Dr. Calvert, F. R. S., spoke of a curious application which has been made of the explosive property of its salts. During these last few years, the picrate of potassium has been employed in great quantities by Mr. J. Whitworth, for charging the bombs for destroying the iron plating of ships. When the projectiles thus prepared strike the iron masses, the enormous propelling force with which they are expelled from the gun is instantaneously converted into heat, and to such an extent that the ball becomes red hot, the heat decomposes the picrate of potash, and a violent explosion ensues, owing to the enormous quantities of vapors and gases which are thus produced in an instant of time.

Whilst the alkaline picrates are endowed with such formidable properties, they also possess others which are useful for the alleviation of human misery. Picric acid is an efficacious remedy in intermittent fevers. Persons affected with such types of fever, upon whom quinine has lost all its beneficial effects by continuous usage of it—and this is the case with some of our soldiers who return from India—derive, I am glad to say, wonderful benefit from the use of picric acid and picrates, as Dr. Aspland has proved to be the case at the military hospital at Dukinfield. The knowledge of this fact may be useful in districts in which poor populations exist, for it affords them a cheap febrifuge; and, moreover, picric acid is not dangerous, as arsenical preparations are, nor does it derange the stomach like quinine.

Diffusion.

Some very elegant and simple methods of exhibiting the phenomena of diffusion are given by Herr Merz in a recent number of the *Journal für Praktische Chemie*. A portion of the shell of an egg having been removed by the action of hydrochloric acid, leaving the membrane exposed, the egg is to be suspended in water from the arm of a balance, a counterpoise being placed in the opposite scale. In about half an hour the weight of the egg has sensibly increased, as the position of the balance beam will show, in consequence of the passage of water through the membrane. If, how, alcohol be substituted for the water, and the weights readjusted, so as to bring the beam horizontal, it will soon commence to move in the opposite direction, showing that the egg has become lighter by the diffusion of water into the alcohol. The diffusion of vapor may be exhibited by tying a diaphragm of India rubber—a portion of a small toy balloon will answer the purpose—over the mouth of a funnel, the other end being in communication, by means of an elastic tube, with a vessel of water. The funnel being inverted over a dish containing ether, which, however, the diaphragm is not to touch, the vapor of this fluid will pass rapidly into the funnel, the air being observed to escape in bubbles in the water at the small end. Remove now the vessel of ether, and the operation will be reversed, the vapor passing through the diaphragm into the atmosphere. In order to fill the vacuum thus created, the water will rise in the tube, the lower part of which should be of glass, to render this apparent, and the diaphragm will be curved inwards. These experiments are particularly instructive, and are within the reach of every one. The balance may be extemporized by means of a light bar of wood.

WILDER'S PATENT PUNCHING PRESS.

The power press has become a common tool in our machine shops. As usually built it has serious objections. It is used not only for perforating sheet metals, but latterly for finishing the surfaces of forged pieces to give a better surface and diminish the amount of hand work necessary to produce a good finish. The common power press is actuated by means of an ordinary clutch which necessitates such a jar and jolt to the driving power as seriously to interfere with the equable action of the machine. The clutch is at any time and under any circumstances a very poor mechanical contrivance, and its use is avoided, as much as possible, by mechanics.

The engravings accompanying this article show a prospective view of one of Wilder's Patent Punching Presses of the smallest size, without gearing, and a vertical section of the upper or working part. Fig. 1 is the perspective, and Fig. 2 the sectional view. Mechanical perfection is not to be expected, but this machine seems to be capable of no very radical improvement. It is so designed that any size of press required can be made without any considerable change in the construction of the parts.

Fig. 1

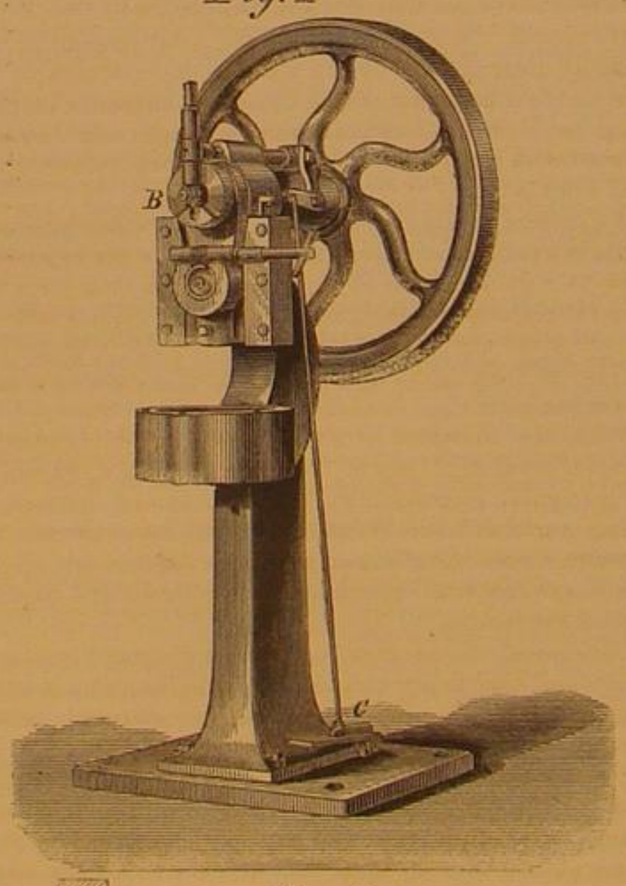


Fig. 2

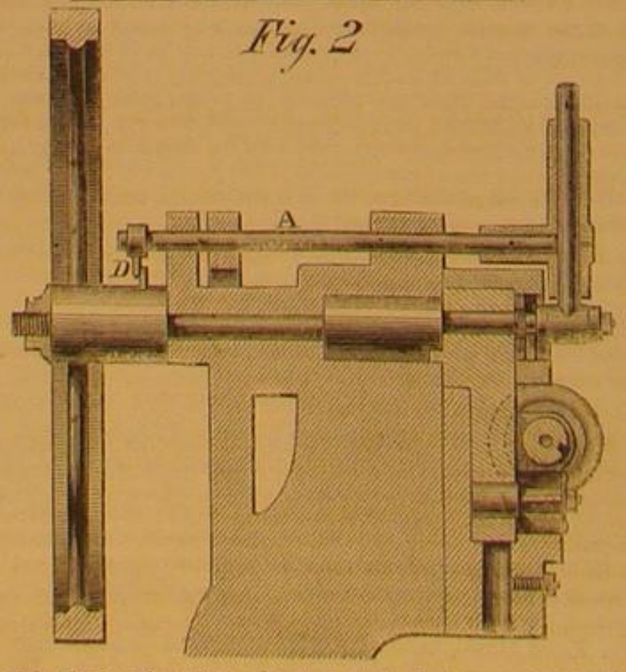


Fig. 1 is a perspective of the press, which, it will be seen, is of pleasing proportions. The power is applied to the wheel by means of a belt, and actuates the plunger in the usual manner, by cam or eccentric. The stop motion is very simple and smooth in its action. It is a sliding bar, A, at the top of the machine—seen drawn on a larger scale in the vertical section, Fig. 2—carrying a dog, which, when the plunger is at work, locks into a mortise in the revolving disk, B, Fig. 1. This stop motion adds no strain to the press when the machine is working, the strain or wear being no more than if there was no stop motion attached. It is held in a locked position by the foot on the treadle, C, and so long as the treadle is pressed down the press will operate, but if the foot be removed the plunger will instantly stop and always in the highest position, an advantage of no little moment, as all machinists know. By removing the foot from the treadle as soon as the plunger begins its downward movement, it will make but one stroke and will be unlocked by the dogs, D, Fig. 2, on the shaft and slide. The length of stroke is adjusted by the horizontal worm shaft seen on the front of the machine, and the stroke may be lengthened or shortened when the press is in motion as well as when at rest.

Patented May 28th, 1867. G. & C. Place, 222 Pearl street, New York city, are the agents for this press. Communications respecting the machine should be addressed as above, or to Moses G. Wilder, patentee, West Meriden, Conn.

Artificial Meerschaum.

Vegetable ivory has long been known, but vegetable meerschaum, vegetable horn, or vegetable coral, as they may with strict propriety be called, are late acquisitions, brought before the public for the first time during the late Exposition. The mode of preparation of these substances is as follows: Common potatoes are peeled and macerated for about thirty-six hours in water acidulated with eight per cent of sulphuric acid. After this operation they are dried in blotting paper, and then in hot sand for several days on plates of chalk or plaster of Paris which are changed daily; being compressed at the same time, an excellent imitation of meerschaum, answering well for the carver, or any purpose not requiring a high temperature, will be obtained. Greater hardness, whiteness and elasticity will be produced, if water containing three per cent of soda, instead of eight per cent sulphuric acid is used. And if, after the potatoes have been macerated in the solution of soda, they are boiled in a solution containing nineteen per cent soda, a substance resembling stag's horn, and which may be used for knife handles, etc., will be formed. Turnips may be used instead of potatoes in the production of the artificial horn; and if carrots are substituted for the potatoes, a very excellent artificial coral will be obtained.

NEW METEOROLOGICAL INSTRUMENT.—Prof. De la Rive, of Geneva, has contrived an instrument for measuring the transparency of the atmosphere. The inventor agrees with Pasteur, who supposes that the light dry fog which under certain conditions of the air intercepts the light, is caused by myriads of organic germs floating near the earth, which are washed to the earth by the heavy rains, or are destroyed by severe frosts, thus accounting for the clearness of the atmosphere at these times. Convinced of the truth of these statements, a determination of the state of the air, it seems, would be of benefit in a sanitary point of view; hence the value of this invention. A complete description of the instrument has not fallen under our notice, but it principally consists of a double telescope with a single eye piece, by which two objects at known distances may be compared, and thus the transparency of a measured stratum of air is directly determined.

INCOMBUSTIBLE CLOTHING FOR WOMEN.—It is stated that no ballet dancer of the Queen's Theater, London, is allowed to dance in garments that have not been saturated with a solution of tungstate of soda. This mineral is now extensively used in the laundries of London. It prevents the fabrics with which it is incorporated from blazing, and does not impair the colors or appearance

Scientific American.

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VOL. XVIII., No. 5....[NEW SERIES.]....*Twenty-third Year.*

NEW YORK, SATURDAY, FEBRUARY 1, 1868.

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INVENTORS---THEIR OPPORTUNITIES AND INTERESTS.

The number of patent claims published in our columns weekly is sufficient evidence of the existence of a large amount of inventive talent in the country; that all these patents do not prove remunerative, or that some of them are improvements only in name, does not militate against this statement. Still, the long list of patents might be much further extended, we think, by the more general cultivation, by our mechanics, of a habit of close observation. An observing and reflective man, possessing natural mechanical capacities, can hardly pass through a workshop in any department of industry, without seeing opportunities for improvement either in the tools and other appliances used, or in the methods of doing work. But it not unfrequently is the case that the mechanic who is constantly engaged on the work does not notice the room for improvement which the stranger sees at a glance; the familiarity induces indifference. Yet, the working mechanic is continually meeting with obstacles to rapidity and perfection of work, and in providing temporary expedients for relief, he may as well perfect them and make them permanent and valuable fixtures of the shop. If properly elaborated and wrought out in the brain before being built, he may find that in developing them he has unconsciously become an inventor—made a patentable and valuable improvement—where he looked only for a present aid, or a "make-shift." Perhaps the exactions of his business will not allow him to devote the necessary time and attention to the improvement, and he must content himself with getting up hastily a temporary aid to his work.

But there come opportunities for this mental labor, which, however, are not always embraced. Such is the present state of dullness in business. The enterprising mechanic whose ordinary work fails him, can profitably employ his otherwise unoccupied time in attempting improvements in the materials, methods, tools, or other appliances used in his business. If he is compelled to a state of comparative physical idleness, so much more room and opportunity is afforded for the exercise of his mental powers. Plenty of instances of valuable discoveries, inventions, and improvements could be adduced to prove that such periods of enforced bodily inactivity have been advantageous to the observant and thinking mechanic.

It is the interest, also, of the inventor to make use of the means offered by our patent laws to secure to himself a portion of the advantages which his improvement possesses. A false idea of honor is that which either carelessly or supinely refuses to allow the inventor to reap a benefit from his improvement. He may consider it as not worth the expense, time, and trouble necessary to make him secure as its originator; but if others deem it valuable enough to use, he should deem it valuable enough to be paid for. It is not the marked and notable improvement that is always the most remunerative to the inventor, but often the little and seemingly unimportant advance on previous attempts, which proves a mine of wealth. If the inventor has any idea which he has so far brought toward a practical and visible form as to be understood, and which promises to be an improvement on processes, machines, tools, etc., it is his duty, as well as right, to secure his proprietorship by a patent at once. By this course he will be benefitted, while nobody will suffer an injustice.

CUMBROUSNESS OF TOOLS FOR IRON WORKING.

A correspondent insists that the massive lathes and enormous planers, etc., which are deemed requisite in the large machine-making establishments, where heavy work is done, are a waste of material, an annoyance by their excessive weight, and unnecessary absorbers of power. He proposes lathes with hollow arbors, planers where the tool, rather than the work, shall be moved, and drills brought to the work instead of the work brought to the tools.

Many years ago, we knew of a "big planer," got up by Mr. Seth Wilmarth, then of South Boston, Mass., the "feed" of which was a screw, we think sixty feet long, but which was cut on a ten or twelve feet lathe by being fed through a hollow arbor and delivered through another hollow arbor on the tail of the lathe. The consequence was a screw-fed planer which could not, at that time, be matched in the world.

Now, it seems that if a continuous screw could be cut on that lathe for that especial purpose, another screw might be cut, or a shaft be turned of any requisite length, on any ordinary lathe having proper heads.

We have seen a planer, the movable bed of which could sustain a load of thirty tuns, and which was run by a special steam engine, take off two chips at a time of seven-eighths of an inch in depth by over one-eighth in thickness. But all the mass of thirty tuns must be moved alternately back and forth, the machinery sustaining the immense shock of the weight and the inertia of the load in the change from one part of the reciprocating movement to the other. It requires power—its direct exercise and palpable expenditure — to run such a machine, while it seems as though the lighter weight of the tools and their head might be much more easily moved. In regard to the use of boring tools on a massive gear or pulley, the plan is already in practical use. If the boring machine (portable) is carried to the work, power is emitted from the boiler through pipes in the form of steam, or is taken from a convenient shaft by means of belts.

We do not believe in carrying so-called "improvements" so far as to shock common sense by the advocacy of novelties which cannot be proved to be real benefits, but it does seem to be practicable to so adapt the proportions of work to be done to the tools to do it, that some, at least, of the heavy labor now really necessary in our large machine and engine shops might be avoided, and some of the power now expended saved.

COMPRESSED AIR AS A POWER.

The successful machinery used for tunneling Mont Cenis, in Switzerland (by which the water power of a mountain torrent is made to compress air, and this compressed air led by strong tubes in the tunnel is made to move the boring machines), has given occasion to some mechanical engineers in France to make plans for transmitting the water power of a river through air tubes to the adjacent city, and bring the tubes into the houses, as gas and water pipes now are, so that by turning on the supply of compressed air, the escaping air may ventilate the building, after moving small appropriate engines, and so serve for sewing machines, turning lathes, and many other kinds of machinery requiring so little power that the erection of a steam engine would be a needless expense. In many instances the total amount of work done at intermissions during a whole day amounts to only three or four hours, for which the steam engine is kept running ten hours; therefore a great saving would be accomplished with this power, which would be consumed only when real work is done.

At present steam power costs in France 62 centimes (12 cents in gold) per hour per horse power; the gas engines are said to cost 73 centimes; this new compressed air power, when steam engines are used to compress the air, will cost 67 centimes; and when water power is used it would come as low as from 12 to 16 centimes (about 3 cents) per horse-power per hour.

With the exception of a few weeks in dry summer seasons, an amount of water falls over the dam at Fairmount, Philadelphia, representing several thousand horse-power, which perhaps could be utilized in the same manner, compressing air and distributing this fresh air through tubes to localities where small amounts of cheap power and good ventilation are needed.

Compressed air is now beginning to be used to dispatch letters and parcels through tubes. In Paris such a system is in operation, and in New Jersey one is in course of construction between the cities of Newark and Jersey City. In London even a passenger railroad is propelled through very large tubes by the same means. However, in all these instances steam is the initiative power used. At the late Fair of the American Institute an experimental machine of this kind by the same means propelled thousands of persons through a large tube.

NITRO-GLYCERIN---ITS USE, ITS DANGER---WHO SHALL DECIDE WHEN EXPERTS DISAGREE?

Although the existence of this substance, and a knowledge of its explosive nature, has been long known to chemists, it was only in the year 1864 that it was brought into public notice as a substitute for gunpowder. Consequently, all our practical acquaintance with its effects has been gathered within the last three years, and new facts are continually presenting themselves as its use becomes more and more general, which it is well to note.

The elements of nitro-glycerin separate with immeasurable velocity, and hence the violence of its explosion, which has been variously estimated at from five to ten times the force of gunpowder. Other economical advantages over gunpowder, in mining operations, may be summed up as follows:

Fewer men are required for working the same sized piece of ground, and fewer holes have to be bored to dislodge an equal amount of rock. Hence a dearth of miners may, to a certain extent, be remedied in this manner, and less steel and iron need be used than hitherto.

Nitro-glycerin does not take fire readily, and when lighted burns but does not explode and goes out as soon as the flame is taken away. The holes can be tamped without danger. After firing the amount of smoke is small compared with that of powder, so that workmen can go back immediately to the place where they have blasted without inconvenience. Finally, holes that have missed fire can be retamped and fired, an operation at present either impossible or accompanied with great danger.

Against these advantages, it appears that the gases formed during the explosion have an injurious effect on the organs of sight and respiration. In course of time, however, the workmen get accustomed to it, and it is no longer looked upon as one which need restrict its employment. Nitro-glycerin, further, freezes easily, and explodes on being sharply struck, but the latter property is not more dangerous than the danger of gunpowder in taking fire readily and exploding.

The latest nitro-glycerin disaster that has come to our notice was the explosion at Newcastle, Eng. In the course of the inquest on one of the victims some interesting evidence was brought out. From the testimony given on that occasion by a Mr. Isaac Bell, whom *Engineering* seems to accept as good authority, it would appear that under a great variety of conditions this substance is liable to spontaneous decomposition. At ordinary temperatures this catastrophe may take place, and particularly is it dangerous if impure in composition. The gases given off, if confined to the vessel containing the liquid, exercise pressure on the remaining liquid, and explosion of the vessel is liable under the least shock or movement. If the explosive is brought from a cool to a warm place; if the substance be exposed to a temperature of 46° Fah., crystallization ensues; or if the temperature is high enough to cause ebulition, under any of these circumstances spontaneous decomposition would result.

The inventor of "blasting oil," Mr. A. Nobel, of Hamburg, asserts that nitro-glycerin can be stored for an indefinite length of time without deteriorating in quality, and that the peculiar property of not exploding by mere contact with fire, renders its carriage, storing, and handling very safe, even when in an explosive state. Mr. Bell, *per contra*, asserts that the compound is liable, from its specific gravity (which is 1·6) to explode from mere movement, and is consequently very dangerous merchandise for a railroad company to transport.

The former gentleman, writing to the London *Times* relative to the same Newcastle accident, bitterly complains that the introduction of this valuable explosive, owing to the accidents resulting, as he afterwards shows, from gross careness, has been systematically opposed, and thinks it high time that the public should know that nitro-glycerin has won its battle over prejudice, and obtained far to firm a footing in several countries ever to be banished from use unless it be by something better. The want of that useful knowledge has been the real cause of the late accident, for no one surely would attempt to store an explosive substance in a city unless unreasonable fear threw an obstacle in the way of conveying it to and storing it in its proper place. He says: "My own printed precautions, lately produced at the trial, best prove how strongly I object to that unreasonable mode of storing; but the puerile refusal to receive it in a powder powder magazine may place an agent in a very embarrassed situation. Instead of adopting every measure to paralyze the circulation of a powerful and useful agent, it were far better to follow the example of Mr. Warrington Smythe in enlightening the public as to its use, thus making it a beneficial instrument for the development of our mineral wealth.

"It not to be wondered at that the immense accidents of Aspinwall and San Francisco led to rigorous measures restricting the transportation of nitro-glycerin; but in Sweden and Norway that substance was already so favorably known and had got into such constant use, that the excitement abroad had no influence on the liberal regulations there, and until this day it is freely carried by rail in both countries, nor has it led to a single accident.

"In Germany, also, before the prohibition took place, thousands of parcels containing nitro-glycerin were sent by rail, without causing the least damage.

"On the other hand, we find upon inquiry that accidents have only occurred when nitro-glycerin was transported under a wrong declaration. Such was the case at Aspinwall and San Francisco, and it is only too natural that such unwarrantable neglect should lead to calamities. It is the same with gunpowder. Whenever people convey an explosive material the first thing they ought to know is its nature."

Then follows a list of nitro-glycerin accidents which have come to his knowledge, and in looking over the list it must be admitted that the substance has been very strangely abused:

"In five cases congealed nitro-glycerin has been melted purposely over fire.

"In three cases a red-hot poker has been inserted into the oil in order to melt it.

"In one case a man kept a cartridge with a percussion cap and fuse affixed and lighted it in his hand until it blew off.

"In one instance a man stood watching the burning of a fuse inserted into nitro-glycerin, until it went off and hurt him.

"In one case a captain set fire to a sailing vessel with a cargo of nitro-glycerin, and people went on board to extinguish the fire, but saved themselves, seeing what was the cargo, and the ship was eight hours on fire before it blew up, which could not possibly have been the case with gunpowder.

"In one instance two workmen, while filling cartridges with nitro-glycerin at the light of a tallow candle, set fire to some gunpowder strewed on the floor, but found time to save themselves and carry away considerable quantities of nitro-glycerin before the explosion took place.

"In one case two leaky canisters, full of nitro-glycerin,

were soldered under continual reports produced by the heating of drops leaking out, but caused no accident.

"In one case a captain of artillery was hammering on a shell filled with nitro-glycerin, until it exploded and killed him.

"In one case a man took to greasing the wheels of his wagon with nitro-glycerin, not knowing what it was, and it went all right until it struck hard against something, and the wheels went to pieces.

"In one case it was burnt in a lamp, as an improvement on petroleum."

Last in the list comes the Newcastle explosion, which, it seems clear, was caused by the grossest violation of the printed instructions. The cans containing the nitro-glycerin were opened with blows of a spade, and then thrown into a hole one upon another. From the shock thus occasioned the explosion took place.

This list is published that these accidents may serve as a warning against similar attempts to perform these feats, but the inventor protests against the very narrow view of trying to check the career of any improvement on the plea of liability to accidents. "There is," says he, "a very easy way of getting rid of them; we need only prohibit the use of steam, fire, poisonous substances, cutting tools, firearms, explosives, etc., and return to those days when ignorance and safety went lovingly hand in hand. But unless civilization is to be stopped, we cannot possibly confine the community to those articles only which it is impossible or even difficult to abuse. Something must be left to the understanding, and it is an excellent regulator. Thus, for instance, phosphorus, one of the most dangerous poisons and combustibles, is in every child's hand, and yet does but little harm."

THE AMERICAN WOOD PAPER COMPANY AND THE FIBER DISINTEGRATING COMPANY.

A case of great importance to patentees, upon the validity of Reissues, and illustrating the importance of having a correct description of the invention in the original specification, has just been decided in the U. S. Circuit Court for the Eastern District of New York.

In this case the American Wood Paper Company filed a bill against the Fiber Disintegrating Company to restrain the defendants from the use of certain inventions for which Letters Patent had been granted to the inventors in this country and by them assigned to the complainants. The whole of the inventions related to the manufacture of paper pulp from crude vegetable substances by means of chemical agencies applied at a high degree of temperature in a vessel or boiler of peculiar construction.

The patents, five in number, alleged by complainants to have been infringed by defendants, were:

(1st and 2d.) Watt & Burgess patents, being two reissues (Nos. 1,448 and 1,449) dated the 7th April, 1863, of a single reissue, 5th October, 1858, of original patent, dated 19th August, 1853, for improvements in the manufacture of paper from wood.

The two reissues were one for the product obtained by, and the other for the process of treating wood so as to produce paper pulp by boiling in caustic alkali under pressure.

Mellier's patent, dated 7th August, 1854, for an improvement in making paper pulp from straw. The process being very similar to that described in the reissued patents of 7th April, 1863, and 5th October, 1858.

(4th and 5th.) For improvements connected with the machinery for the purposes of making paper pulp. But the only question of general interest to inventors is in connection with the reissues of the Watt & Burgess patents, and on the Mellier patent, to which we confine our report.

The original Watt & Burgess patent, of August, 1853, contains the following words:

"The shavings are then to be boiled in a solution of caustic alkali, the strength of which, being dependent on the nature of the vegetable substance operated on, can be only learned by experiment. For deal or fir wood we find that a solution of alkali of the strength indicated by 12° of the English Hydrometer answers very well. The length of time necessary for this part of the process is somewhat dependent on the nature of the vegetable substance to be heated. We find boiling in a solution of caustic alkali under pressure, of considerable service. We do not claim this operation as part of our invention."

In an English patent obtained by Watt & Burgess, 1st August, 1853, their complete specification, which is dated 18th February, 1864, contains exactly the same words. In their French patent, dated 27th September, 1853, boiling in alkali is mentioned, but there is nothing whatever to indicate that this boiling should be under pressure, but it states "We have found it very advantageous to have a heating apparatus in the vats where the alkali solution is added; the pulp should be heated by steam, or other convenient method, to the boiling point."

In October, 1858, Messrs. Watt & Burgess obtained a reissue of their patent, and their specification contains the following words:

"The length of time necessary for this part of the process is somewhat dependent on the nature of the vegetable substance to be heated; that is, its resinous or gummy nature, and boiling in a solution of caustic alkali under pressure is of considerable importance. By the words 'under pressure' is meant a pressure at, near or above 300° of Fahrenheit's scale."

To the specification to the two reissued patents of 1863, the words used are substantially the same, the claim in the first (No. 1,448) being for the *product*, viz., a pulp suitable for the manufacture of paper made from wood or other vegetable substances by boiling in alkali under pressure; the claim in the second (1,449) being for the process of boiling in an alkali under pressure.

The defendants contended as to the Watt & Burgess patent (among other things), that the reissued patents of 1858 and 1863 were improperly issued, being for a substantially different invention to that described by the specification to the patent of 1854; and with regard to the Mellier patent, they alleged that as they treated bamboo and not straw, and that while Mellier claimed the employment of a pressure of seventy pounds, and a heat of 310° Fah., as the pressure used by defendants as denoted by the steam gage, never exceeded sixty pounds, they did not infringe on Mellier's patent.

It was argued by Mr. Jenckes for the complainant, and by Mr. Russell and Mr. Harding for the defendants. Mr. Jenckes contended that the reissue of the patents by the Commissioner was conclusive until reversed by a substantive proceeding for the purpose; that the inventions therein described were those really invented by Watt & Burgess, and incorrectly described in the first instance; and he very ingeniously argued that, by inserting the words "under pressure," Watt & Burgess narrowed their claim. That Burgess believed, when he took out his English patent, that he could cover the open boiling process, as well as boiling under pressure. On examination, it was found that Coupier and Mellier, in 1851, treated wood precisely in that way. His action was, therefore, exactly within the requirement of the law, that where by mistake a patentee has claimed too much in his original patent, he should surrender it and take out a narrower claim in his reissue.

The Court took time to consider, and on the 7th of January, 1868, rendered a judgment of which the substance, so far as of importance from the point offered above indicated, is:

First, that the Watt & Burgess reissued patent (No. 1,448) is void, on the ground that it is impossible to consider that to be a new material, patentable as a new product, which is simply a substance long well known to exist in wood and other substances in a state nearly pure.

Second, that the Watt & Burgess reissued patent (No. 1,449), is also void, on the ground that the process described is substantially different from any described in the original patent. And this decision, which seems sound from every point of view, serves to establish as a principle, that even though an invention be so undescribed and the evidence of actual invention at the date of application so clearly established before the Commissioner of Patents as to entitle the inventor to a reissue, that the reissued patent will be void if the invention described in it be the description of an invention essentially different from the one previously described.

Third, the Mellier patent was held to be good and a decree made in favor of complainants on the ground that the 70 pounds pressure mentioned by the inventor was evidently meant in accordance with the French method of reckoning, viz., internal pressure, from which one atmosphere has to be deducted to get at the pressure denoted on the steam gage, as was further apparent from the temperature given of 310° Fah., which, on the French scale, corresponds to 70 pounds pressure, meaning internal pressure. That, further, Mellier's description sufficiently covered the treatment of bamboo, which is of the same natural order as the wheat, oats, and other plants, to the stalks of which the term straw is usually applied.

Decree in favor of the complainants on the Mellier patent bill. Dismissed as to the others.

Rotary Ventilating Fan or Blower.

At the November meeting of the Massachusetts Institute of Technology, Mr. S. P. Ruggles exhibited and explained a model of the ventilating fan or blower, invented by himself, now in practical operation at the Institute and about to be introduced into the State House in Boston.

It consists of three floats of which one remains for a short time stationary while the other two are moving, each in turn becoming stationary. The object of the stationary fan is to act as a wall to prevent the air going back, and to cause the air brought by the ascending float to pass upward through the passage which conducts it to the building. This action of the floats is produced by the shaft which carries them, being made in three parts, one within the other, each carrying a float. From the condition of rest the first float begins to move slowly, and gradually increases in speed for a quarter of a revolution, then carries the body of air at a uniform speed for half a revolution, and then decreases in speed in the last quarter of revolution to the state of rest. When the first float has completed a half revolution, the second begins to move, to follow in like manner; the third float begins to move when the first has completed its revolution, and follows in the same manner as the other two, the action of the three producing a constant and uniform current.

This movement is produced by an ingenious arrangement of wheels of irregularly oval shape producing a crank motion. The fan at the Institute is vertical, ten feet in diameter, and ten feet high; it makes about twelve revolutions per minute, forcing out seven to eight hundred cubic feet of air at each revolution; this amount must go forward and never can go backward on account of the wall of the stationary float. It requires only about one sixth of the power required for ordinary fans of this size to move it.

Prof. Rogers alluded to the great number of rotary aspirators and blowers in use in Europe and this country, in all of which centrifugal action from rapid revolution is depended on; in the apparatus of Mr. Ruggles centrfiugal action is not the motive force, but the mass of air is drawn in below and forced or bucketed up, and delivered to the discharge pipe. The temporary stationary condition of a float in a fan blower had been used before the apparatus of Mr. Ruggles; but in fans with two floats only, in which no provision can be made against the backward flow of the air. In Mr. Ruggles' invention, the use of three floats, by the novel and ingenious arrangement of shaft and wheels, render this retrograde action impossible, as all the air drawn in can pass in no other than a forward direction, where it is required for use.

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Preservation of Stone.

This subject, which has attracted the attention of so many chemists, seems now to have been brought to a very successful point. We have received some specimens of chalk treated by a process discovered by Messrs. Dent and Brown, of the Chemical Department, Woolwich. Their process consists in the application of a solution of oxalate of alumina to the stone. The experiments date from December, 1865, and the results they have now obtained are most encouraging. The process is applicable to limestone, dolomite, and chalk, and may, we think, be made subservient to the preparation of lithographic stone. Oxalate of alumina is readily soluble in water, and the solution, which is simply applied with a brush, is made of a strength varying with the porosity of the material to which it is to be applied. The specimens we have before us are left in the original condition at one end, and have been prepared with the solution at the other. The physical characteristics of chalk so treated are—lightness, the possession of a glazed surface approaching somewhat in appearance to marble, and greatly increased hardness; in this respect the stone is about equal to fluor spar, or 4 in Mohs' scale. Furthermore, the lime being transformed into one of the most insoluble and unalterable of its compounds, and the alumina being precipitated, the pores are filled with a substance almost unacted upon by water or by the impurities present in the atmosphere of large cities. We should be glad to hear that the discoverers had one of the experimental bays of the Houses of Parliament placed at their disposal. They might thus prove their process to be a formidable rival to that of their colleague Mr. Spiller which, according to present appearances, is likely to be the numerous schemes now *sub judice* at Westminster.—*Chemical News.*

PRIMITIVE GEOMETRY.—M. Lenormant, a member of the French Academy, has been devoting considerable attention to the study of an interesting papyrus, just added to the British Museum collection. This ancient relic contains a fragment of a treatise on geometry applied to surveying, including a description of the modes of estimating the areas of a square, a parallelogram, of various kinds of triangles, and of the computation of the area of an irregular figure by means of triangles, and of the volume of a pyramid, the whole being illustrated by appropriate diagrams. M. Lenormant, in a report to the Academy, refers the production of this papyrus to the period of the twelfth dynasty, which would be cotemporaneous with the reign of Solomon.

STEAM MAN.—A lengthy account is going the round of the newspapers of a wonderful piece of mechanism in the form of a "Steam Man," invented at Newark, N. J., by one Zaddock Deddrick. We have taken the pains to investigate the truthfulness of the wonderful story and we learn that, although an invention of the kind is in progress, it is far from being perfected; and we have the promise that as soon as the steam man is in a condition to travel we shall have an opportunity of witnessing it, and the liberty of explaining its construction and operation. In the mean time we advise our contemporaries not to get excited over the steam man for he is likely to remain harmless for the present.

ELECTRICITY IN A VACUUM.—A new apparatus for demonstrating the fact that the electric spark will not pass through a perfect vacuum has been contrived by M M. Alvergniat, of Paris. A glass tube, having inserted in it two platinum wires placed at a distance of two millimeters (three thirty-seconds of an inch) apart, is attached to a mercurial pneumatic machine. After half an hour's action the tube is heated over charcoal to a dull redness, and the vacuum continued until a point is reached when, in spite of the slight distance between the wire points, electricity ceases to pass.

HOW TO HOLD PEARLS.—It is stated that certain native artists resort to an ingenious plan for firmly securing in any desired position such pearls as they wish to drill or work upon. The gems are first fitted loosely in holes bored in a piece of soft wood. A few drops of water are then sprinkled over them, and this penetrating the fibers, causes the wood to swell and the pearl is held as in a vise, but without marring it or in any way depreciating its value. After a time the water evaporates, the fibers gradually relax, and the gem is again set free.

ABSORPTION OF GASES BY SOLIDS.—Atmospheric air by passing through india rubber, Mr. Graham, master of the British Mint, has observed, becomes super-oxygenated, and will rekindle smoldering wood like pure oxygen. He has even collected this gas by creating a vacuum in a thin india rubber bag, which latter is kept distended by mechanical means. Mr. Graham states that gases passing through solid films are first condensed into liquid form within the substance, and then pass off on the other side by evaporation.

"WASHING-DAY SPRING."—A correspondent says that "in Saline county, Missouri, is a spring, a few miles from the Missouri river, which flows freely on Fridays, but is dry on every other day, and the people thereabouts call it washing-day spring for this reason." From the above it would seem that the traditional washing-day, usually considered as following Sunday, is not recognized in Saline county. If the spring was hereaway its usefulness would be much enhanced by a change in its day of flowing.

The Public Clocks of New York.

Mr. D. W. Bradley, City Timekeeper, lately read an interesting paper upon Tower Clocks, before the American Institute, in which were the following remarks:—

"With all due deference to the philosopher who said that time is money, I would observe that time is improvement, progress, science, art; and on the other hand it is idleness, dissipation, poverty, decay, ruin. As for its being money, let me remark that I have been experimenting with it these thirty years, and have never succeeded in making it yield more than enough to keep soul and body together. We visit St. Paul's. The bell was new a year ago. The old one got cracked, and they set a man to boring the crack out. He worked a week or two, and nearly froze to death, and when he finished his work it was found that the crack was larger than ever before. So they put in a new bell. The frame of the clock stands five feet long, two feet three inches wide, and four feet high. The pendulum is of wood, 13 feet long, giving 32 beats, and the ball weighs 75 pounds.

"St. John's clock was built by Henry Harris, London, in 1812. It is nearly similar to St. Paul's, but is better finished, and has the worst escapement I ever saw.

"The clock of the Dutch Reformed Church, Fifth avenue and Twenty ninth street, and that of St. Mark's, were made by Stokell. They are both like the clock of St. Paul's, though smaller and better. Stokell made some of the best regulators in this country.

"Trinity clock is the heaviest in America. The frame stands 9 feet long, 5 high, and 3 wide. The barrels are 20 inches, turning three times in 24 hours. The winding wheels are driven by a pinion and arbor. On the latter is placed a jack, or a wheel, a pinion, and a crank; 850 turns of the crank are required to draw up each of the weights. It takes 700 feet of 3-inch rope for the three cords; and the winding up of the weights consumes more than an hour of time, and requires the labor of two men. The pendulum is 18 feet long, and makes 25 beats. I cannot think that Mr. Rogers had a correct notion of what he was going to do when he began the building of this clock. At first it would not run 7 days, and he was obliged to put in new main wheels. The clock was at last finished, and an agreement was made with the sexton's son that he should receive 25 cents whenever it stopped, provided he at once notified the timekeeper; but as it stopped every day, and frequently three or four times a day, the expense of feeing the informer became irksome to bear, and the cumbrous timepiece was placed in new hands. By this time it had gained a poor reputation, which clings to it even in our day. The weights are 800, 1,200, and 1,500 pounds respectively, and drop 50 feet. A large box is placed at the bottom of the well, which holds about a bale of cotton waste to check the fall of a weight in case of accident. Two years ago I wound it up on Saturday, and on Sunday morning the chiming cord broke, letting the 1,500 pound weight fall a distance of 50 feet, causing much damage. The cotton box was strongly braced on all sides, but the force of the blow burst it open. The contents were well scattered, otherwise the organ bellows, just in line below, would have contracted under a pressure somewhat greater than that which the "blower" was accustomed to exert upon them. A much better clock could be built of the metal contained in the frame and main wheels of Trinity's. None of these clocks keep accurate time. Trinity does best, the clock of the Dutch Reformed Church next. During the late heavy snow storm the north window in the clock-room of St. Paul's was blown open. The snow came in, partially covered the movement, and drifted down into the box to the depth of several inches, nearly covering the ball; yet the old pendulum waded through it with the glee of a school-boy, and stowed the snow on this side and that, and pelted it with such pertinacity that by the next morning the clock was 15 minutes ahead of time. The first warm day that followed, it fainted, and stopped running. There was an old German clock on the Post Office, but it was removed a long time ago. It had but one hand. Old St. George's clock is about 50 years old. It is smaller than the others, but has gained a reputation for accuracy. Twenty years ago a person who had not St. George's time was supposed, like a busy man, to have no time at all. As it is soon to be pulled down no care is taken of its inside, and the figures on the dial are grown so rusty that the time can only be guessed at. At the City Hall we find a good clock. The pendulum, 15 feet long, vibrates in 2 seconds. The ball weighs 300 pounds. To counteract the effect of heat and cold the compensation principle has been applied to this pendulum. The contraction of the iron rods which would draw up the ball is opposed by the greater contraction of the brass bar on which the ball rests, thus letting it down. When the rods expand the greater expansion of the brass bar lets it down—only it don't—that is, not yet. I regulated it from June 1866, to February 1867, without moving the hands, but after the latter date, for three or four months, I set it every week although the variations never exceeded 30 seconds. The pendulum has not lost one vibration in more than two years. The new clock of St. George's, Sixteenth street, has never been excelled in finish. The frame is 8 feet long, 3 wide and 7 high. The main time wheel is 3 feet in diameter, has 180 teeth, turns once in 12 hours, has the figures on its face, and a pointer marking the hour. The second wheel is 27 inches, has 300 teeth, revolves every hour, and has the minutes on its face. The third wheel turns once in three minutes, and has the seconds pointed off on it. The pendulum is 35 feet long, and vibrates in three seconds, and the ball, weighing 390 pounds, is four feet in length by seven inches diameter. Two pinions and three wheels constitute all the machinary of this clock. Trinity's has five pinions and ten wheels. A duplicate of this clock is now being put up in the new arsenal at Rock Island. The clocks in the Brick Church and that in St. Therese are small but good ones, if attended to. They are cared for by the sextons, and get no care at all. A gentleman from Pennsylvania was lately telling me about his wonderful one, which did not vary 15 seconds in a year. On questioning him as to the observations he was in the habit of taking, he remarked that he took observations every day, by a noon-mark cut in the floor of his back porch. The clock of the Third-avenue Railroad depot is a fine instrument. It is exposed to a greater range of heat and cold than any other clock in the city, yet keeps excellent time."

[We gave a detailed description of the "new clock of St. George's, Sixteenth street," on page 80, Vol. XV., SCIENTIFIC AMERICAN. The finish of that clock and the beauty of its construction is probably not excelled by any in this country, whether of domestic or foreign manufacture.—EDS.

OFFICIAL REPORT OF PATENTS AND CLAIMS

Issued by the United States Patent Office

FOR THE WEEK ENDING JANUARY 14, 1868.

Reported Officially for the Scientific American.

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73,220.—HOLDER FOR DRYING GLUE.—William Adamson, Philadelphia, Pa.

I claim the within-described holder on which to dry glue, the said holder consisting of cords, wires, strips or sheets of suitable material saturated or coated with paraffine, or its equivalent, for the purpose specified.

73,221.—CONNECTING THE TUBES WITH THE HEADS OF SURFACE CONDENSERS.—Horatio Allen, New York city.

I claim, 1st, Making one of the tube heads of greater thickness than the other, in the manner and for the purpose herein described.

2d, Also cutting and bending into bell-mouth form tongues in the ends of the tubes, for the purpose and substantially in the manner herein described.

73,222.—HORSE HAY FORK.—D. W. Amos, Broad Top City, Pa.

I claim, 1st, The combination substantially as described of pivoted tines, A, link rods, C, and a spreading link, D, with a tripping latch and hoisting chain, B, for the purpose set forth.

2d, The arrangement as described of the link rods, C, below the joint of the tines, whereby the fork is opened by its own weight in descending.

73,223.—HORSE HAY FORK.—Lewis Atwater, Ithaca, N. Y.

I claim, 1st, The tines, C D, constructed in the form of hooks at their upper ends and branching below the said hooks to a broad bearing support near their center and to double prongs at their lower ends, all in one piece, substantially as set forth.

2d, The combination of the levers, F G, and bail, A, all constructed and operating substantially as and for the purposes set forth.

3d, The combination of the tines, C D, levers, F G, and bail, A, arranged and operating substantially as set forth.

73,224.—CULTIVATOR.—A. Bennett, Rockford, Ill. Antedated January 4, 1868.

I claim, 1st, The hitching iron, a, in combination with the plow beams, C C, and the front cross beam, D, arranged and operating substantially as and for the purposes herein described.

2d, Also the chain, h, with the stirrup, m, at one end, connected with the plow beams, C C, at the other end and passing over the rear cross beam, E, to raise the beams and shovels, as described.

3d, Also the upright hand levers, e e, hinged or pivoted to the plow beams, C C, and passing through the staples, g g, on the cross beam, E, to which they are secured by pins, k k, arranged and operating as and for the purposes described.

4th, Also the movable foot piece or steps, f, on the levers, e e, held in place by notches in the sides of the levers, as and for the purpose specified.

5th, Also the adjustable braces, p p, and slotted bolts, r r, arranged in relation with the beams, C, and standard, d, to regulate the pitch of the shovels, as herein shown and described.

73,225.—SHEEP WASH.—E. B. Booth, St. Louis, Mo.

I claim a sheep wash composed of the ingredients above named, or their equivalents.

73,226.—SAW.—E. M. Boynton, Grand Rapids, Mich.

I claim as an improvement in the construction of saws providing them with the gaging and clearing teeth, B, consisting of the inclined points, c, and the horizontal face or bearing, e, with a shoulder between the point and the bearing, e, substantially as shown and described.

73,227.—SAW TANG.—E. M. Boynton, Grand Rapids, Mich.

I claim the detachable saw tang consisting of the socket, A, with the arm, B, having the groove, n, formed in its under side in combination with the slotted bolt, D, and the thumb nut, E, substantially as described.

73,228.—SHOE HOLDER.—A. N. Brenceman, Lancaster, Pa.

I claim the arrangement of the toe and heel pieces, A B, when connected by a hinge, C, in combination with the sliding wedge and band, D E, or its equivalent, for separating the parts below, substantially in the manner and for the purpose specified.

73,229.—SPIROMETER.—G. W. Brown, Rockford, Ill.

I claim, 1st, The arrangement of spirometers and index, H, and shield, I, in the manner specified and for the purpose as described herein.

2d, The metal tube, B, which rises through the water in the reservoir, A.

3d, The arrangement of the guides, E E, and eyes, F F, with spirometer, for the use and in the manner herein described and set forth.

73,230.—STRAP HOLDER.—H. W. Burgess, Ithaca, N. Y.

I claim, 1st, The construction of the strap holder when the said surfaces of the movable piece or part, B, and of the bed or opposing piece or part, A, are made to be a part or section of the volute curve, F, as figured and described.

2d, The giving by the above-named volute-shaped surfaces an adaptation to varied thickness of straps and a parallelism to each other of the said surfaces thereby safely and surely holding the varied straps placed between the grasping surfaces, as herein described.

3d, The combination of the bed piece, A, movable piece or part, B, volute-shaped surfaces, F, handle, G, and hinge, D, the same making a strap holder, as set forth as an article of manufacture.

73,231.—SHOVEL PLOW.—H. C. Chandler, Erie Township, Ind.

I claim, 1st, The notched beam at D, for the purpose of adjusting the handles to the desired hight, by a bolt passing through them and the notch.

2d, The double slotted wedge, F, and method of application at the point G, under the beam between the standards, B B, to adjust them as to width, and the slotted rods, E E, securing a forward or backward movement of the standards, B B, and the shovels attached thereto, and fastened to the beam in the slots by a bolt or other similar device.

73,232.—BALANCED FEED WATER VALVE.—Geo. E. Chenoweth, Baltimore, Md.

I claim, in combination with the valve, valve-stem, and passages, an elastic, impermeable diaphragm, and air chamber underneath it, for the purpose of holding the valve in a balanced condition in any of the positions of the valve, substantially as herein described and represented.

73,233.—APPARATUS FOR DETERMINING DEVIATION OF LOCOMOTIVE CRANK PINS FROM TRUE CENTER.—Chas. J. Clifford, New Hampton, N. J.

I claim the instrument for ascertaining, without quartering or centering, whether or not crank pins on locomotive driving wheels are bent or sprung, constructed with the arms, a, feet, b, brace, c, adjusting screws and spring-marking point, fig. 3, all arranged and combined substantially as shown and specified.

73,234.—POLE ATTACHMENT.—Geo. N. Compton, Canton, O.

I claim, 1st, The combination of the part, L, with the pins, a a, and the ring, G, the whole forming the ring pieces, L G, shown in fig. 6, in the manner and for the purpose herein specified.

2d, The clevis, F, composed of the two U's, united by a hollow neck, and cast either in a single piece or in two pieces, which are connected by a bolt or rivet, in the manner and for the purpose herein specified.

3d, The tongue shield, S, with pins, a a, thereon, constructed and arranged in the manner and for the purposes herein specified.

73,235.—CORSET.—Clara Z. Cummings, Buffalo, N. Y. Antedated Dec. 28, 1867.

I claim a corset having a portion of its back formed of elastic goods, B, and provided with elastic buckle straps, C and D, for the purposes and substantially as described.

73,236.—CART HARNESS.—P. K. Curll, Elk Ridge Landing, Md.

I claim a cart harness saddle, provided with the lever, D, pivoted in the upper end of a bolt, C, said bolt being arranged to turn loosely in the cross-piece, A, all constructed and arranged to operate substantially as shown and described.

73,237.—LOOM.—John Deakin, Gloucester, N. J., assignor to himself and D. and C. Kelly, Philadelphia, Pa.

I claim the combination and arrangement of the heddle levers, pattern chain, and adjustable cams, with levers, E H, or their equivalents, the whole being constructed and operating substantially as specified.

73,238.—CIRCULAR SAW.—Henry Disston, Philadelphia, Pa.

I claim a circular saw, every tooth of which has its back edge so formed in the arc of a circle, having a center eccentric with the center of rotation of the saw, that the sharpening of each tooth may be effected by reducing the front edge in a spiral course, as herein set forth.

73,239.—SAW GUMMING MACHINE.—Thos. S. Disston (assignor to Henry Disston), Philadelphia, Pa.

I claim, 1st, The rotary cutter, G, arranged to revolve in disks, adapted to and admitting of being turned in a suitable frame secured to the saw, all substantially as described for the purpose specified.

2d, The combination of the rotary cutter, G, its bearing blocks, D D, adapted to the movable disks, B, all substantially as and for the purpose herein set forth.

3d, The rod, J, rendered adjustable on the machine, and having a notched end, adapted to the point of one of the teeth of the saw, as set forth for the purpose described.

4th, The recesses, k k, in the disks, B, for the reception of the forked end of the lever, H.

73,240.—REGULATOR FOR TIME PIECES.—Samuel F. Estell, Richmond, Ind.

I claim the combination of the regulating lever, C, having a slotted end, in combination with screw, F, and nut, E, substantially as described, and for the purpose set forth.

73,241.—AMALGAMATOR.—A. L. Fleury, New York city.

I claim the herein described amalgamator, constructed and operating substantially in the manner set forth.

73,242.—BUCKLE.—George L. Gerard (assignor to himself and David Forbes), New Haven, Conn. Antedated Dec. 28, 1867.

I claim the combination of the central bar, f, and bars, h and i, and the rims, r and s, the whole constructed and arranged so as to operate in the manner specified.

73,243.—MACHINE FOR SCOLLOPING LEATHER.—Andrew Goodyear, Albion, Mich.

I claim, 1st, A cutting-edged disk, A, with radial corrugations or other ornamental shaped indentations formed around it on both its faces next the periphery, substantially in the manner and for the purpose herein described.

2d, The use of one or more revolving cutting disks, A, with faces shaped radially in ornamental forms, in combination with an adjustable bed roller, B, and levers, L and M, mounted in a suitable frame and arranged, adjusted, engaged, and operated substantially as and for the purposes set forth.

73,244.—NECK TIE FASTENING.—Robert A. Goodyear, New Haven, Conn. Antedated Dec. 28, 1867.

I claim the spring clasp, c, formed as shown at 1 1, for grasping the button, and so bent at or near the hinge, b, of the plate, a, that a spring is produced for keeping the plate, a, toward the clasp, as and for the purposes set forth.

73,245.—ANTI-FRICTION BEARING FOR MACHINERY.—John Harden, Chicago, Ill.

I claim the glass bearings, B, in combination with the working parts of machinery, A, flexible seat, d, arranged as set forth and for the purposes specified.

73,246.—COMPOSITION FOR PRESERVING WOOD, METAL, CANVAS, ETC.—Louis Harmyer, Cincinnati, Ohio.

I claim the composition itself, and the manner and process of compounding and using the same, substantially as herein set forth.

73,247.—AUTOMATIC ALARM FOR GRIST MILLS.—M. W. Helton and J. H. Redfield, Bloomington, Ind.

We claim, 1st, The apparatus substantially as described, and which is constructed so that when applied to mill machinery and properly adjusted thereto, it will automatically give an alarm at the proper time for changing the sacks, for the purpose set forth.

2d, In combination with alarm mechanism and devices which will automatically sound the alarm, and then be disengaged from the main driving power, substantially as shown and set forth, means, substantially as described, by which the machine can be adjusted and set to sound the alarm at any given time, for the purposes set forth.

3d, The adjustable index wheel, K, with its stop, i, and pawl, m, or their respective equivalents, in combination with the hand or arm, L, upon the shaft, b, and an alarm mechanism, operating substantially as described.

4th, The vibrating lever, D, and catch, H, in combination with the tripping wheel, E, worm-wheel shaft, C, and driving shaft, B, operating substantially as described.

5th, The pawl and clamp, m s, or their equivalents, applied to the wheel K, for holding this wheel firmly in place when properly adjusted, substantially as described.

6th, Sustaining the worm-wheel shaft, C, at one end, by means of a lever, D, in combination with a catch, H, and also with means for tripping this catch, when said shaft, C, has made a given number of revolutions, substantially as described.

73,248.—HORSE RAKE.—Benj. F. Horton, Ithaca, N. Y.

I claim, 1st, The arrangement of the teeth, and the knobs projecting from the lower sides of the thimbles, B, substantially as described.

2d, The combination and arrangement of the described levers and rods, F G H I and J, substantially as set forth.

3d, The combination of the hand lever, J, rod, I, pivoted lever, H, rod, G, lever, F, and lifting bar, E, when all are constructed and operated substantially as described.

73,249.—SODA FOUNTAIN.—John S. Hull, Cincinnati, Ohio.

I claim the soda fountain, G, tubes, H I and J, and cooler, E, combined and arranged for ejecting the water by compressed air forced into the water fountain, substantially as described.

73,250.—STEAM GENERATOR WATER GAGE.—John S. Hunter, Hartford, Conn.

I claim the arrangement of the three-way cocks, b and c, with their respective outlets, G, in combination with the tube, E, the connections, D, so as to operate substantially in the manner and for the purpose herein set forth.

73,251.—MACHINE FOR HUSKING CORN.—H. W. Knowlton, Saratoga Springs, N. Y. Antedated Jan. 1, 1868.

I claim the combination of the rollers, C D, with the elastic aprons, K, on the rollers, I L, substantially as and for the purpose set forth.

73,252.—GENERATING ILLUMINATING GAS.—Ferdinand King (assignor to himself and Charles W. Neudecker), Richmond, Va.

I claim, 1st, The method herein described of generating or producing illuminating gas.

2d, Also the compound oil herein described, for the purpose set forth.

73,253.—PUMP.—James McBride, Flint, Mich.

I claim an inclosed annular space around the pump cylinder, deriving a supply of air from the well, substantially as and for the purpose described.

73,254.—ANIMAL TRAP.—Oliver Metcalf, Salem, Ind.

I claim, 1st, The combination of a catch, a, upon a hinged door, A', with the latch rods, f, upon the revolving platforms, C, substantially as described.

2d, The hinged platform, d, held up by a spring, g, and combined with the revolving platform, C, and apron, b, substantially as described.

3d, Connecting the platform, C, to the spring shaft, c, by means of a removable key rod, h, applied substantially as described.

73,255.—PEN.—Wm. A. Morse, Philadelphia.

I claim a fountain union pen, made of two parts, a c and F, the same being adjustable, and connected, substantially as described and shown, for the purpose specified.

73,256.—HAND LOOM.—Jas. E. Nute and Geo. H. Hathorn, Lincoln, Me.

We claim, 1st, The combination with the loom frame of the pivoted arms a', warp beam, C, rod, c' and eye, d', and screw nut, e', or equivalent, securing devices, substantially as described.

2d, Combining with the treadles, H, the adjustable devices, herein described, for holding the shed pen till the reed beats up the thread, or which will allow the shed to close when the shuttle passes, when constructed and arranged to operate by means and in manner substantially as described and specified.

3d, The combination with the loom frame of the shaft, f, and spooling mechanism, substantially as described, so that the motor which drives the loom shall simultaneously operate the spooler, substantially as described.

4th, The spooler, as constructed, with the sliding serrated bar, s', slide, r', actuated by cam, z, or its equivalent, and with the pawl, t', and eye, f', arbor Y', and support, w, or their equivalents, for suspending the bobbin, all constructed and arranged to operate in manner substantially as and for the purposes specified.

73,257.—FENCE.—E. F. Olds, Brighton, and Warren Clark, Green Oak, Mich.

We claim the special arrangement of the braces, C, in combination with the posts, B, when the said braces are connected to the post and to each other in manner and for the purpose substantially as described.

73,258.—BRICK MACHINE.—S. J. Parker, Ithaca, N. Y.

I claim, 1st, The perpendicular adjustable cam, C, in connection with the plungers and movable wheel, arranged and operating together as shown and described.

2d, So arranging the mold wheel, A, feed plate, E' E'' E''', and contracted feed pipe, G' G'' G''', in connection with each other, that nearly the entire surface of each brick shall be subjected to the smoothing contact of metal, as described.

3d, The arrangement of the adjustable auxiliary cam, N, in connection with the main cam, C, as and for the purposes described.

4th, The cutting wheel, X, arranged in connection with the feed pipe, G'', and feed plate, E''', as set forth.

5th, The secondary feed pipe, Z, and its side grooves, in connection with the feed pipe, G, and feed plate, E''', substantially as described.

6th, The combination of the wheel, A, on the horizontal shaft, L, adjustable cam, C, feed plates, E' E'' and E''', when substantially made, and operating as described.

7th, The combination of the wheel, A, on its shaft, L, adjustable cam, C, auxiliary cam, N, cam surface T a, plate, E', and table, H, arranged and operating substantially as described.

8th, The feed plate, E' E'' E''', when made adjustable, and arranged with reference to the mold wheel, A, substantially as shown and described.

73,259.—APPARATUS FOR THE MANUFACTURE OF STARCH.—John A. Owens, Little Falls, N. Y., assignor to himself and Henry I Petrie.

I claim, 1st, The tank, A, with the shaft and arms, A1, constructed and operating as described, and for the uses and purposes mentioned.

2d, The screen, C, constructed of the sieves, C1 and C2, and the incline

plane, C8, substantially as described, and for the uses and purposes mentioned.

3d, Forming the front end of the sieves, C1 and C2, with the angle, C9, substantially as described, and for the uses and purposes mentioned.

4th, Forming the end of the sieves, C1 and C2, with a curve, substantially as described, and for the uses and purposes mentioned.

73,260.—FENCE.—M. D. Pratt, Copley, Ohio.

I claim the combination and relative arrangement of the stake braces, C, and short braces, D, with the rails, A, and posts, B B, in the manner herein shown and specified, the said stake braces being placed in the hollow of the angles of the fence, and alternating from side to side, as and for the purposes described.

73,261.—TEMPORARY BINDER.—N. M. Shafer, New York city.

Antedated January 2, 1868.

I claim, 1st, The series of clamps, A A, intersected by the steel bars, E, hinging on the wire, B.

2d, The movable slide, C C, and the lug or key, d, for securing the same.

3d, The back, to be used in the manner as set forth and described, in combination with the other parts.

73,262.—COMBINED LUBRICATOR AND WATER CONDUCTOR.—T. A. Shock, U. S. N., Boston, Mass.

I claim the combined lubricator and water conductor, constructed substantially as and for the purpose described.

73,263.—HAY CRANE.—Matthew Simms and Jas. V. Chambers, Wheeling, W. Va.

We claim, 1st, The application and arrangement of the guys, C C C, in their connection with the ring, b, and collar, a, and pin, c, in combination with the movable post, A, arm, A, brace, C', and lever, D, when used substantially in the manner and for the purpose as herein set forth.

2d, The arrangement of the pulleys, F F F, in combination with the post, A, and arm, B, when used substantially in the manner and for the purpose as herein set forth.

73,264.—PLOW.—Stephen T. Skinner, Jacksonville, Mo.

I claim, 1st, My forward upright frame, F, with swing bar, G, and flat chains, H H, for the use and purpose as specified and herein set forth.

2d, The attaching of my pole to the center, or near the left side of my machine, for the use and purpose as specified and herein set forth.

3d, My triple whiffletree with the triple link, x, as represented in fig. III, for the use and purpose as specified and herein set forth.

4th, My crank axles, as made, attached, and operated on my machine, for the use and purpose as specified and herein set forth.

5th, My compound regulating shaft, X, with the revolving sockets, J J, spring lever, K, and circle, L, for the use and purposes as specified and herein fully set forth.

6th, The combination of my crank axles, compound regulating shaft, X, and spring lever, for the use and purpose as specified and herein set forth.

7th, My double crank shaft, M, with lever, N, and slings, Y Y, for the use and purpose as specified and herein set forth.

73,265.—WAGON BRAKE.—James Harvey Smiley, Caroline, N. Y.

I claim, 1st, The extension of the rear axle braces, M and N, behind the rear axle, and suspension on the extremities thereof of the brake bar and brake, as described.

2d, The construction of the metallic braces, S, from beneath the rear axle braces, in front of the hind axle, to the under side of the axle, and thence to the end of the braces, M and N, where they support these braces, and give bearings for the brakes and bar, as set forth.

3d, Constructing the joint between the tongue and reach by the loop on the end of the tongue rod, and playing in the slot, D a, of the plate, D, when arranged substantially as described.

4th, Constructing the tongue rod or bar, by the long part under the tongue, held by the loop near the yoke pin, and extending thence to the rear end of the tongue, where it makes the loop, C a, and thence is continued, over the top of the tongue, to the evener of the whiffletrees, and thus binding the lower part of the bar to the upper and the tongue, by the evener bolt in its slot in the tongue, for the purpose of actuating the brake by the yoke pin, and releasing the brake by the whiffletrees, in the manner substantially as set forth.

5th, The combination of the forward and broad end of the plate, D, with the slot, D a, for the tongue and reach joint, and the slot for the king bolt, and connecting with the reach rod in the rear of the plate, as described.

6th, The combination of the bolt, E, in the holes, E E a E b, with the bolt and holes, F, for the purpose of lengthening the reach, as described.

7th, The combined whole, made substantially as described, for the purposes set forth.

73,266.—HAND LOOM.—Oliver Strong, Green Centre, Ind.

I claim the tappet wheel, E, lever, F, pawl, G, and ratchet or cloth beam, the weighted lever and arm, the same being combined in the manner and constructed as and for the purposes substantially as set forth.

73,267.—ROVING FRAME.—William H. Thompson, Biddeford, Me.

I claim the combination of a series of flexible metallic bands with the transverse rail, E, substantially as herein described, and for the purpose specified.

73,268.—SPRING BED BOTTOM.—J. D. Tifft, Cuyahoga Falls, Ohio.

I claim the combination of sections, B' C', and independent frame, D, operated by the cord and pulley, and hinged to section, C', all in the manner as and for the purpose set forth.

73,269.—MACHINE FOR POLISHING THREAD.—William W. Trapp (assignor to Tobias Kohn), Hartford, Conn.

I claim the guides around which the threads pass, arranged substantially as described, in combination with the reciprocating rubbers, so that each thread in its travel shall present two parts moving in opposite directions to the action of the rubbers, substantially as and for the purpose described.

73,270.—MACHINE FOR TWISTING WAX ENDS.—Francis K. Way, Springfield, Ohio.

I claim the arbors, D, provided with the spring clips for holding the threads, and pulleys for imparting motion, in combination with the driving pulley, C, all mounted in the frame, B, and arranged to operate substantially as and for the purpose herein set forth.

73,271.—FRUIT JAR.—E. B. Whitmore, Rochester, N. Y.

I claim the double bowed bail, C, provided with the finger places, h h, and spring bends, i k k, constructed and arranged substantially as and for the purposes set forth.

73,272.—MACHINE FOR FILLING PAINT CANS.—John Wilcox, Springfield, Mass.

I claim, 1st, The adjustable wing, q, when constructed and arranged substantially as described, and for the purpose specified.

2d, Also, the movable collar, M, in combination with the wing, q, shaft, J, and tube, a, substantially as described, and for the purpose specified.

3d, Also, the angle-box, D, when recessed as described, in combination with the tube, a, and cylinder, E, substantially as described, and for the purpose set forth.

4th, Also, the cylinder, E, when constructed with a shoulder and side aperture as described, in combination with the angle box, D, packings, c c', nut, e, and check nut, e', substantially as specified, and for the purpose set forth.

5th, Also, the packings, c c', when constructed and arranged in the manner described, and for the purpose specified.

6th, Also, the rest, G, constructed and arranged as described, and for the purpose set forth.

7th, Also, the stops, l l', in combination with the slotted rest, G, rod, b, and pin, s, as and for the purpose specified.

8th, Also, the rod, b, when provided with a pin, s, in combination with the rest, G, plunger, H, and cylinder, E, substantially as described, and for the purpose specified.

73,273.—WEIGHING SCALE.—J. D. Willoughby, Shippensburg, Pa. Antedated, December 28, 1867.

I claim the spring, I, or its equivalent, in combination with the scales, for the purpose set forth.

73,274.—SCAFFOLDING BRACKET.—John S. Wilson, Indianapolis, Ind.

I claim the bracket for scaffolding, composed of the elements, A B C, and D, constructed and arranged substantially as and for the purpose set forth.

73,275.—FRICTION MATCHES.—Benjamin F. Woodside, McDonald, Tenn.

I claim, 1st, A twine or cord, coated at intervals with igniting composition as a series of friction matches, substantially as above described.

2d, Also, such twine, in combination with a spool, or wound into a ball, substantially as specified.

3d, Also, the case, D, in combination with the continuous match, substantially as specified.

4th, Also a twine, or other suitable material, when waxed, and forming a continuous flexible taper, substantially as and for the purposes herein specified.

73,276.—RAILROAD SNOW PLOW.—John Resco Adams, Cisco, Cal.

I claim, 1st, the dash board or share, G, and the false bottom or slide, F, operated by the hand-wheel, g, and cord or chain, g', substantially as and for the purpose specified.

2d, The bonnet or gate, E, for retaining the load upon the incline, and the hand-wheel and pins, b, pawl d, and cord or chain, b', for raising or lowering said bonnet, substantially as described; and

3d, The side pieces, D and D', movable in the ways, l l l' l', substantially as and for the purpose described.

4th, The platform, C, upon which the hand-wheels are placed, as described.

73,277.—GATE.—Ralph Adams, Ottawa, Ill.

I claim, 1st, The levers, L, and rods, R, in combination with the rack, E, substantially as shown, for the purpose of opening a gate, all as set forth.

2d, The latch bar, P, and cord, m, in combination with the levers, L, substantially as shown and for the purpose specified.

3d, The pawl, v, in combination with the levers, l and L, and notch, f, for the purpose of holding a gate open, substantially as shown.

73,278.—LAMP.—John Allen, New York City. Antedated January 4, 1868.

I claim the combination of the conical holder of the non-conducting material compartment, C, with the wick tube, B, when constructed as herein described, for the purposes set forth.

73,279.—BIT-STOCK.—Charles A. Amidon, Greenfield, Mass.

I claim, in combination with the jaws, G G, or their equivalents, constructed to move away from or toward each other in the manner described, so that they may conform to the taper of the bit shank, the screw thimble, F, or its equivalent, to force the said jaws upon said shank, as and for the purpose set forth.

The jaws, G G, constructed with the groove, formed substantially as set forth, so as to enclose the taper sides and the shoulders of the shank, as and for the purpose described.

The cavity D, formed with a bevelled orifice, as shown, in combination with the jaws, G G, constructed with correspondingly bevelled ends, as and for the purpose shown and described.

73,280.—EXHAUSTING VENTILATOR AND CHIMNEY COWL.—James W. C. Anderson, (assignor to Henry Demarest,) New York, City.

I claim, 1st, The collar or water stop, a, arranged relatively to the cone, B, and body, A, substantially as and for the purpose within set forth.

2d, Also, the within described construction and arrangement of the body, A, incline, B, connection, C and holes, D and E, as and for the purposes herein specified.

73,281.—MACHINE FOR MAKING CHEESE.—B. Armstrong, Huntsburg, Ohio.

I claim, 1st, the cylinder, E, provided with cutters, I, in combination with the mouth, K', and case, D, as and for the purpose substantially as set forth.

2d, The shell or case, D, and projection, X, constructed and arranged, in relation to the cylinder, E, and cutters, substantially as and for the purpose set forth.

3d, The ring, G, in combination with the cylinder, E, and case D, as and for the purpose set forth.

73,282.—RAILROAD RAIL.—Peter Ashcroft, Richmond Road, Dalston, and George Frederick Lee Meakin, London, England.

We claim a compound steel and wrought iron rail, in which the adjacent (or bearing) vertical surface of the steel and iron portions are formed with angular interlocking ribs and grooves, and the upper faces of the iron plates and lower faces of rail head form taper bearings, all substantially as described.

73,283.—AIR CONDENSING APPARATUS.—H. J. Bailey, Pittsburg, Pa.

I claim, 1st, the combination, with a vessel for receiving and retaining air under pressure, of two vessels for receiving air and water alternately, cooperative by means of cylinders, pistons, and pipes, for the purpose of condensing air, substantially as described.

2d, In combination with the apparatus above named, an eight way cock or valve, and a three way cock or valve, substantially as shown and described.

3d, A condensing apparatus, to which air or water may be applied, for working the valves, and thereby rendering the operation of the same self-acting or automatic, in the manner described.

73,284.—INKSTAND.—N. Gray Bartlett, Keokuk, Iowa.

I claim the overflow chamber, D, in combination with a fountain inkstand, substantially as herein shown and described.

73,285.—EYE GLASS AND SPECTACLE.—J. J. Bausch, Rochester, N. Y.

I claim the combination of the connecting spring, C, guards, D, and plates, E, adjustably attached to the bows, B, substantially as described and for the purpose specified.

73,286.—HARNESS ATTACHMENT.—W. W. Beebee, Dubuque, Iowa.

I claim an attachment for harnesses, substantially as and for the purpose described.

73,287.—WATER PROOF OR DAMP PROOF PAPER.—Samuel C. Bishop, (assignor to Bishop Gutta-Percha Company,) New York City.

I claim a damp proof paper, prepared with valata or balata gum or milk, in any way, substantially as herein specified.

73,288.—WATER PROOF CLOTH.—Samuel C. Bishop, (assignor to the Bishop Gutta-Perch Company,) New York City.

I claim a water proof cloth prepared with valata or balata gum, or milk applied to or used in connection with cotton in any suitable way, substantially as specified.

73,289.—PLIER.—James Bounds, Bridgeport, Conn.

I claim the adjustable jaw, d, dog, g, shanks, A B, and link, e, the whole being constructed and combined substantially as herein set forth and described.

73,290.—INSTRUMENT FOR DRAWING ELLIPSES.—Franklin Bowly, Winchester, Va.

I claim the combination and arrangement of the slotted handle, A, the marking bar, B, the sliding rods, C D, and the connecting rod, E, constructed and operating substantially as and for the purpose herein described.

73,291.—CULTIVATOR.—Jesse C. Boyd, Milroy, Ind., assignor to himself, C. P. Wilson, and L. L. Boblet.

I claim the arrangement of the beams, D, with their attachment directly to the axle, A, by means of shifting clevises, with handle, H, bar, I, and bars, F, and G, the several parts being constructed and operating substantially as and for the purpose specified.

73,292.—REFRIGERATING AND CONDENSING APPARATUS FOR PRESERVING ANIMAL AND VEGETABLE SUBSTANCES.—Edwin D. Brainard, Albany, N. Y.

I claim, 1st, the combination of the drip gutters and condensing and refrigerating troughs or condensers, forming the ceiling of a chamber, constructed and arranged substantially as described, and operating as and for the purposes herein set forth.

2d, The method of forming the condensing troughs, by uniting the sides to a cap with closed double seams, substantially as described.

73,293.—SHAFT COUPLING.—James Brayley, Buffalo, N. Y.

I claim providing the guard ring, A, with concealed recesses, g h, on its interior surface, or receiving the ends of the loose pins, e e, in combination with the holes, i, and openings, i i, of the forked heads, B, constructed and arranged substantially as and for the purposes set forth.

73,294.—APPARATUS FOR RAISING SUNKEN VESSELS.—John Burger, (assignor to himself and Albert Manvil,) Elizabethport, N. J. Antedated January 4, 1868.

I claim, 1st, the envelope, C, constructed and applied to the hull of a vessel, substantially as described, in combination with a suitable binding cable, substantially as and for the purpose specified.

2d, The construction of the binding cable, D, in two or more sections, of India rubber or like elastic material, substantially as and for the purpose specified.

3d, The frame, B, arranged upon the hull of the vessel, and in combination with the envelope, C, surrounding the same, substantially as and for the purpose specified.

4th, The supplemental sheet or wing, E, arranged in relation with the envelope, C, and the hull of the vessel, substantially as and for the purpose specified.

5th, The anchors, G, straining cables, F, and pulleys, h, arranged in relation with each other, and with the hull of the vessel, the envelope, C, and binding cable, substantially as and for the purpose specified.

73,295.—CAR-TRUCK.—Henry T. Carter, St. Louis, Mo.

I claim, 1st, a car truck, constructed as described, with braces or bars, B B', having slotted extremities connected by pins or bolts, substantially as and for the purpose set forth.

2d, In combination with the above, the sliding bar, H, rods, d d' and e, and their connections, substantially as described.

73,296.—POSTAGE STAMP.—Samuel Carusi, Washington, D.C.

I claim constructing a postage stamp, as described, with a blank space upon its face, for the purposes set forth.

73,297.—HINGE.—Samuel A. Chapman, Waterbury, Conn.

I claim, 1st, an iron hinge wrapped or covered on its edges and faces with sheet brass, substantially as described.

2d, In iron hinges encased by sheet brass wrappers, burring or sinking said wrappers into the screw holes of the hinge, for the double purpose of preventing exposure of the iron, and of holding or securing the wrappers, essentially as specified.

73,298.—TWEER IRON.—Robert W. Clark, Pittsburg, Pa.

I claim, 1st, the combination of the air chamber, A, removable top, B, and keys, C C, when the same are constructed and arranged substantially as described.

2d, The combination of the air chamber, A, turning valve, E, and removable top, B, when the same are connected and arranged substantially as described.

73,299.—SEAMING AND BAG CUTTING MACHINE.—John Collins, Jr., and Nicholas K. Nixon, Richmond, Ind., assignors to N. R. Nixon, Thomas Nixon and Allan T. Bennett.

We claim, 1st, the combination of the belts, F F, G G, H H, and I, and their supporting rollers, as and for the purposes shown and described.

2d, The cutters, K K, arranged and operating between the belts, substantially in the manner and for the purpose specified.

3d, Also, a series of knives or cutters in combination with alternate double belts, substantially in the manner described, for the purpose of cutting rags into strips of any desirable width, to be woven into carpets.

73,300.—FRUIT BOX.—Ira Copeland, North Bridgewater, Mass.

I claim a box, in which the cover is secured to the body by means of one or more elastic media, arranged so as to operate substantially as described.

Also, providing a cover, when secured as described, with cross pieces on its outer surface, so that said cross pieces serve to keep apart the bottoms and tops of adjacent boxes when packed in crates, and thus permit circulation of air between the boxes, and also serve as feet for the boxes to rest upon when the cover is secured beneath the box, as in filling, or when used as a show box, and prevent injury to any marks or labels which are upon the outer surface of the cover.

Also, in combination with a box in which the cover is secured as described, and with such cover, the dowel or steady pins and holes substantially as and for the purpose specified.

Also, in combination with elastic media, secured to the sides or ends of boxes substantially as described, cross bars, or slats, or strips of wood, or other suitable material, which serve to reduce the length and cost of the elastics.

73,301.—LOW WATER DETECTOR FOR BOILERS.—C. F. Cosfeldt, Jr., Philadelphia, Pa.

I claim, 1st, the arrangement of the levers, G H, and valve, D, constructed substantially as herein set forth.

2d, The combination of the set screw, I, with the levers, G H, and valve, D substantially as herein described.

73,302.—DEVICE FOR STRAINING WIRE FENCES.—F. H. Crandall, Ontario, N. Y.

I claim the threaded bolt, C, constructed, arranged and applied substantially in the manner and for the purposes herein set forth.

73,303.—MECHANISM FOR OPERATING SEWING MACHINES.—Gustavus Cuppers, New York city.

I claim, 1, The combination and arrangement of the shaft, a, of the spring power mechanism, with the crank shaft and connecting rods for operating the needle arm, shaft for operating the feed and hook, and brake for regulating the movement of the said parts, in the manner herein shown and set forth.

2d, The employment, in connection with the needle bar, of the movable weight or counterpoise, applied to the said bar, substantially in the manner and for the purposes described.

3d, The friction brake, constructed as herein described, and applied to the shaft for actuating the feeder and shuttle, substantially as shown and set forth.

73,304.—DEVICE FOR HOLDING BOOTS AND SHOES.—Henry T. Dillon, Big Lick, Va.

I claim, 1st, The standard, A, provided with two shanks, d d', the levers, R and O, and the hinges, b, supported by the brace, N, by means of the collar, c, as constructed, and for the purpose specified.

2d, The standard, A, in combination with the ratchet, M, and the adjustable standard, B, as and for the purpose set forth.

3d, The standard, A, when used in combination with the standard, C, and its ratchet, f, as is herein fully set forth.

73,305.—SASH STOP.—Bartlett Doe, Boston, Mass.

I claim, in combination, the hollow cylindrical bolt and the outside lever, when arranged in connection with a helical spring, substantially as and for the purpose specified.

Also, the bent wire link, b, when applied to the hollow bolt and lever, substantially as set forth.

73,306.—ORE CONCENTRATOR.—Henry Donnelly, Virginia City, Nevada.

I claim, 1st, The concave, reversible shaking tables, C C, attached to and operating upon the opposite sides of the shaft, B, together with the trough, A, substantially as and for the purpose described.

2d, The key, c, and the spring, d, together with the arms, a a' b b', loosely attached to the shaft, B, for the purpose of reversing and locking the tables, substantially as herein specified.

73,307.—SEEDING MACHINE.—P. A. Downer and A. P. Stuart, Monmouth Township, Iowa.

We claim, 1st, In a seeding machine, having a revolving cylinder, the combination of the sliding head, E, disk, e1, slide, g, lever, h, and standard, L, all arranged and operating substantially as and for the purpose described.

2d, The cleats, d', constructed and applied substantially as and for the purpose specified.

73,308.—FREIGHT CAR.—S. W. Downey, Piedmont, W. Va.

I claim the construction and arrangement of the hinged top or roof, in combination with the car, A a, and rail or rod, C, when the same are constructed and arranged substantially as described, and for the purpose specified.

73,309.—FIRE PROOF SAFE.—Ebenezer D. Draper, Hopedale, and Edward W. Glover, Medford, Mass.

We claim the combination and arrangement of a heat non-conductor, c, of mica or its equivalent, with each or either of the metallic jambs or sides of the door frame, and the filling thereof, the whole being substantially as and for the purpose specified.

Also, the combination and arrangement of one or more strata of fusible metal, d, with the mica or heat non conductor, c, arranged in a safe, substantially in manner and for the purpose specified.

Also, the combination and arrangement of mica, or its equivalent, or of mica and fusible metal, with the sides of the burglar proof and the next adjacent internal surfaces of the safe, the whole being substantially as specified.

73,310.—CARPET STRETCHER.—A. L. Dunbar, Sheldon, Ill.

I claim the carpet stretcher, constructed as described, consisting of the sections, B, of equal length, pivoted together, said stretcher provided at each end with a toothed head, whereby the carpet can be stretched to be nailed down upon two sides of the room at once, without removing the stretcher, as herein shown and described.

73,311.—SAFETY PLUG FOR BOILERS.—Theodor G. Eiswald, Providence, R. I.

I claim fusible plugs, constructed substantially as shown and described.

73,312.—GATE.—Lewis Essig, Canton, Ohio.

I claim, 1st, The opening and closing of any farm or other gate, A, by means of the windlasses, b, and ropes, H, H1 and H2, substantially as shown and described.

2d, The windlasses, b, and the ropes or chains, H, H1 and H2, and the pulleys, E and E', in combination with each other, and in combination with the posts, G, and the post, B, and any gate, A, substantially as shown and described, and for the purposes set forth.

3d, The slotted cap, e, in combination with the gate, A, substantially as shown and described, and for the purposes set forth.

73,313.—PORTABLE SHADE AND SEAT.—Dana Estes, Newton, assignor to himself and Casper W. Roeth, Boston, Mass. Antedated Jan. 3, 1868.

I claim the combination of the adjustable rail, C, and the posts, B B, provided with notches, a, as set forth, with the settee or seat, A, and the awning, D, applied therto, by means and so as to operate as specified.

73,314.—HARVESTER.—D. S. Fisher, Cedar Spring, Ind.

I claim, 1st, The combination of the caster wheel, C, pivoted adjustable standard, a, pivoted arm, b, pivoted bar, d, and perforated horizontal segment plates, D, whereby the rear end of the frame and cutters is raised and lowered, and the direction of the harvester changed, as herein shown and described.

2d, The combination of the projection, ax, grooved wheel, l, spring, m, lever, T, pendent arm, U, crank, mx, shaft, V, rod, p, arm, q, rod, W, and finger, n, as herein described, for the purpose specified.

3d, The combination of the pivoted shaft, M, frame, L, and lever, Q, with the vibrating arm, N, having the pivoted head, O, and rollers, P, the lever, R, and connecting rods, J, all constructed and arranged as described, whereby the vibrating arm is thrown in and out of gear with the driving wheel, B, as herein shown and described, for the purpose specified.

73,315.—BAGGAGE CHECK.—Edward Flather, Bridgeport, Ct.

I claim the indicator arm, C, revolving on the set screw or rivet, D, and their equivalents, in combination with the disk, A B, substantially as herein set forth and described.

73,316.—PUMP.—Robert M. Fryer, New York city, assignor to Universal Pump and Manufacturing Company.

I claim, 1st, The vertical chambers, C D, having sediment chambers, E E', vertical cylindrical chambers, P P', with conical tops, U U', and diaphragm chambers, F F', in combination with a horizontal cylinder, A, arranged as described, and operating in the manner set forth.

2d, The arrangement of the valve chambers, S', T and K, in their relative positions one to the other, to operate substantially as specified.

73,317.—THILL COUPLING.—W. W. Goff, Avoca, N. Y.

I claim the bolt, A, sliding hook, B, and India rubber ring or spring, when combined substantially as and for the purposes set forth.

73,318.—METHOD OF STOPPING CREVASSES.—Louis A. Gossin. Parish Lafourche, La.

I claim the construction and arrangement of the boat, A, and piles, F, in the manner and for the purpose substantially as herein set forth.

73,319.—POTATO DIGGER.—John H. Gray and Charles W. Calhoun, Florence Township, Michigan.

We claim the construction of the machine, with the inner frame, b b, hinged to the front end, with the scoop attached, in combination with the other devices, as shown and described.

73,320.—ELASTIC COUPLING FOR SEEDING MACHINES, ETC.—A. P. Green, Stueben, Ohio.

I claim, 1st, The shank, C, provided with shouldered collars, D, in combination with the ring, E, elastic filling or ball, F, in the manner and for the purpose set forth.

2d, The thimble or sleeve, G, arms, H, in combination with the ring, I, washer, J, and elastic filling, F', in the manner and for the purpose substantially as set forth.

73,321.—BARREL HEADING, CIRCLING, AND BEVELING MACHINE.—Remig Grotz, Chicago, Ill.

I claim, 1st, The frames, J, with their clamping devices mounted on the central pivot, D, and the operating devices, so arranged that as one is moved to the saw the other shall move from it, substantially as described.

2d, The pivoted sleeve, D, provited with the slotted arms, F, for supporting and adjusting the frames, J, as described.

3d, The adjustable locking levers, p, arranged to operate as described, for the purpose of holding the frames in position, as set forth.

4th, The clamps, M, having the adjustable segments, O, with the springs, k, applied to plates, P, in combination with the square mandrel, h, with the spring, i, and cam lever, N, applied thereto, all mounted on the arm, I, of the swinging frames, J, when arranged to operate substantially as described.

73,322.—SOLUTION FOR TREATING VEGETABLE FIBER FOR THE MANUFACTURE OF VEGETABLE PARCHMENT.—Stuart Gwynn, New York city.

I claim the mode of producing the fluids numbered (1) one and (2) two, substantially as described, to be used consecutively in transforming cellulose into "vegetable membrane."

Also, fluid number one, produced substantially as described, as a "new composition of matter."

Also, fluid number two, produced substantially as described, as a "new composition of matter."

Also, the use of these fluids, produced substantially as described, in combination with machinery and apparatus, hereafter to be patented, for manufacturing cellulose, in the form of "vegetable felts," into a "new composition of matter," to be patented under the name of "vegetable membrane."

73,323.—CORN SHELLER.—J. R. Hamilton, Portland, Oregon.

I claim, 1st, The apparatus, as constructed, with a series of rowers, a a a, arranged in a circle, also the scrapers, f f f, in the rear of the rowers, substantially as and for the purpose herein set forth.

2d, The rowers, as arranged alternately, the one forward of another, the same being pressed by springs toward the center, so as to act as a wedge, parallel with, between, and under the rows of corn.

3d, The sliding plunger, H, to push ears of corn between and through bars a a a a, with the rowers or points, b b, attached either vertically or horizontally, as and for the purposes herein set forth.

73,324.—LAMP CHIMNEY CLEANER.—Jonathan R. Hamilton Portland, Oregon.

I claim, 1st, The scrubbers or wipers, A A' and C C, when constructed and applied so as to operate substantially in the manner as and for the purposes herein set forth,

Also, the wiper, as constructed, in combination with the gear mechanism for operating the same, as specified.

73,325.—WINDOW SASH FASTENER.—John W. Hansel, Peoria, Ill.

I claim the combination of the weight, A, on the bolt, B, with the arm, C, on the lever, D, operating together substantially as and for the purpose herein specified.

Also, one or more spurs, s s, on the upper edge of the bolt, B, in combination with its mortises in the window frame, with the said weighted bolt and the fluted lever, D, operating substantially as described.

73,326.—STEAM COMPRESSER FOR VULCANIZING FLASKS.—Geo. E. Hayes (assignor to Buffalo Dental Manufacturing Company), Buffalo, N. Y.

I claim, 1st, The process, substantially as herein described, of closing the flasks under pressure of steam or vapor, during the operation of vulcanizing the rubber in the molds, by means of a steam ram or compresser connected with the flasks by a clamp or otherwise, and having the heat necessary to effect vulcanization transmitted through it in such manner as that the steam which is thus derived from a vessel that is distinct from the vulcanizer, though arranged within the latter, operates to close the flasks in advance of outside steam pressure on the latter, and while the rubber is at a comparatively low temperature, and plastic, essentially as herein set forth.

2d, The steam compresser composed of cylinders, A and B, in combination with a suitable clamp for holding the flask sections in connection therewith, substantially as specified.

73,327.—CHURN.—A. J. Heavner, Time, Ill.

I claim, 1st, The double dasher consisting of the parts, D E, constructed and arranged substantially as described to work one within and through the other, as specified.

2d, Also the double dasher consisting of the parts, D E, operated by the double crank, G H, through the medium of the connecting rods, F I, substantially as described and specified.

73,328.—BOOT HEEL.—Gottlieb Henning and Herman P. Willie, Buffalo, N. Y.

We claim a boot heel consisting of the embedded skeleton frame, A, provided with the flanges on the rim, c, fixed screw, e, and rubber, E, constructed and arranged substantially as set forth.

73,329.—WAGON JACK.—Nicholas W. Hess and Jacob H. Fry, Fort Wayne, Ind.

We claim the lever, A, the concavo-convex or crescent-shaped step or link, B, in combination with the convex surface of the stud or lifter, C, the same being constructed in the manner and for the purpose described.

73,330.—IMPLEMENT FOR DRAWING NAILS.—Henry W. Holly, Norwich, Conn.

I claim the jaws, A A, constructed to open and close as described and with their upper ends or arms having converging sides, g, forming an opening, f, between them so that by lifting on the same through a lever inserted as specified to extract the nail the grip of the nippers is tightened on the latter, in the manner substantially as set forth.

73,331.—IMPLEMENT FOR DYERS AND BLEACHERS.—H. W. Holly, Norwich, Conn.

I claim the forked implement having the extremities of its tines knobbed or enlarged, substantially as herein set forth for the purpose specified.

73,332.—DRY GAS METER.—T. C. Hopper, Philadelphia, Pa.

I claim, 1st, Producing both of the channels, a' a'', on the same side of the partition, A, substantially as and for the purposes described.

2d, In the valve seat, B', the annular channel, b''', in combination with the closed center and narrow-faced dividing partitions, b'' b'', of the four openings which are surrounded by the said annular channel, b3, substantially as and for the purposes described.

3d, Casting the seat, B', of the valve and the projecting portion, b'', thereof in one piece so that both of the channels, a' a'', can thereby be produced exclusively on one side of the partition, A, substantially as described and for the purposes specified.

4th, In the rotary disk, B, of a gas meter the outlet, 3, in combination with the space above the faces, 2 2, and the annular channel, 4, arranged substantially in the manner described and shown for the purposes specified.

5th, Passing the spindle, C, loosely through the rotary disk, B, and giving it a bearing in the seat, D', substantially as and for the purpose described.

6th, Giving rotary motion to the disk, B, upon the seat, B', by means of the cross bar, c', fixed in the spindle, C, in combination with the studs, c'' c'', fixed in the said disk, B, when the spindle, C, passes loosely through B', substantially as and for the purpose described.

7th, Arranging the packing box, F, of the spindle, C, in the top of the valve cover, E, in the position shown as below the worm wheel for the purpose of admitting of the "repacking" as occasion may require without removing the king post, G, as described.

73,333.—CUPOLA FURNACE.—John Howarth, Salem, Mass.

I claim in combination with a cupola, blast or other furnace (in which combined air and steam are used as described) the superheater chamber located directly over the furnace, substantially as described.

Also the superheater base, f, and its upright return bends, g, combined and arranged together and relatively to the furnace and air blast, substantially as shown and described.

73,334.—LOCKING KNOB LATCH.—W. L. Imlay, Philadelphia, Pa.

I claim, 1st, Constructing the key bolt, B, with a projection, F, for the purpose of locking and unlocking the knob latch, A, by means of its described action in the slot of the knob latch, as set forth.

2d, The constructing and arranging of the knob latch, A, with the surface, a (for the action of the key), and the slot in its inmost end for the purpose of giving the knob latch a dead latch action and for the purpose of conjoined locking with the key bolt, B, thus making the latch, A, subserve any one or all of the three uses, as follows: of a simple knob latch, a dead or night latch and an additional security to the key bolt, B, as set forth.

73,335.—HYDROCARBON BURNER.—W. L. Imlay, Philadelphia, Pa.

I claim, 1st, The construction of the vapor and gas chamber, B, with two walls the outer one of any suitable form and the inner one cone shaped or inclined inward, and operating substantially as set forth.

2d, The construction of the blast-equalizing chamber, E, larger than the flow pipe, D, and with the inclined apertures or escape, F, arranged just beneath or just within the lower part of the generator, as set forth.

3d, An apparatus for burning hydrocarbons constructed and made of the pipe, A, from the reservoir, the chamber, B, flame blast aperture, G, tube, D, receiver, E, and escape apertures, F, operating substantially as set forth.

73,336.—SEEDER AND CULTIVATOR COMBINED.—A. Ingalls, Independence, Iowa.

I claim, 1st, The slide, G, as arranged in combination with the lever, H, and adjusting rod, I, for the purpose and in the manner as set forth.

2d, The graduating scale, F', in combination with the adjusting rod, I, for the purpose and in the manner as set forth.

3d, The foot board, Q, and swing bar, O, as arranged in combination with the cultivators, N, for the purpose specified.

73,337.—CARD AND CRIBBAGE BOARD.—R. S. Jennings, Philadelphia, Pa.

I claim a card board constructed as described and so arranged as to be used for playing thereon the ordinary games of cards or the game of cribbage.

73,338.—SWAGE FOR SAW TEETH.—Nelson Johnson, Jasper, N. Y.

I claim, 1st, The provision of notches or teeth, a, on the swage stock to hold the notched or serrated saw tooth against displacement, substantially as described.

2d, The adjustable swage pin or die, B, or its described equivalent, whereby the swage is made to accommodate or adapt itself to irregularities or variations in the saw teeth, substantially as described.

3d, A reversible supporting die or swage pin, B, having a convex or oval face in order to either spread the tooth sideways or draw the same endways, substantially as described.

4th, The die or stamping device, C, in combination with the spring holder, C1, and adjusting screw, C2, substantially as and for the purpose set forth.

73,339.—MACHINE FOR POINTING PICKETS.—W. W. Johnson, Nashville, Tenn

I claim the swinging arm, D, provided with the eccentric lever, F, and the holding clamp, E, when constructed and arranged to operate the picket against the knife, a, substantially as and for the purpose herein described.

73,340.—AXLE FOR WAGONS.—Daniel Jones, San Francisco, Cal.

I claim the countersunk collar, C, either in combination with the strap, D, or, where used alone, constructed and arranged substantially as and for the purpose described.

73,341.—SAW FRAME.—Moses J. Jones, Fredonia, N. Y.

I claim the saw frame, A B, constructed as described and used for the purposes set forth.

73,342.—EXPANDING WHEEL HUB.—A. I. Judge, Baltimore, Md.

I claim, 1st, An adjustable base with an inclined face against which the ends of the several spokes of the wheel bear so arranged that the spokes may be simultaneously more or less extended through the hub by changing the position of the inclined base, substantially as and for the purpose set forth.

2d, Also in combination with a chambered hub the conical base, B, and adjusting screws, A, substantially as and for the purpose set forth.

73,343.—SHINGLE MACHINE.—Edmund Keith, Buffalo, N. Y.

I claim, 1st, The sliding bar, P, and frame, Q, provided with inclined arms, q q, arranged and operating the pivoted tilting frame, N, substantially as set forth.

2d, Also the concentrically grooved wheel, H, in combination with the bar, P, grooves, n t, dog, c', with projections, d', and pin' v, all constructed and operating substantially as described.

3d, Also the sliding spring jaw or clamp, F, in combination with the lever, E, and eccentric, G, for alternately operating to release and hold the bolts, all constructed and arranged substantially as set forth.

73,344.—CLAMP FOR FILING SAWS.—Christian Kendig, Safe Harbor, Pa. Antedated January 2, 1868.

I claim the bed pieces, A and A', when provided with the screws, e e, the face block, B, provided with the screw, f, the jaws, C C', and the clamps, D D', arranged substantially as described and set forth.

73,345.—STREAM OR RIVER FENCE.—H. A. Kephart, Fletcher, Ohio.

I claim the sill pieces, A A, secured in position as shown, or in any equivalent way, and having the slats, B, attached in connection with the counterpoised slats, D, arranged substantially in the manner as and for the purpose specified.

73,346.—SCAFFOLD FOR BUILDING.—James Lamb, Aurora, and Francis Livings, East Enterprise, Ind.

We claim the horizontal bar, B, notched near its inner end, provided with diagonal braces, D D, and vertical bars, f f, bolted together as described between which are passed the shore timbers, C, connecting into the notch in bar, B, for supporting one end of the platform, A, all constructed and used as specified.

73,347.—COFFEE MILL.—W. J. Lane (assignor to himself and J. G. Lane) Washington, N. Y.

I claim the external shell or cone, D, of a coffee mill of the class described when provided with the pendent flange, a, surrounding the conical grinder, E, for the purpose of giving a downward direction to the ground coffee and preventing it from being scattered about in the mill, as herein shown and described.

73,348.—THRESHING MACHINE AND GRAIN SEPARATOR.—Levi B. Lathrop, San José, Cal.

I claim, 1st, The device for imparting the peculiar motion as herein described to the screen, E, said device consisting of the inclined guides, C, arm, G, and crank shaft, H, or their respective equivalents.

2d, Providing a screen, E, with alternate depressions and elevations similar to waves, substantially as and for the purposes herein shown and described.

3d, The packing, e, when arranged at the sides of the frame of the screen, substantially as and for the purposes herein shown and described.

4th, Passing the grain by any suitable conveyor directly under the end of a suction pipe, as set forth.

5th, The screen, E when arranged and operated as set forth in combination with the suction tube, I, the same being arranged substantially as described.

6th, The tossing motion of the screen, E, when applied to the purpose of separating grain from straw or for separating it from chaff or for simply conveying light articles, substantially as described.

73,349.—FASTENING FOR WIRE FENCES.—W. E. Lockwood, Philadelphia, Pa.

I claim the pulley, D, its many-sided projection, d, when the said pulley is arranged to turn in the brackets, B and B', or their equivalent, and is confined by a key, E, all substantially as and for the purpose herein set forth.

73,350.—APPARATUS FOR DRYING ENVELOPES.—William F. Lockwood, Philadelphia, Pa.

I claim, 1st, Two sets of endless tapes or bands in combination with a train of pulleys, arranged substantially as described for the purpose specified.

2d, The combination of the narrow pulleys, C C', with the broader pulleys, D, and the two sets of bands, for the purpose specified.

73,351.—CARTRIDGE EXTRACTOR.—Horace Lord, Hartford, Conn.

I claim discharging or throwing out the empty cartridge (after it has been extracted from the charge chamber) by means of a vibratory or lifting lever or hammer arranged to strike the case, substantially as described.

73,352.—BERRY BOX.—Truman Mabbett, Jr., Vineland, N. J.

I claim a box for berries and other small fruit, constructed of two upright end pieces, A A, and a body B, of semicircular form in its transverse section, and secured to the end pieces as shown, the body and end pieces being perforated or not, as desired, substantially as herein shown and described.

73,353.—LET-OFF FOR LOOMS.—J. A. Marden, Chelsea, Mass.

I claim, 1st, The combination of parts, D F and E, with parts, C and H, constructed, arranged, and operating substantially as described.

2d, The double friction brake, e e', operating upon the periphery of the wheel, C, and actuated by means of spring, H, and the whip roll and lever, D F, and yarn, G, substantially as described.

3d, The above in combination with a take-up mechanism, substantially as described.

73,354.—MILL SHAPE OR MOLD FOR MANUFACTURING TOBACCO.—Grandison F. Marks, Petersburg, Va.

I claim the iron plate, A, or other metal, of suitable thickness, and securing the same to the followers or sinkers, B B, and the plates, e e e, with strong rivets, C C C, for the construction of mill shapes or molds for manufacturing tobacco, substantially as herein set forth.

73,355.—REFLECTOR.—Wm. M. Marshall, Philadelphia, Pa.

I claim, 1st, The flexible base, B, of pasteboard, papier maché, wood, or sheet metal, in combination with the silvered strips of glass, A A, the metal frame, C C, and the curved wire mesh work, D D D, and the metal clasps, F F and H H H, substantially as described.

2d, The wire frame, C C, the curved wire mesh work, D D D, and the metal clasps, F F F, in combination with the glass plates, A A A, and the base, B, when arranged together so as to form a reflector or section of a reflector, substantially as described and for the purpose set forth.

73,356.—GRAIN TESTER.—B. Martin, Prairie du Chien, Wis.

I claim 1st, The grain tester, with the scale, c c', graduated 61 degrees downward, as described, and with a straight edge, r r', upon one side, for the purpose of leveling the grain in the bucket, P, as herein shown and described.

2d, The combination of the spring, L, rod, m, and bucket, P, with the index finger, H, and scale, c c', as herein described and for the purpose specified.

73,357.—BREECH-LOADING FIRE-ARM.—James E. McBeth (assignor to himself and Sheldon Sturgeon), New Orleans, La.

I claim the close hinged box, D, in which are completely incased the lock and cock, and which is held in position by means of the spring dog, I, as and for the purposes specified.

73,358.—LOCK CATCH AND STOPPER.—Edgar P. McCeney, Washington county, D. C.

I claim so combining and arranging a bent lever, b, a slide bolt, c, with a frame, a, in the manner substantially as and for the purposes set forth.

72,359.—ELASTIC PRINTING APPARATUS.—James McDermott, Frederick, Md.

I claim, 1st, The arrangement of the frame, A, movable bottom, B, set screws, H, yokes, E, and adjustable types, substantially as described.

2d, The concave roller, I, shaft, K, reciprocating frame, J, guide grooves, O k, lugs, j, frame, A, and inking apparatus, m m' n, when combined and arranged in the manner described.

73,360.—WINDLASS.—Wm. G. McIvor, Liverpool, England.

I claim the application of strings to a windlass to operate in the manner substantially as and for the purpose specified.

73,361.—ASH SIFTER.—Joseph A. Miller, New York city.

I claim the combination in a box or case, of the upper and lower chambers A B, grate, C D, the one portion, D, of which inclines upward, and sluice or grate, for cleansing ashes or cinders by a water process, essentially as herein set forth.

73,362.—APPARATUS FOR SINGEING COTTON CLOTH.—Joseph A. Miller, New York city.

I claim, 1st, In combination with a rotating singeing body, or surface, the reflector, E, substantially as described.

2d, The combination of a damper, F, with a rotating singeing body or surface, essentially as specified,

73,363.—STEAM GENERATOR.—J. A. Miller, Providence, R. I.

I claim, 1st, The combination of the fire dome, F, with the fire chamber, C, and tubes, G J, arranged and operating essentially as herein set forth.

2d, The arrangement of the valves, H, within the smoke box, for controlling the central or fire dome flues, substantially as shown and described.

72,364.—STEAM GENERATOR.—J. A. Miller, Providence, R. I.

I claim, 1st, The combination of the tubes, C and E, with the shields, D, crown sheets, c, and lower sheets, d, substantially as specified.

2d, The combination of the shields, D, with the sediment tubes, E, and outer tubes, C, essentially as herein set forth.

73,365.—COMBINED DRILL, ROLLER, AND CULTIVATOR.—T. S. Mills, Kendallsville, Ind.

I claim, 1st, Constructing the frame of the machine of two parts, A A, connected by joints, a, and each part provided with a roller, B, when said parts, thus constructed and arranged, are used in combination with a seed dropping apparatus for planting seed either in hills or drills.

2d, The operating of the toothed wheels, G, from one of the rollers, B, through the medium of the gearing, J M, pitman, I, connected with bar, K, and with crank pulley, H, on one of the shafts, F, of the wheels, G, all arranged substantially as and for the purpose set forth.

3d, The bar, O, attached centrally and longitudinally to the frame at its rear end, and provided at its front end with a caster wheel, P, in connection with the wheel K, and strap, l, or their equivalents, for raising and lowering the front part of the machine, as set forth.

4th, Operating the seed distributing wheels, U, through the medium of the toothed segment, W, at the lower end of the bent lever, X, and the pinion Y, on one of the shafts, F, substantially as and for the purpose specified.

73,366.—STAMP MILL.—Geo. R. Mitchell, Nevada, Colorado.

I claim, 1st, The bearing, D, having the lower portion enlarged, forming a water chamber, a, substantially as described.

2d, In combination with the above and with the stem, S, of stamp, a, the water supply pipe, H, tube, F, stop cock, G, and flexible hose, E, substantially as described and for the purpose specified.

73,367.—MANUFACTURE OF ARGAND GAS BURNERS.—George Mooney (assignor to himself, Job Arnold, and James Shaw, Jr.), Providence R. I.

I claim, 1st, Forming an argand gas burner of one piece of metal, substantially as described.

2d, Forming the gas jet apertures through the top or rim of the burner without drilling, and substantially as described.

3d, The screw, f, forming an adjustable check, in combination with an argand burner, for the purpose of producing a still light, as herein shown and described.

73,368.—HORSE COLLAR.—Thomas Moore, New York city.

I claim forming a horse collar with one outside and one inside leather piece joined together at the sides, with two seams only, and bent around continuously at the bottom, so as to make a collar with a whole throat, having no cross seam, arranged substantially as herein described.

73,369.—EYE MEDICINE.—D. R. Morgan, San Francisco, Cal.

I claim the above described composition for treating the eyes, made of the ingredients enumerated, mixed or compounded in about the proportions specified.

73,370.—CORK EXTRACTOR.—Jas. Morton, Philadelphia, Pa.

I claim a double lever cork extractor consisting of the bars, A C and D, all made and operating substantially as herein shown and described.

73,371.—SPINNING MACHINE.—Robt. Moxley, Muscatine, O.

I claim, 1st, The combination and arrangement of the shaft, a''', belts, a a' shafts, F F', brake, T, treadles for tightening the belts, a a', belt, c, and carriage, C, all the said parts being constructed and operating together substantially in the manner and for the purposes specified.

2d, The arrangement of the said parts with the belts, b and d, wheel, D, apron, J, faller, I, slide, L, set screw, l, inclines, g g, and gate, G, the whole constituting a combined hand roll and twisting machine, substantially as described.

3d, The adjustable apparatus for indicating the twist, consisting of the slide O, belt, u, knot, o', lever, v, and bell, W, all arranged and operating substantially as and for the purpose set forth.

73,372.—LAMP.—George Neilson, Boston, Mass.

I claim in combination with the tops of lamps for using burning fluids, an annular cork packing, made, arranged, located, and held in position in the lamp, in the manner and for the purpose herein described and represented.

73,373.—APPLE SLICER.—H. Norton and J. S. B. Norton, Farmington, Me.

We claim the combination as well as the arrangement of the corer, K, with the knives, L L' and H H' H'', substantially as described and for the purpose set forth.

73,374.—LOOM.—Benjamin Oldfield and Edwin Oldfield, Newark, N. J. Antedated Jan. 4, 1868.

We claim, 1st, The combination of a brake, c2 or d, with the tension spring c, reel, R, and shuttle, S, substantially as and for the purpose set forth.

2d, The spring catch or bridge piece, d, in combination with the shuttle, S, and reel, R, constructed and operating substantially as and for the purpose described.

3d, The loose peg, f, in combination with the shuttle-carriers, C, guide bars, h, cams, g, and shuttle, S, constructed and operating substantially as and for the purpose set forth.

4th, The arrangement of slide bars, D, moving on the top of the batten, in a straight line, without rise and fall, having uprights attached thereto with holes in to receive a loose peg or stud capable of carrying a shuttle, each peg or stud receiving motion by a cam or its equivalent, substantially as and for the purpose set forth.

5th, The arrangement of cams, F, attached to or formed by the cog wheels E, in combination with stops, k, on the slide bars, D, substantially as and for the purpose described.

6th, The arrangement of a cam, n, and eccentric, t, attached to and operated by the shaft that carries the shuttle actuating devices, and in combination therewith, the spring stop, s, bar, E', and belt shipper, H, constructed and operating substantially as and for the purpose set forth.

7th, The arrangement of a brake, G, in combination with the stop motion and shuttle motion, constructed and operating substantially as and for the purpose described.

8th, Operating the harness by chains and chain wheels, N, and levers, L M, substantially as and for the purpose set forth.

9th, A harness motion composed of loose arms, L, each of which is pivoted at one end to a lever, M, and at the opposite end to a circular or segmental chain wheel, N, substantially as and for the purpose described.

10th, The vibrators, J', in combination with the rods, I', carrying the hooks I', and with the intervening hinge, O, and pattern chain, Q, constructed and operating substantially as and for the purpose set forth.

11th, The arrangement of elastic springs or cushions under the pins or studs of the pattern chain, in combination with the T-headed shanks of said pins or studs, and with suitable ridges or cavities on the inner surfaces of the several leaves of the pattern chain, substantially as and for the purpose described.

73,375.—COMBINING COPPER AND CAST STEEL.—James Park, Jr., Pittsburg, Pa.

I claim combining copper and cast steel by heating the copper to a good red heat, and teeming or pouring thereon liquid molten cast steel, substantially as and for the purposes hereinbefore described.

73,376.—KEEL AND BILGE BLOCK.—J. T. Parlour, Brooklyn, N. Y., assignor to himself and William Beard.

I claim, 1st, The combination, with the blocks, B C D, and side pieces, E F, of the chains, G K, pulleys, M I L, ratchet wheel, Q, and pawl, R, all constructed, arranged, and operating substantially as described.

2d, The side strips to the supporting or cap piece of a bilge or keel block, substantially as and for the purpose specified.

73,377.—FINISH FOR PAINTED SURFACES.—H. T. Payne and Wm. Ayres, San Francisco, Cal.

We claim a finisher for paint, consisting of crude galena, prepared and applied substantially as and for the purpose herein described.

73,378.—CASE FOR UMBRELLA.—S. H. Pearce, Boston, Mass.

I claim an umbrella-case composed of enamelled cloth, the parts of which are secured together by cement, substantially as described.

73,379.—MECHANICAL TOY.—H. G. Pearson, New York city.

I claim, 1st, A mechanical toy, the positive motions of whose parts are derived from a crank or cranks on the axis or revolving hoop.

2d, Also, the combination, with such a crank or cranks, of a system or systems of connecting links, substantially as shown and described.

3d, Also, in combination, a revolving hoop, carrying a suspended image or toy, which does not revolve, but whose members are given positive and determined movements, substantially as described.

4th, Also, the combination, with the rooling hoop of a mechanical toy, of a radial arm, projecting from the hoop toward its center, as and for the purpose set forth.

5th, Also, the combination, with such a hoop and radial arm, of a jointed image

73,380.—DROPPING PLATFORM FOR HARVESTER.—G. M. Peters, Lancaster, Ohio.

I claim, 1st, A slatted dropping platform adapted to turn upon a pivot located at its inner front corner, and to tilt or drop upon a hinge or fulcrum supports arranged in a line parallel with the finger bar, substantially as described.

2d, The semicircular plate, E, provided with the incline or offset, e', in combination with the quadrant plate, or its equivalent, attached to the platform, and operating substantially as described.

3d, The slatted platform, pivoted at its inner front corner, in combination with the plates, E and F, or their equivalents, substantially as described.

4th, The dropping platform, pivoted at its inner front corner, in combination with the forked lever, J, and cam wheel, K, substantially as described.

5th, The combination of the turning and dropping platform, with the cut-off, M, in the manner substantially as described, whereby the cut-off is operated by the same lever which throws into gear the mechanism operating the platform, as set forth.

73,381.—VALVE FOR STEAM ENGINE.—Wm. G. Pike, Philadelphia, Pa.

I claim, 1st, The steam supply chest and supply-valves, B, and their stem, E, in combination with the two exhaust valve boxes, N N', exhaust pipes, O O1, terminating in a single pipe, O2, exhaust valves, J J', and their stem, all arranged and operating in the manner and for the purpose substantially as set forth.

2d, Also, arranging the exhaust valves, J J', below the exhaust valve box covers, K K', so that said valves move upon and against the under side of said covers, substantially as set forth.

73,382.—SEPARATOR.—J. F. Pool, Monroe, Wis.

I claim, 1st, The thumb screws, P and W, when operating to adjust the screens, m and n, in the manner described.

2d, The screw, X, in connection with a roller, y, for regulating the hopper-screen and hopper, as herein set forth.

3d, The bar, F, furnished with plates, g and e, in combination with shaft, H, plate, K, and hooks, s, the whole constructed substantially as set forth.

73,383.—BOXED HONE.—Joseph Potter and Oliff Abell, Whitehall, N. Y.

We claim, as a new article of manufacture, the circular hone encased in a circular wooden box, having wooden cover, C, in such a manner as to protect the hone and keep its upper surface level, or from having depressions formed therein by the action of the tool being ground, as herein shown and described.

73,384.—ANIMAL TRAP.—Samuel Reed, Whitestown, Pa.

I claim the combination of the hinged vestibule, A, and trap, B, constructed and arranged substantially as and for the purpose herein specified.

73,385.—CAR COUPLING.—Horace Resley, Cumberland, Md.

I claim, 1st, The links or bars, A, with shouldered head and bevelled ends, and suspended by a flexible connection, so that they can rock or turn in the line of their length when they are to connect or disconnect the train, substantially as described.

2d, Also, in combination with the link or bar, A, constructed and operating as above described, the box, B, with shoulders, c c, and rounded end, j, as and for the purpose herein described and represented.

73,386.—CRUTCH.—J. C. Rhodes, Stillwater, Minn.

I claim the handle, G, in combination with the rod, A, spur, B, and the devices for projecting and retracting said spur, substantially as set forth.

73,387.—ROOFING SCAFFOLD.—Peter Richmond, Aberdeen, assignor to himself and Jacob Lamb, Aurora, Ind.

I claim the side pieces, A A, platform, B, plates, I I, and the frame, C C, or scantling, H, for forming a scaffold, the several parts being constructed and used substantially as and for the purpose set forth.

73,388.—HARVESTER RAKE.—Samuel C. Ridgaway, Baltimore, Md.

I claim, 1st, Operating a harvester rake by means of a cam of suitable form, in combination with a rotating arm and lever, or their equivalents, substantially as described.

2d, The combination of the rotating arm, a, rod, D, and rake, R, with the cam, B, when constructed and arranged to operate substantially as and for the purpose set forth.

73,389.—HARNESS PAD.—H. R. Ridgley, Mansfield, Ohio.

I claim, as an improved article of manufacture, a harness-pad and iron, constructed as described, consisting of the solid flanged iron, m, having the crupper loop cast upon and with it, and the continuous pad, d, with its upper surface, m', formed of soleleather, covering and receiving the burrs, e, as herein described, for the purpose specified.

73,390.—CONVERTABLE FORK AND HOOK.—Lyman Riggs, Lansing, Mich.

I claim, 1st, The pin, F, constructed and operating substantially as and for the purposes set forth.

2d, In combination with the shank of a fork, having notches, A B and C, the springs, D and E, constructed and operating substantially as specified.

73,391.—CHAIN INCLINOMETER.—Hermann Schussler, San Francisco, Cal.

I claim a chain inclinometer having the level, I, and scale, A A, together with the handle, III, for ascertaining the correct horizontal distance when measuring, the whole constructed and operated substantially as and for the purpose herein described.

73,392.—CULTIVATOR.—J. B. Sexton (assignor to himself and John L. Andrew), Pella, Iowa.

I claim, 1st, The adjustable iron bars, G, constructed substantially as herein shown and described, and adjustably attached to the end bars, a2, of the frame, A, as and for the purposes set forth.

2d, The beams, H, constructed substantially as herein shown and described, that is to say, curved outward at their forward ends, and strengthened at their rear ends by the cross bars, J, as and for the purpose set forth.

3d, The curved adjustable bar or yoke, L, curved edgewise, and adjustably bolted to the cross bars J, substantially as herein shown and described and for the purpose set forth.

73,393.—SEED DRILL AND ROLLER.—S. Shirley, Guilford, Ill.

I claim, 1st, The wheels, A1, with attachment, A2, in combination with frame A, when arranged as described.

2d, The frame, o, cutter, E, hopper, O, drill point, O1, rods, s s', when combined and arranged as and for the purpose explained.

3d, The roller, P, with the V-shaped projection, having a triangular section cut out, as shown, as and for the purpose explained.

73,394.—COAL BOX.—S. A. Simison (assignor to himself and Boyd D. Simison) Earlville, Ill.

I claim the hopper, B, and drawer, R, in combination with slide, C, and scuttle, G, the last two constructed and operating substantially by means as described, or other equivalent means, and the whole arranged substantially as described, forming a coal box of any desirable shape and size, for purposes herein set forth and specified.

73,395.—MOVABLE BARREL STAND.—P. J. Skinner, Oswego, N. Y.

I claim the combination of the barrel stand with the rollers, D, and upright, B, as and for the purpose specified.

73,396.—CHANGE GATE FOR RAILROAD CARS.—J. B. Slawson, New York city.

I claim, 1st, A self-closing oscillating gate, B, when arranged in the door or front wall of a railroad car, omnibus, or other public vehicle, substantially as and for the purpose herein shown and described.

2d, A self-closing gate, B, when arranged as described, and when combined with a bell, I, so that whenever the gate is opened the bell will be struck, as set forth.

3d, The arrangement of the headed pin, E, and spring, h, in combination with the oscillating, self-closing gate, B, all made and operating substantially as and for the purpose herein shown and described.

73,397.—STORE TRUCK.—A. V. Smith, San Francisco, Cal.

I claim, 1st, The roller, B, brake bar, E, brakes, C C, holder, D D, metal arm H, and springs, c c, when applied to store trucks, substantially as described, for the purpose specified.

2d, The cross bar, I, handles, a a, straps, b b, ring, b', when arranged and operated substantially as described for the purposes specified.

73,398.—DEVICE FOR RAISING CASKS AND BARRELS.—Rob't Smith, Brooklyn, N. Y.

I claim, 1st, A device for transporting barrels, casks, etc, which is made and operating substantially as herein shown and described.

2d, The wheels, B, when arranged in rows, the axles in one row not being in line with those in the other rows on the same side of the frame, A, substantially as and for the purpose herein shown and described.

3d, The frame, A, when provided with slotted upper bars, d, and blocks, g, in combination with the frame, C, and rollers, e and f, all made and operating substantially as and for the purpose herein shown and described.

4th, The device for changing the respective positions of the frames, A and C, consisting of the lever, E, connecting rod, G, cross bar, K, ears, l, and pin, m, all made, operating, and secured, substantially in the manner herein shown and described.

5th, The rollers, D D, on the frame, C, in combination with the frame, A, and rollers, B, as set forth.

73,399.—LET-OFF MECHANISM FOR LOOM.—T. S. Smith, Boston, and A. B. Ely, Newton, Mass., assignors to William N. Ely, Stratford, Conn.

We claim, 1st, The arm, J, in combination with arm, I, and whip roll, F, when J is made adjustable in I, and the parts are severally arranged, substantially as described.

2d, The whip roll, F, and arm, I, having an adjustable arm, J, in combination with the single detent lever or pawl, K k, and escapement wheel, E, when severally constructed and arranged for operation, substantially as described.

The lever, G g, with or without adjustable fulcrum, and having an adjustable weight, L, as set forth, in combination with rocking-shaft roll, F, all arranged substantially as described.

4th, The combination of lever, G g, weight, L, arm, a, levers, F I J K, and escapement wheel, E, all arranged and operating substantially as and for the purposes set forth.

5th, The rod, o, and brake, p P, arranged in combination with and in relation to the yarn beam and whip roll, substantially as and for the purposes described.

6th, The rod, o, and brake, p P, in combination with a let-off mechanism operated by the strain of the yarn, substantially as described.

7th, The mechanism for throwing back the rod, n, or rod, o, to free the yarn beam, substantially as described.

73,400.—WATER WHEEL.—William Snodgrass, Cold Spring, Wis.

I claim the float, D, with its valves, a' and c, the scroll, B, and the segment f, with the sliding piece, g, the spring, h, and screw, i, when arranged and combined substantially as described, and for the purposes set forth.

73,401.—MECHANICAL MOVEMENT.—E. Soper, N. Y. city.

I claim a crank, when composed of the gear wheels, B and D, or their equivalents, and of the plates, C, and pin, a, all made substantially as described, and operating so that the velocity of the shaft is increased without increasing the number of revolutions of the crank.

73,402.—COMBINED CATHETER AND SYRINGE.—Dr. N. B. Sornborger, Northampton, Mass.

I claim the slide or collar on the body to a syringe, in combination with a collar in the discharge tube, when the two are connected together and arranged for operation substantially as and for the purpose described.

Also, the loops applied to the cylinder of a syringe for receiving fastening straps, substantially as described.

73,403.—HORSE HAY FORK.—Isaac C. Spear, New Wilmington, Pa.

I claim, in connection with the curved lines of a hay elevator, a locking device, consisting of arms, b c, link, d, and detaching lever, f, or its mechanical equivalent, constructed and arranged substantially as and for the purposes hereinbefore set forth.

73,404.—WASH BOARD.—Edgar M. Stevens, Boston, Mass.

I claim a corrugated wash board, when made of India-rubber mixed with fibrous material, and shaped and vulcanized in the mold, substantially as described.

73,405.—SKATE.—W. X. Stevens, Waterford, N. Y.

I claim 1st, Forming the sole and blade of a skate from one continuous piece or sheet of metal by first slitting or cutting, and then bending the said metal sheet, substantially in the manner and for the purposes herein shown and described.

2d, A combined skate sole and blade, formed from a continuous sheet of metal as described, and corrugated or indented at the angle formed by the sole, with the blade, so as to form braces for stiffening the said parts, substantially as shown and set forth.

3d, The combination with a skate of ordinary or suitable construction, of the herein described spring clutch for grasping the boot sole, the same being pivoted to the forward part of the skate, so as to extend diagonally across the sole of the same, under the arrangement and for operation as shown and set forth.

4th, The combination with a skate of ordinary or suitable construction, having a stationary jaw or equivalent bearing for the rear of the boot heel of the pivoted catch and adjustable set screw, for holding the said boot heel to the skate under the arrangement and for operation as herein shown and set forth.

73,406.—CHECK-REIN HOOK.—F. U. Stokes, Cincinnati, Ohio.

Antedated January 2, 1868.

I claim the drop piece, C, secured to the point of the check hook, as shown at c, for the purpose of closing the check hook and preventing the rein getting out.

73,407.—ANNEALING FURNACE.—W. R. Thomas, Catasauqua, Pa.

I claim the rings, F, placed between and supporting the car wheels, and fitting snugly within the furnace, A, whereby the heat is prevented from reaching the chilled tread of the wheel, while the center is being annealed by intense heat, the whole supported upon the offset, s, in the furnace, as herein set forth for the purpose specified.

73,408.—MACHINE FOR SOFTENING LEATHER AND HIDES.—Jonathan Tidd, Woburn, Mass.

I claim, 1st, A leather softening machine, constructed and arranged to operate substantially as described for the purpose specified.

2d, The perforated bed, B, or its equivalent, and the pins, c, or their equivalents, with the yielding cross head, G, and the supporting beam, K, for the purpose and substantially as described.

3d, The shaft, H, wheels or cranks, I, pitmen k and rods m, combined with the cross head, G, in the manner and for the purpose substantially as described.

4th, The nuts, d and e, and springs, g, combined with the rods, m, and the cross head, G, for the purpose and substantially as described.

73,409.—LAMP.—Howard Tilden, Boston, Mass.

I claim, 1st, The openings, i i, in the flange, C, arranged in relation to the cap, B, in the manner and for the purposes specified.

2d, The ring, D, when provided with the sustaining wires, e e, and combined with the base, A, substantially as and to operate as set forth.

3d, The base, A, the ring, D, and the cap, B, when arranged with relation to each other substantially as described.

4th, The ring, J, arranged upon and used to lift the cap, B, by, as described and set forth.

72,410.—SAUSAGE STUFFER.—John P. Troxell, Hancock, Md.

I claim the sausage stuffing machine herein described, consisting of the hinged cylinders, C C', rack bars, H H', provided with disks, I I', situated as described, and operated by wheels, E F G G', so that while one cylinder is filling the other cylinder may be filled with meat, and prepared to fill its casing as soon as the first cylinder has done its work, and *vice versa*, substantially as described.

73,411.—MACHINE FOR SIZING HAT BODIES.—Henry Warner, Newark, N. J.

I claim, 1st, The combination of the reciprocating rocking platen or board, C, platen or board, D, and connecting rods, z y, with the crank shaft, B, as and for the purpose described.

2d, The injectors, G and H, and the distributor, w, when used in combination with the boards, C and D, substantially as shown.

3d, The expressing rollers, F, and the weights, I, when combined with the described sizing machine, in the manner and for the purpose specified.

73,412.—CRANK PLANER.—William H. Warren, Worcester, Mass.

I claim, 1st, The combination, with a crank planer or like machine, of mechanism substantially as herein described, for regulating the throw of the crank without stopping or interrupting the continuous operation of the machine, as shown and set forth.

2d, The combination, with gear, F, and face plate, E, of the tubular shaft, g, central shaft, 3, screw shaft, 8, and gears, 4 h 6, and 7, substantially as and for the purposes set forth.

3d, The combination with the shaft 2, and gear, 1, of the loose gear, 5, and pulley, 12, or its mechanical equivalent, operating substantially in the manner and for the purposes herein shown and described.

4th, The combination, with gears, 1 and 5, and pulley, 12, mounted on the shaft, 2, as described, of gears, 4 and h, and their respective shafts, arranged for operation substantially as and for the purposes herein shown and specified.

5th, The combination, with the friction pulley, 12, and beveled pin, 13, of the lever, H, and shoulder, 15, substantially as and for the purposes set forth.

73,413.—MODE OF STRAINING WOOD SAWS.—Joseph R. Webster, Boston, Mass.

I claim, in combination with a hand saw frame, the lever, I, and mechanism by which it is connected with the frame, and is operated to strain the saw blade, substantially as set forth.

73,414.—TUBE WELL.—Rollin C. Welch and Joseph B. Miller, Buffalo, N. Y.

We claim the imperforated external tube, D, connected with the perforated internal tube, A, by means of the inner collar, c, and the outer collar, b, so that the tube, D, comes in contact with an external shoulder of a conical plug, B, of the tube, A, during the operation of forming the enlarged water chamber, a, and rests upon a spring catch when the tube well is adjusted for operation, substantially in the manner and for the purpose described.

73,415.—LANTERN.—George Wheeler, Chicago, Ill.

I claim, 1st, The arrangement of the conical tube or chimney, D, with the globe of a lantern, substantially as and for the purposes specified.

2d, Also, providing said chimney, D, with one or more diaphragms, E, arranged and operating substantially as and for the purposes set forth.

3d, Also, In combination with the said chimney, D, and the openings, b b, in the lantern top, the arrangement of the perforated disk, c, in the manner and for the purposes described.

4th, Also, the arrangement of the draft openings, a b, in the lantern top, with the chimney, D, operating substantially as described.

73,416.—DESK AND SEAT.—Hiram W. White, Olney, Ill.

I claim, 1st, The folding legs, C C C' C', in combination with the notches, 1 2 3 4, and locking plates, F F, or their equivalents, as a means for adjusting desks, tables, and chairs, vertically, substantially as described.

2d, The blocks, H H, and rod, I, in combination with a desk, A C C', and chair, D C C', substantially as and for the purpose specified.

73,417.—CIDER MILL.—W. N. Whiteley, Jerome Fassler, and O. S. Kelly, Springfield, Ohio.

We claim, 1st, Constructing the grinding box in two parts, substantially as set forth, and attaching the bearings of the crushing rollers to the upper part, as and for the purpose set forth.

2d, Mounting the journals of the grinding rollers, V V, in boxes, which are attached to the lower side of the sidewise projecting flange, by screw bolts, and so that the said boxes may be slightly adjustable as to their distance from each other, as set forth and described.

3d, The construction of the press frame with the press beam, L, the stay rods, J J, the front posts, A A, the girder, B, the tie rods, H H, and the angle irons, I I, as set forth.

4th, The two ribbed crushing rollers, S S, and the two grinding rollers, V V, directly beneath them, and running at different speeds, combined and arranged in a metallic grinding box constructed in two parts, and the bearings of one set of rollers connected to one of said parts, and the bearings of the other set connected to the other of said parts.

73,418.—ANIMAL TRAP.—James P. Wigal, Henderson, Ky.

I claim, 1st, the combination of the coil spring, H, crank, G, lever catches, I and J, spiral spring, L, or its equivalent, connecting rods, E and F, and arms, D, with each other and with the wings, B and C, substantially as herein shown and described, and for the purpose set forth.

2d, The combination of the pivoted platform, M, arm, N, connecting rod or wire, O, elbow lever, P, and bar, R, with each other and with the lever catch, J, for the purpose of springing the trap, substantially as herein shown and described.

3d, The combination of the arm, T, and connecting rod or wire, U, with the drop gate, S, and lever catch, I, for the purpose of resetting the trap, substantially as herein shown and described.

4th, The combination of the curved arm, W, with the wing, B, and drop gate, V, substantially as herein shown and described, and for the purpose set forth.

73,419.—MANUFACTURE OF PENS.—Edwin Wiley, Brooklyn, N. Y.

I claim, in the manufacture of pens, composed of both gold and silver and known as the Union Pen, giving the seam between the two metals an extra thickness by means of solder, or otherwise, substantially as and for the purpose described.

73,420.—WORM FENCE AND PEN.—John Will, Bryan, Ohio.

I claim, 1st, the worm fence, constructed as described, whereby pens or yards can be formed by interlocking from either side, as herein shown and described.

2d, The sections, provided with notches at one end in the under part of each board, and, at the other end, in the top part of each board, the notches in the under side of one section engaging with the upper notches of the other section, and held in position by means of the cleats upon each side of the boards, near each end, all constructed and arranged as herein set forth, for the purpose specified.

73,421.—VENEER.—John B. Wilson, New York, N. Y.

I claim the veneer produced by a corrugated or zigzag cut, substantially in the manner as described.

73,422.—PIPE COUPLING.—Lewis Wilson, Ovid, N. Y.

I claim the double convex metal ring, b, interposed between the ends of the pipes, A A, and fitted into recesses, c c, formed therein, and retained in position by external pressure, applied through screw bolts, a a, or their equivalents, substantially in the manner and for the purpose described.

73,423.—WOOD TURNING LATHE.—E. K. Wisell, Warren, O.

I claim the reciprocating and vibrating frame, H, pivoted to the adjustable rod, K, and carrying the adjustable live and dead centers, M M', arranged concentrically with the axis of the revolving cutter-head, B, and operating substantially as and for the purpose described.

73,424.—HARVESTER.—William F. Goodwin, East New York, assignor to Samuel Johnston, Syracuse, N. Y.

I claim, 1st, The arrangement of pinions, H H', and the transmitting wheels on arms, F F', on and around the axle and within the drum, E, whereby the required number of revolutions is obtained, substantially as described.

2d, The spur and bevel pinions, H H' and I, mounted on the tubular sleeve or axle, and operated by means of the drum and transmitting wheels, substantially as described.

3d, The secondary arm, F', carrying the transmitting wheel gearing with the drum and secondary pinion, H', for the purpose set forth.

73,425.—CONSTRUCTING ARTESIAN WELLS.—N. W. Green, Cortland, N. Y.

The herein described process of sinking wells, where no rock is to be penetrated, viz., by driving or forcing down a rod to and into the water under ground, and withdrawing it, and inserting a tube in its place to draw the water through, substantially as herein described.

73,426.—COMBINED TROUGH AND DOUBLE RACK FOR FEEDING SHEEP, CATTLE AND HORSES.—James Douglass McBride, Mansfield, Ohio.

I claim, 1st, The box trough, A, constructed substantially as described, and provided with the rack, T, and the supplementary troughs formed by the hinged boards, B B, as and for the purpose herein set forth.

2d, The rack, composed of the bars, D D and D', and bars, E, forming a double rack, and hinged cover for the box, A, when used in combination with the said box, substantially as set forth.

3d, The graduating end bars, P P, used in combination with the bar, D', for enlarging or contracting the upper and lower racks, as and for the purpose set forth.

REISSUES.

2,830.—CAR STARTING APPARATUS.—Joseph Steger, New York city. Dated July 9, 1867.

I claim, 1st, The multiplying gear, consisting of the traction bar, T, lever or equivalent, L, pivoted pawl, R, ratchet wheel, W, spiral spring, S, and spring, P S, constructed and operating substantially as and for the purpose specified.

2d, The gearing device, consisting of the spring, P S, provided with a foot button and the pawl, R, suspended from said spring, substantially as and for the purpose set forth.

2,831.—NURSING BOTTLE.—Milo S. Burr, Boston, Mass., assignee by mesne assignment of Francis J. La Forme.

I claim my said improved nursing bottle, having its body, A, composed of glass or other suitable material, and provided with an elastic nipple, or mouth piece, f, and a flexible or pendulous tube, C, applied thereto, substantially in manner and so as to operate as and for the purpose set forth.

Also, in a nursing bottle, otherwise properly organized, the use or application of a flexible or pendulous tube, substantially as and for the purpose set forth.

Also, the application of a gravitating tip or tube, c, to the lower end of the flexible tube, C, substantially as and for the purpose set forth.

2,832.—HEATING APPARATUS.—Thomas S. Clogston, Boston, Mass. Dated Dec. 13, 1864.

I claim the application and use, for heating purposes, of one or more tubes having a corrugated or annular ribbed surface, in combination with a boiler or other suitable steam generator, and pipes for conducting the steam or hot water from said generator to the corrugated tubes, essentially as herein shown and described.

2,833.—PEGGING MACHINE.—Wm. N. Ely, Stratford, Conn., assignee of Edgar M. Stevens. Dated May 28, 1867.

I claim, 1st, The combination of a vibrating moving awl with a sliding or vertically moving, or a swinging head, substantially as described.

2d, The combination of a feeding awl, with a sliding and swinging head, or with a sliding head, or with a swinging head, substantially as described.

3d, Raising and driving the awl bar and peg driving bar, or either of them, positively and directly, by means substantially as described, in combination with a laterally moving or feeding awl.

4th, So constructing the parts that the awl bar, moving up and down perpendicularly to its carriage, shall also move laterally, substantially as and for the purposes described.

5th, In combination with the foregoing, the laterally and vertically moving peg driving bar, substantially as and for the purposes described.

6th, Constructing and arranging the knife in relation to the driver and peg tube, substantially as described.

7th, Cutting the peg from the strip, substantially as described.

2,834.—SCYTHE FASTENING.—Pinckney Frost, Springfield, Vt. Dated Jan. 11, 1853. Reissue 524, dated Feb. 9, 1858; extended seven years.

I claim the loop bolt, provided with the groove, b, and the hook or loop, e, in combination with the set-ring, also provided with a groove, b', all constructed and arranged substantially as and for the purpose set forth.

2,835.—STEAM BOILER FURNACE.—John T. Hancock, Boston, Mass. Dated March 1, 1864.

I claim the method of supplying air and steam to ignited fuel in furnaces, by commingling and then introducing them into an enclosed space under the grate bar, by means substantially as above described.

2,836.—HAND STAMP.—B. B. Hill, Chicopee, Mass. Patented November 6, 1866.

I claim, 1st, The employment of an indicator index or calendar, R R', to represent the period of time, in combination with stamp-canceling wheels, I J, arranged and operating substantially as described.

2d, Also, the wheel case, G, stud or axis pin, a, with the ribbon cylinder when made in one piece of metal, substantially as and for the purpose described.

3d, Also, the calendar wheels, R R', arranged upon the same axle with the wheels, I J, in combination with the hand stamp, arranged and operating substantially as described.

4th, Also, the bracket, H, made on or secured to the case, G, having a step, c, or its equivalent, to enter the lower end of the spindle, and orifice for the screw, e, for attaching and detaching said case to the spindle, E, substantially as and for the purpose described.

5th, Also, in a hand stamp, the employment of the flanch, K, on the chase, L, in combination with the case, G, and bed, C, for the purpose of easily and quickly attaching and detaching said chase on or off of said case.

2,837.—STRAW CUTTER.—Franklin Benjamin Hunt, Richmond, Ind. Patented January 5, 1864. Reissue 2,368, dated October 2, 1866.

I claim, 1st, The bar, x, cast in one piece, with the bearings, b b, of cutter shaft, c, and extending across from one to the other, substantially as shown.

2d, Also, connecting the feed rollers, G and H, by means of the pinions, a', b', d', and e', the pinions, b' and d', being placed on studs on the swinging plate, c', attached to the shaft, n, the pinions, d' and e', being kept in gear by the link, f, or its equivalent.

3d, Also, the swinging plate, c', connected to the shaft, n, and carrying the pinions, b' and d', substantially as and for the purpose shown and set forth.

4th, Also, mounting the upper feed roller, H, in a frame, with sling extending below the lower feed roller, and acted upon by a spring, or its equivalent, substantially as shown and for the purpose set forth.

5th, Also, the hooked slings, q q, in combination with the yielding feed roller, H, and spring, I, or its equivalent, whereby the said feed roller, H, is limited in its upward movements, as set forth.

6th, Also, the hubs or bearings, u' u', attached to the slings, q q, and surrounding the shaft, p, of the feed roller, H, said hubs moving in slots, b b, in plates, w, and relieving the shaft from friction against the plates, as set forth.

7th, Also, the guide board or plate, n, connected to and moving with the frame, t, of the upper feed roller, H, and extending downward at the back of the said roller to near a level with its axis, substantially as and for the purpose set forth.

8th, I claim the slots, v v, in the plates, w, when made eccentric with shaft, C, in combination with pinions, a, b, d, and e, said pinions connecting feed rollers, H and G, so that the adjustable roller can move up and down concentric with shaft, C, and the pinions remain in gear, substantially as set forth.

9th, Also, in combination with the bar, x, and adjustable bar, E, a revolving knife, D, with its axis placed above the plane of the adjustable cutter bar, E, to act with a slanting and shearing cut, substantially as set forth.

2,838.—STRAW CUTTER.—Franklin B. Hunt, Richmond, Ind., assignee by mesne assignments of himself. Patented December 27, 1859.

I claim, 1st, Combining in one piece the bed piece, R, upon which the adjustable bar, T, rests, and the side pieces, V V, substantially as shown and described.

2d, The adjustable bar, T, against which the knife cuts, when secured, by vertical bolts, U, to an immovable bearing within the limits of the width of the cutting knife, as shown.

3d, The plate, Y, for the purpose of covering the joint between the adjustable bar, T, against which the knife cuts, and the bed piece, R, in manner substantially as set forth.

4th, The link bearings, M, attached to the shaft, D, and carrying the feed roll, Q, in combination with the springs, W, in such manner that, as the roll rises, it shortens the operative length of the springs, and thereby gives the greatest pressure to the roll when most needed, in manner substantially as shown.

5th, Attaching the fly wheel of a feed cutter to its shaft in such manner as to constitute a yielding device between said wheel and the cutting knife, for the purpose described.

6th, Attaching the knife cylinder of a feed cutter to its shaft in manner shown, or in an equivalent way, to constitue a yielding device between the knife and other parts of the machine, for the purpose herein shown and set forth.

2,839.—FIRE ANNIHILATOR.—Chas. T. Jerome, Minneapolis, Minn. Patented July 9, 1867.

I claim, 1st, The application of a quick match, or its equivalent, which will take fire at a low temperature, to an apparatus for extinguishing fires by an injection upon the same of a gaseous or a liquid non-supporer of combustion, substantially as described.

2d, Preparing the ends of the quick matches with a composition composed of the within described ingredients mixed together in about the proportions set forth.

2,840.—CLOTHES WRINGER.—C. H. Knox, Mount Pleasant, Iowa. Patented July 2, 1867.

I claim, 1st, The double cog wheel, P, and double pinion, S, substantially as set forth.

2d, The combination of cog wheel, P, and pinion, S, with rollers, D D, substantially as and for the purpose set forth.

3d, The arrangement and combination of lever, M, hinged to box, A, roller L, rods, K, levers, I, and plate, C, arranged to operate upper roller, D, as set forth.

2,841.—MACHINE FOR MAKING DRAIN PIPE.—Bradford S. Pierce, New Bedford, Mass., and Mason R. Pierce, Woodstock, N. Y. Patented April 19, 1859. Reissue 1,897. Dated Feb. 28, 1865.

We claim, 1st, A mold consisting of a case capable of being properly secured around the material while the pipe is being moulded, and of being freed from the pipe when the molding is completed, in combination with a core, and also with a core socket, having a provision for freeing the socket or pipe, or both, from the core, the whole operating substantially as set forth.

2d, A mold in which the core socket is made separate and distinct from the other parts, and so formed, and so combined with such other parts, that it is capable of being connected with them when the mold is ready for use, and of being continuously kept connected with them during the entire process of molding and finishing the pipe, substantially as and for the purposes described.

3d, The arrangement of the mixing apparatus and of the core relieving devices above the platform, which conveys the molds in the manner and for the purpose substantially as specified.

4th, The combination of the core socket with the revolving disk, which receives the core and the mold, when the disk contains a provision for enabling the socket or pipe, or both, to be freed from the core, the whole operating substantially as described.

2,842.—HOOP SKIRT.—Wm. T. Ryerson, Philadelphia, Pa. Patented Aug. 27, 1867.

I claim a skeleton skirt provided with buckles, or their equivalents, near the waist band, for adjusting the vertical tapes or connections at the sides of the skirt, to accommodate the size and shape of the hips, or vary the length of the skirt, substantially as set forth.

2,843.—WEAVING.—William Smith, New York city. Dated April 5, 1853. Extended seven years. Reissue 2,656. Dated June 18, 1867.

I claim the process herein specified of weaving consisting in the use of stationary warps in combination with moving warps and filling that inclose such stationary warps, substantially as set forth.

2,844.—WEAVING.—William Smith, New York city. Dated April 5, 1853. Extended seven years. Reissue 2,656. Dated June 18, 1867.

I claim the heddle, or its equivalent, for supporting the stationary central warps in combination with mechanism, substantially as set forth for performing the weaving.

2,845.—CENTRIFUGAL MACHINE FOR DRAINING SUGAR AND OTHER SUBSTANCES.—David M. Weston, Boston, Mass. Dated April 9, 1867.

I claim, 1st, In the construction of centrifugal machines for separating liquids from other substances suspending such machines at the top by flexible connections, operating substantially as described.

2d, The combination of the spindle, D, and its accessories with the socket, B, and its india-rubber bushing, C, or other equivalent spring connection to form a flexible and elastic bearing for the shaft, E, by which the cylinder may be suspended, substantially as described.

3d, The employment in a centrifugal machine of a hollow shaft and a spindle or axle on which it runs to support the cylinder or basket, substantially as described.

4th, So forming and arranging the driving pulley, F, upon the shaft, E, that it shall surround the spring-bearing, substantially in the manner and for the purpose described.

5th, The construction of the openings, I, in the bottom of the cylinder in such machines and the valve, J, for the purpose of closing the same, substantially as described.

6th, The combination of the cylinder, G, the hollow shaft, E, the driving pulley, F, the spindle, D, its elastic bushing, C, and socket, B, to form the operative part of a centrifugal machine, substantially as described.

2,846.—PRINTERS' CHASE.—Richard Yeomans, Cincinnati, Ohio. Dated October 24, 1865.

I claim the transverse notches or grooves in combination with the projecting transverse obtuse edges specifically as set forth, for the purposes designed.

DESIGNS.

2,858.—CHAIR.—Levi Heywood (assignor to Heywood, Brothers & Co.), Gardner, Mass.

2,859.—FLOOR OIL CLOTH PATTERN.—John T. Webster, New York city, assignor to Edward Harvey, Brooklyn, N. Y.

PENDING APPLICATIONS FOR REISSUES.

Application has been made to the Commissioner of Patents for the Reissue of the following Patents, with new claims as subjoined. Parties who desire to oppose the grant of any of these reissues should immediately address MUNN & Co., 37 *Park Row, N. Y.*

47,753.—PLOW CASTING.—Francis F. Smith, Collinsville, Conn. Dated May 16th, 1865. Application for reissue received and filed January 2d, 1868.

I claim, as a new article of manufacture, plow plates made of scemic steel, faced with cast steel.

9,540.—OPERATING THE TREADLES OF LOOMS.—Robert M. Andrews, Stafford, Conn. Dated January 18th, 1853. Extended January 17th, 1867. Application for reissue received and filed January 8th, 1868.

I claim operating each treadle by means of a mover having two outwardly acting cam surfaces of unequal lengths combined in one piece, and producing the movements and retentions substantially as herein set forth.

I also claim such a relative form and arrangement of the treadles and the movers and cams, that the cams can be reversed upon the shaft, and thereby cause a reversal of the movements and retentions of the said treadles, substantially as herein set forth.

I also claim, in a cam loom, having upright treadles or harness levers, actuated by a single set of cam wheels arranging the fulcrum shaft of the harness levers directly over or within the vertical plane of the cam wheels, substantially as described.

54,589.—GEARING.—Metropolitan Washing Machine Company, Middlefield, Conn., assignees of S. Wand, J. F. Palmer, Auburn, N. Y. Dated May 8th, 1866. Application for reissue received and filed January 3d, 1868.

I claim, 1st, Forming upon either or both faces of a disk or circular plate, cogs or teeth, so as to project from the faces of said disk in contradistinction to forming said teeth upon a hub so as to project radially therefrom, substantially as and for the purposes herein shown and described.

2d, The combination of toothed or cog wheels of ordinary or suitable construction, when used in pairs upon the same shaft, with a plate or plates arranged upon the interior opposite or exterior opposite faces of either pair in the manner described, whereby the wheels on the one shaft shall be held in place by the plate or plates of the wheels on the other shaft, and thus prevent the lateral play of the one shaft with respect to the other as set forth.

3d, In a machine having shafts arranged to operate at varying distances from each other as described, the combination with a circular plate or plates on one shaft of a hub upon the other shaft, under such an arrangement that when the gear wheels of the shafts have engaged to a certain extent or depth the said plate or plates and hub shall come in contact and prevent the further and undue penetration of the teeth of said gears, substantially as and for the purposes specified.

66,044.—AUTOMATIC APPARATUS FOR LIGHTING AND EXTINGUISHING GAS.—E. P. Russell and P. Tremain (assignees of E. P. Russell), Manlius, N. Y. Dated June 25th, 1867. Application for reissue received and filed January 4th, 1868.

I claim, 1st, The screws, F F', the bolts, J J', the disk, H, and the arms, H', each separately and in combination with each other, made and operated substantially as and for the purposes set forth.

2d, The combination and arrangement substantially as described, of the main spring, K, gas cock, N, and arms, H', for the purposes set forth.

3d, The stop shaft, E, and thumb screw, I, each separately and in combination with the hollow shaft, F, and the hands, D D', arranged and operated substantially as and for the purposes described.

4th, I claim the springs, J J', separately and also in combination with the bolts, J J,' when made and operated as above described.

70,272.—MODE OF LIGHTING STREET GAS BURNERS.—E. P. Russell, and Porter Tremain (assignees of E. P. Russell), Manlius, N. Y. Dated Oct. 29th, 1867. Application for reissue received and filed January 4th, 1868.

I claim a small supplemental burner, A, to be kept burning constantly, and the pipe leading thereto when operating in connection with a main burner, substantially as and for the purposes set forth.

I also claim the same parts, in combination with a main pipe and burner, to be used in connection with any kind of automatic apparatus for lighting and extinguishing gas, substantially as above described.

13,197.—MACHINE FOR MITERING PRINTERS' RULES.—R. Hoe & Co. (assignees of William McDonald), New York city. Dated July 3d, 1855. Application for reissue received and filed January 6th, 1868.

I claim the combination with a movable cutter of a sector, guide, plate, a rule holding bed and adjusting mechanism, constructed and operating substantially as described and for the purposes specified.

☞ NOTE.—*The above claims for Reissue are now pending before the Patent Office and will not be officially passed upon until the expiration of 30 days from the date of filing the application. All persons who desire to oppose the grant of any of these claims should make immediate application.* MUNN & CO., *Solicitors of Patents, 37 Park Row, N. Y.*

Inventions Patented in England by Americans.

[Condensed from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

3,451.—LIGHTING, HEATING, AND COOKING APPARATUS.—Zoeth Durfee, Philadelphia, Pa. Dec. 4, 1867.

3,484.—OPERATING CHAIR FOR DENTISTS.—James B. Morrison, St. Louis, Mo. Dec. 7, 1867.

3,494.—WEIGHING APPARATUS.—Joseph A. Munn, New York city. Dec. 7, 1867.

3,500.—MACHINE FOR EXCAVATING DITCHES AND DRAINS.—Henry C. Ingraham, Tecumseh, Mich. Dec. 9, 1867.

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WE are prepared to contract and furnish to order Cap Screws, Set Screws, and Milled Machine Screws of every description. A large assortment of the American Machine Screws constantly on hand.
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OF THE
Union Pacific Railroad
Running West from Omaha
Across the Continent,
ARE NOW COMPLETED,
The Track being Laid and Trains Running Within
TEN MILES OF THE SUMMIT
OF THE ROCKY MOUNTAINS.

The remaining ten miles will be finished as soon as the weather permits the road-bed to be sufficiently packed to receive the rails. The work continues to be pushed forward in the rock cuttings on the western slope with unabated energy, and a much larger force will be employed during the current year than ever before. The prospect that the whole

GRAND LINE TO THE PACIFIC
WILL BE COMPLETED IN 1870,

was never better.

The means provided for the construction of this Great National Work are ample. The United States grants its Six Per Cent Bonds at the rate of from $16,000 to $48,000 per mile, for which it takes a *second lien* as security, and receives payment to a large if not to the full extent of its claim in services. These Bonds are issued as each twenty mile section is finished, and after it has been examined by United States Commissioners and pronounced to be in all respects a first class road, thoroughly supplied with depots, repair shops, stations, and all the necessary rolling stock and other equipments.

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At present, the profits of the Company are derived only from its local traffic, but this is already much more than sufficient to pay the interest on all the Bonds the Company can issue, if not another mile were built. It is not doubted that when the road is completed the through traffic of the only line connecting the Atlantic and Pacific States will be large beyond precedent, and, as there will be no competition, it can always be done at profitable rates.

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are offered for the present at **90 CENTS ON THE DOLLAR**, they are the cheapest security in the market, being more than 15 per cent lower than U. S. Stocks. They pay

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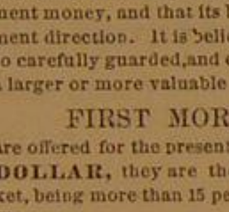
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A New Pamphlet and Map, showing the Progress of the Work, Resources for Construction, and Value of Bonds, may be obtained at the Company's Offices, or of its advertised Agents, or will be sent free on application.

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Send Stamp for Circular and Sample of the Paper.
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PATENTS



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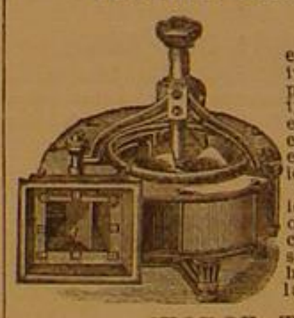
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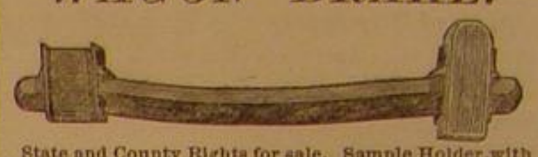
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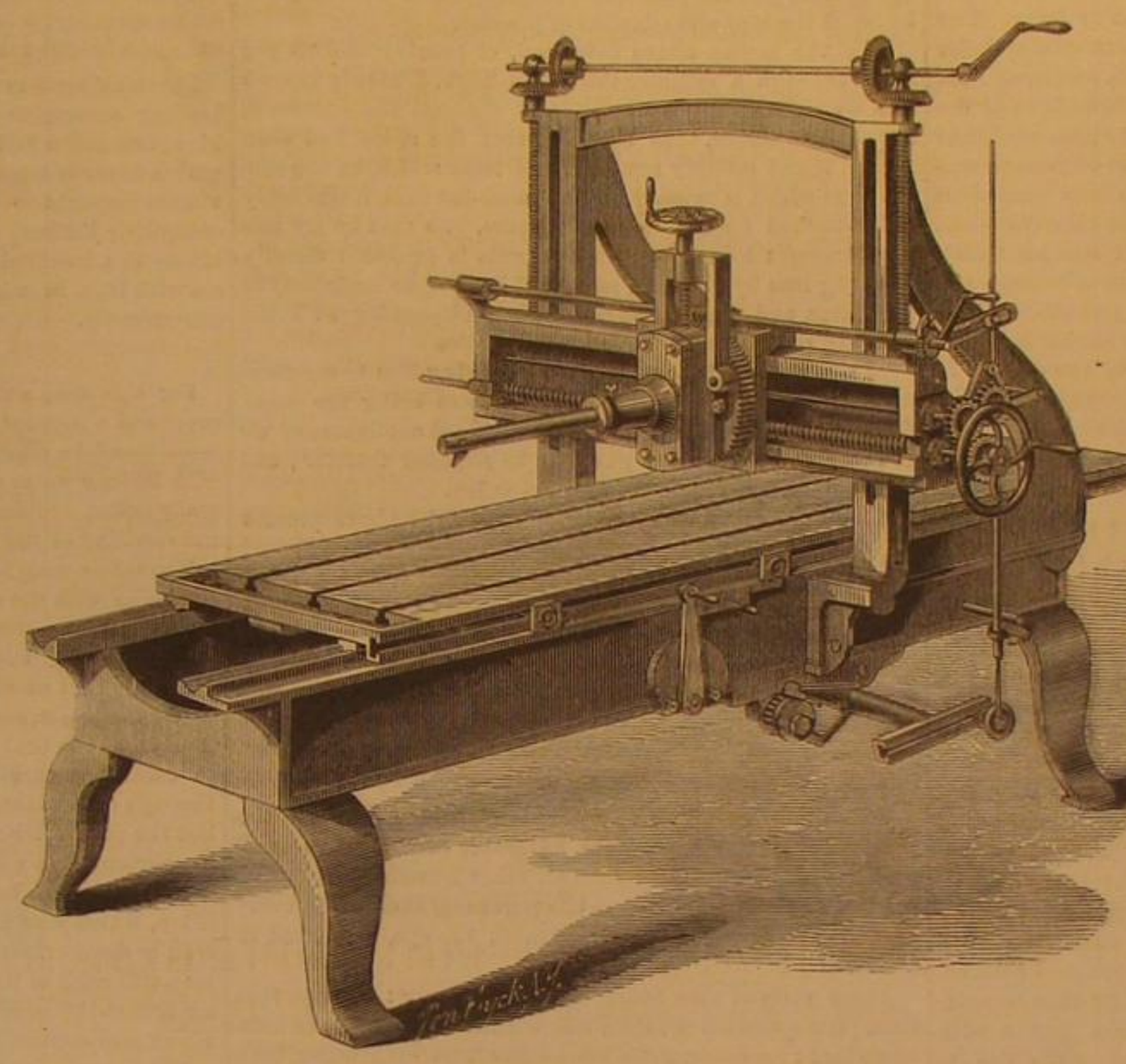
Vol. XVIII.—No. 6. [NEW SERIES.] NEW YORK, FEBRUARY 8, 1868. $3 per Annum [IN ADVANCE.]

Improvement on Iron Planers.

The hand planer and shaping machine are often used instead of the power planer, because the latter could not be easily adapted to the style of work desired when the surface to be planed was angular, slashed, or of a partially circular form. The attempt of the inventor of the improvement intended to be represented in the accompanying engravings, is to adapt the ordinary planer to a class of work now generally done on the hand planer, slotter, and shaping machine. It is of such a character as to be readily attached to any planer, and in no wise impairs its normal efficiency. It is the invention of Charles A. Meinhard, of Fort Wayne, Ind., and was patented through the Scientific American Patent Agency, Nov. 26, 1867.

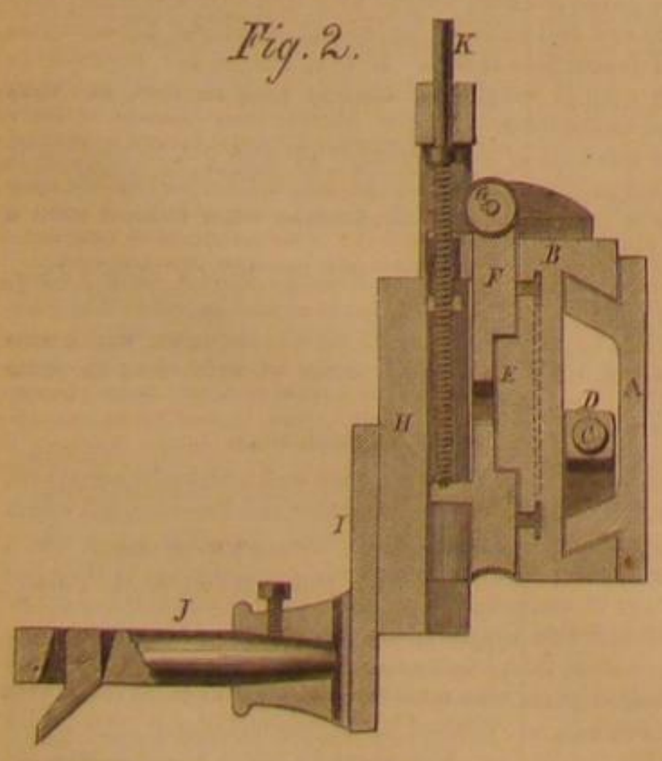
In addition to the work usually performed by the ordinary planer, this appurtenance will enable the operator to work on angular and curved surfaces, or to cut the slots and keyways in taps, reamers, shafts, or pulleys, and other useful adaptations will suggest themselves to the practical mechanic.

Fig. 1 is a perspective view of the planer having this attachment; Fig. 2 being a section of the head and its appurtenances. The letters refer to the latter alone, as their connection with the main figure can easily be traced. A is a frame on which slides the head, B, having dovetailed lips fitting corresponding surfaces on the frame, A. This head, with its connections, is moved transversely across the bed of the planer on the frame, by the screw, C, which works in a nut, D, formed on the inner side of the head, B, so that by turning the screw, C, the head, B, can be worked transversely across the planer as with the ordinary head. On the outer side of the head or plate, B, is formed a circular T-shaped groove, and concentric with it is a circular projection, E. F is a solid worm wheel, having a recess on its inner face, fitting the projection, E, and held by bolts with T-shaped heads fitting the circular groove in B. The shaft, G, which passes, like the screw, C, across the frame, is slotted or grooved from end to end, and carries a worm engaging with the worm wheel, F, and turning with the shaft, G, by means of a fixed feather, key, or pin. It is kept in contact with the teeth of the worm wheel by projecting ears on B. On the face of the worm wheel is a dovetail tenon upon which a correspondingly grooved plate, H, slides. To this plate is bolted the tool holder, I, and a screw, K, serves to elevate or depress the planing or slotting tool by means of the plate, H. The cylindrical



MEINHARD'S COMBINED PLANER AND SLOTTING MACHINE.

Fig. 2.



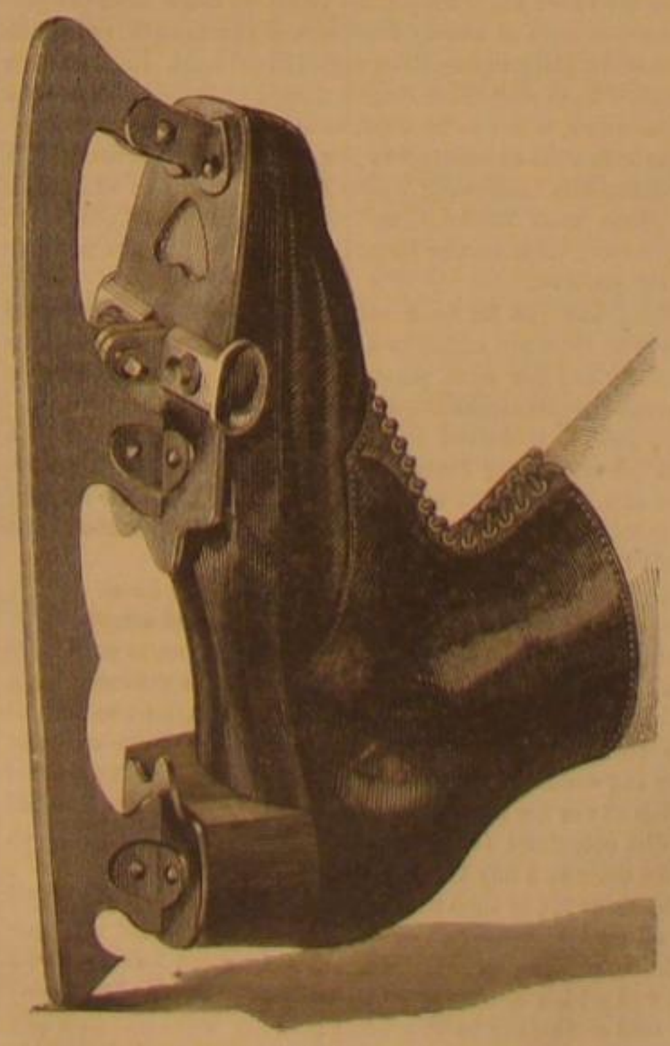
tool holder, J, holds the cutter, which is pivoted in a slot and is held in position by a light spring which allows it on the return stroke, to ride over obstacles, but returns it to place on the forward movement.

It is evident to the practical mechanic that not only the transverse movement of the cutter head can be controlled by an automatic feed, but that the position of the tool to necessary angles or curvatures can be similarly controlled; so that a planer, with this device attached, may by used to plane around surfaces which present a form varying from the level. The tool-holding plate, I, may be at any time removed and another substituted to suit any syle of work. As every practical machinist will readily understand the object and construction of this planer, from the engravings, it will not be necessary to give a more detailed description.

Further information, however, in regard, to rights may be obtained of the patentee, Charles A. Meinhard, Fort Wayne, Ind.

SMITH'S NEW YORK CLUB SKATE.

Skating has become a popular amusement for young and old of both sexes, and is generally recommended as healthful and invigorating. Consequently, the manufacture of skates



in this country has, within a few years, assumed vast proportions, and the skate itself has been greatly improved in material, form, and convenience. Those now generally used are very much lighter than those formerly imported from Europe, the wooden stock being replaced by plates of thin sheet steel and in some the straps and buckles being dispensed with. Such is the character of the skate shown in the engraving, the adopted skate of the New York Club, and deservedly popular in New York and other localities. It is made entirely of metal, the runner and plates being of steel and the clasps of steel, white metal, or brass, silver plated, the latter making an elegant contrast with the other portions.

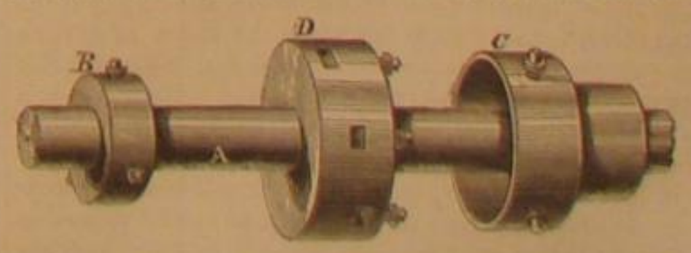
The bottom of the runner is curved in the "rocker" style, but having the full toe and long heel, which, while they give sufficient security to the beginner, supporting the body in all positions, permit backward skating and all other movements desired by the accomplished skater.

The heel fastening is a square plate recessed into the boot heel and held by four screws. In the center is an elliptical hole which receives a similarly shaped button projecting from the heel plate of the skate. This is inserted with the skate at right angles to the foot, and the skate being swung round under the foot, the heel is secured. The front plate is fastened to the sole of the boot by two sliding jaws, the inner face of the projections being serrated to grasp and hold firmly to the edges of the sole. They pass under the front plate, to which they are secured by set screws passing through slots, by which the skate can be adjusted to the width of the foot and be fixed in the center or on one side, as may be desired. The edges of the clamps are so formed as to receive and support the weight of the body when, in describing very large circles in fancy skating, the skate iron is at too great an angle to be depended upon. A horizontal screw, passing through ears on the clasps, draws them together. By means of a key, or wrench, the skate may be put on or taken off in a few seconds. There being no straps, strings, nor buckles, the circulation of the blood is not impeded and the foot is not cramped.

The skate is neat, elegant, convenient, and strong, and in practice we have found it all that could be desired. It is made of the best materials and in a workmanlike manner. The letters patent, granted through the Scientific American Patent Agency to O. G. Brady, date Sept. 23, 1862, and the reissue, to Phineas Smith, Dec. 24, 1867. For rights, etc., address the manufacturer, Phineas Smith, 25 Cliff street, New York city.

BORING OF CYLINDERS ON A LATHE.

We have published two engravings with descriptions—one on page 408, Vol. XVII., and the other on page 52, Vol. XVIII.—on the securing of cutters in boring bars. Both of them must recommend themselves to practical machinists as possessing real advantages over the plans ordinarily employed. They are from correspondents who are evidently practical mechanics, and who know their business. We think, however, that some additional information, not afforded in our



correspondents' letters, in regard to the boring of cylinders may be of use to our mechanics, and offer the following description of a method of boring cylinders on lathes, which we used with success some fourteen years ago, believing it at the time to be original, and not since having seen it in operation in any other shop. Others, however, may have conceived the idea and used the apparatus:

The usual method, when a cylinder has to be bored by a horizontal bar on a lathe, is to "block up" the cylinder, one end resting on the lathe carriage and the other on a temporary support of wood, the cylinder being "shimmed up" with wedges and other temporary contrivances, and secured to place by bolts and nuts. Every machinist knows that such a method involves a large amount of time, demands the exercise of patience, and provokes a disposition to profanity. If one end of the cylinder is brought to the proper level and trued to the cutters, the other is almost certain to be "out," either in one or the other direction.

Our plan is to hang the cylinder on the boring bar itself, making its center the center of the cylinder, the whole being sustained by the centers of the two spindles in the lathe heads. If the cylinder—whether an engine cylinder or a pump tube—is heavy (and this depends mainly on its diameter), the stock of the boring bar, with its proportions as to length, etc., must conform to the work to be done. There is no block'ng or shimming up to be done, and no bolts are required.

The accompanying engraving shows a boring bar, A, of suitable diameter and length, turned and finished from end to end. Bored and reamed to fit are two disks, B and C, which may slide on the bar freely. D is a cutter head secured to the bar by key or set screw, having cored apertures, one, three, five, or more in number, to receive the cutters, which are held by set screws, as seen. Each of the cutters is slightly receded from the other as regards its position relative to the face of the cutter head, or disk. This arrangement every machinist will understand as calculated to allow of roughing and finishing cutters acting one after the other.

The disk marked B is intended to go inside the cylinder, the set screws—the top of heads of which are slightly convex—engaging with the inside surface of the cylinder. The dished disk, C, is intended to pass over the end of a cylinder too small in diameter to receive the disk, B, inside, and set screws, passing through its rim, fasten on the outside of the cylinder. It is provided with a long hub to give sufficient bearing. This disked disk is not necessary to be used in connection with the other, except where, as in iron pumps for ships, one end of the cylinder is much smaller than the other.

The disks, B and C, slide on the boring bar, and are thus a part of the cylinder. To prevent the entrance of borings and dust between the outside surface of the bar and the inside of the sliding disks, a gland of leather or india rubber is passed over the boring bar on the advancing side of the disks. In boring engine cylinders the disks may be dispensed with, and heads be bolted on the ends of the cylinder, the faces of which having been previously turned.

Improvement in the Manufacture of Iron.

This is a recent patent by David Stewart, of Kittaning, Pa., who says:—

"My invention consists in an improved method of treating iron as it comes from the blast furnace, or remelted pig iron, to remove therefrom the carbon, silica, sulphur, phosphorus, and other impurities which are found in the iron, and which are not removed from or have been contracted by the iron by the process of reduction from the ore.

"It is well known that pig iron, or iron from the blast furnace, contains a large amount of carbon, which it receives in the process of reduction, and which must be more or less completely removed in order to produce wrought iron or steel. Carbon has a great affinity for oxygen, greater than either carbon or oxygen have for iron, and as the union of carbon and oxygen, at a sufficient temperature to produce combustion, evolves a great amount of heat, it follows that by mixing oxygen with molten pig iron, the carbon ignites with vivid combustion, and is thereby eliminated, while the increase of heat thereby obtained renders the iron more fluid, and obviates the necessity of using other fuel or fire than is furnished by the carbon contained in the molten iron.

"The most approved mode of accomplishing this object, heretofore introduced into practice, is to pour the melted metal from the blast furnace into a receiver or vessel through which a stream of atmospheric air is forced at sufficient pressure. This, known as the pneumatic process, is attended with the use of very expensive apparatus and machinery, and, moreover, requires to be closely watched, as the operation, if continued too long, injures the metal; besides, it is not effectual in removing the impurities other than carbon, such as silicon, sulphur, phosphorus, etc; and even as respects the removal of the carbon, its operation is not always satisfactory, as it is difficult to secure the equal action of the oxygen on all the particles of iron in the receiver. My improvement produces a much more satisfactory result, with little or no special apparatus, and produces immediately from the molten pig metal wrought iron, which may be at once taken to the rolls and worked in like manner as iron which has been puddled and squeezed.

"My improvement consists in subjecting molten pig metal or iron direct from the blast furnace to the action of oxygen (in any convenient shape, as atmospheric air, ozone, or other vapor or gas containing oxygen), by passing the molten metal in a stream or shower, either poured or forced upwards or sideways, so as to secure an intimate admixture of the particles of iron with the oxygen, or other oxygen-bearing gas or vapor. In order to carry this into effect, no special apparatus is required; indeed, each manufacturer will probably vary the arrangement of his furnace to suit the mode of accomplishing the desired result which will best suit his convenience or the requirements of his business.

"The melted iron may be run directly out of the tap hole of the blast furnace, or may be first poured out into a pot. It is then allowed to run from an elevation of thirty feet, more or less, to the ground, and by this means the iron is brought into intimate contact with the air, so that the carbon is rapidly ignited, increasing the temperature of the metal and its fluidity, and, at the same time, carrying off in a great measure the other impurities, such as silicon, sulphur, and phosphorus, which also ignite with the carbon and are thus eliminated. If it is desired to prevent the metal becoming spattered around as it falls, when it reaches the ground, it may be poured through a pipe, cylinder, or tube, open at both ends, so as to permit the free passage of the air upwards through the cylinder. This plan has the advantage of securing a more uniform current of air, which will flow upwards through the cylinder, in consequence of the rarefaction caused by the heat of the metal. A stream or current of atmospheric air, either hot or cold, or of ozone, or steam, or a mixture of any of the gases or vapors, singly or combined, may be introduced into the cylinder, pipe, or tube, through which the metal is poured; and, if desired, pressure may be applied so as to create a stronger current or blast up through the cylinder. If it is desired to add any fluxes to the iron (or physic it, as the iron workers term it), this may be done before the iron is poured out. The hight from which the metal is caused to fall may be varied according to the quality of the metal, and also somewhat according to its quantity, as the more impure the iron, the greater the hight from which it should fall, the consequent distance through which it should be exposed to the action of the air or other oxygen-bearing gas or vapor, and the larger the quantity, the greater the hight should be so as to secure the more complete action on the particles of iron. A more complete separation of the particles of metal may be secured by pouring it through holes or perforations in a plate or otherwise. Instead of pouring the metal downwards, the same result would be produced by an upward jet; but the plan above indicated, it is believed, will be found the best and simplest in practice.

"By the means above described, of pouring molten pig metal through a cylinder thirty feet high, I have produced iron which, when heated and passed through the squeezers, gave out no cinder, thus showing that the silica had been nearly, if not entirely removed, and from which, in the condition in which it passed from the muck-bar rolls, it was ready to be worked for any desired purpose. So that by my process, wrought iron ready for the rolls is produced directly from pig iron by a process requiring little or no machinery or apparatus, and scarcely any time, and dispensing with the ordinary troublesome and tedious processes.

"I also apply the above mode of purifying iron to the manufacture of semi-steel and steel, the process being the same, though a more perfect and longer continued admixture of air or other oxygen-bearing gas may be required therefor; and such application I include in my invention.

"I do not claim the use of steam in the above process. What I claim as my invention is—

"Purifying pig iron or blast furnace metal from its carbon and other impurities by passing it in a stream through ozone, atmospheric air, or other oxygen-bearing gas or vapor, substantially as and for the purposes hereinbefore described."

MANUFACTURE OF SOAPS.

TOILET SOAP.

Under this denomination a soap is classed which is distinguished by its fine appearance, agreeable odor, and the small quantity of lye it contains, from all other household and washing soaps. It is presented to the purchaser enclosed in every sort of envelope, embellished to catch the eye, or packed in boxes.

Three sorts of this toilet soap are known; namely, that from pure cocoanut oil, from tallow and cocoanut oil, or from hog's lard: however, these sorts differ from each other, both as to the proportions of lye and the manipulation.

Among all the toilet soaps found generally in commerce at present, that from the cocoanut is most in demand, as cold water is generally made use of for washing. This cocoanut soap froths equally well in cold as in warm water, which is not the case with tallow soap worked with soda. Besides this, cocoanut oil is very suitable for a toilet soap, producing a fine white color, and when dyed red has a very alluring appearance.

The lye fit for toilet soap must be either made from the purest German soda at ninety-five degrees of strength, or (which is better for the purpose) from crystallized soda. English soda of eighty to eighty-three degrees, such as is generally found in commerce, is not to be used, as it produces a bad article.

The best soda at ninety-five per cent comes at present from the Baron von Landsberg Velim's chemical works at Schloss Wocklum, near Iserlohn, and delivered free at Cologne, at $\frac{1}{3}^{6}$ per cwt., whereas the English soda at eighty-five per cent costs $\frac{1}{6}^{5}$ per cwt.

When the lye for finer soap is to be made, a hundred pounds of lime are added to a hundred pounds German soda at ninety-five per cent, whereas forty-five pounds lime to a hundred pounds crystallized soda is the general proportion.

The soda is dissolved in the boiler with water, or with a weak lye remaining from a former operation at twenty degrees of strength, and afterwards added to the lime slacked to a state like broth. This mixture must boil two hours and be left to deposit.

The next day, the lye, which probably may be at twelve degrees, must be taken out, and the boiler filled afresh. The lye drawn from the lime and at eight degrees, is poured in with it to evaporate. By this method a lye is produced at a medium of nine or ten degrees, but it must be evaporated till according to the lye scales it shows thirty-four degrees. After the cooling it will weigh thirty-six pounds. This evaporation of the lye is to increase its causticity, and to cause all the dirt contained in it to precipitate to the bottom, which can be done in a day if it is sufficiently strong.

The clear lye is then drawn off from the dirty deposit, and put either into vitriol bottles or into an iron vessel well covered. If vitriol bottles are used, they must be filled with water in which some lime has been dissolved, to take away any acid remaining in the bottle, which would, if this precaution be not taken, absorb much of the causticity of the lye, and this must be done several days before using the bottles. The dirt and deposit from the salt remaining at the bottom after the boiling, can be added to the lime in the weak lyes.

We have not made the experiment of using the lye stronger than eleven degrees before the evaporation, as we have learned from France that it must not be stronger than eleven degrees. Yet, after mature experience, it appears to us now that a lye can be obtained quite as good by adding more soda and lime to the lye, and thus increasing the strength to eighteen or twenty degrees, by which the evaporation is spared. In this case more vessels are wanted, which must not be of wood but of iron, because the wood will color the lye, which must be especially avoided for fine soap, for the only means of obtaining a perfect soap free from defect, is to use none except the finest and whitest lye, and oil or grease of the greatest purity.

If the clearness be an indispensable requisite for this lye, it must be much more so for the oil or grease to be employed, the proportion of which is so much greater than the lye.

The cocoanut oil to be used for this soap must be of the best quality of Ceylon oil, which is dazzling white, of an agreeable odor, and without the slightest acid. If it has a strong odor, then it is a bad oil, and will produce a soap of a strong and disagreeable smell. Before purchasing a considerable quantity, it is better to have some samples from different casks brought in order to choose the best.

For making fine soap, low forms of wood are required, holding seventy-five to eighty pounds of soap, six inches high, two and a half feet long by one and a half in breadth, with a cover of wood exactly fitting the form, so that the soap will be brought to the same level, and nothing lost by its obliquity; further, a small iron boiler is needed, holding ninety to a hundred pounds of soap, standing on an iron circle with legs, in which boiler the soap can be stirred more conveniently.

TRANSPARENT SOAP.

For this soap a small still, such as distillers use, with a cover and a serpent, is wanted. This still with its serpent must stand in another boiler, in which it is heated either with boiling water or by steam, and besides, some tallow soap ready boiled and unsalted is wanted, and some spirit of wine not smelling of bad brandy.

The tallow soap must be cut in small pieces, and put into the boiler with the spirit, in the proportion of ten of spirit to ten pounds of tallow, and the cover put on, with the serpent communicating through, and carefully pasted round with dough, so that no steam may escape. The fire is then made under the boiler, and the soap with the spirit brought to boil. As soon as the heat is felt in the mass, the spirit will begin to evaporate through the serpent; but as it has to pass through cold water, it will not be the steam which escapes, but the pure spirit, which will flow into a vase placed under the serpent. As soon as this escape of the spirit commences, the heat must be brought on slowly, to prevent a strong ebullition, which would cause the soap to come to the surface, and seek to escape through the serpent. If, notwithstanding, the soap still stick to the serpent, there is no other way to obviate it than by pouring hot water through the serpent, but which will certainly stop the boiling.

When ten pounds of spirit have been used, five pounds only must escape through the serpent, and therefore there will be five pounds left with the soap. The soap is then finished, and the cover must be taken off, and the soap poured into a tin chest to cool it. Before it is cold, a little oil of cinnamon of cloves must be given to perfume it, and if it is to be dyed, some root of alcana is used for red, and gallnut for brown.

The next day the soap detaches from the tin chest, and is then to be cut into lengths of one and a half feet, and three and a half inches thick, like the large bricks of soap, and dried in the open air eight or ten days. It is true that it does not dry altogether, but shrinks in the middle, while the edges continue pointed. At the end of ten days it is cut into pieces of the intended weight with iron wire, and these pieces left to cool still another day, and then pressed between two small plates into tablets. If oval shapes are required, as much soap is weighed at once as each requires, and thus placed in the form.

For this kind of soap cocoanut oil must not be used, as it will not produce a fine transparency, neither will tallow soap made with soda be suitable, because when finished such a soap froths badly.

When this transparent soap should be of a clear yellow, there must be no dye added, but it should be left as it is when distilled, suppressing also the oil of cinnamon, which also gives out color; only a few drops of aniseed or lavender should be used to perfume it.

BROWN WINDSOR SOAP.

Under this name there is a soap well known in commerce, and much esteemed for its durability and fine odor, but which is not made by the cold system, like the other toilet soaps, but by boiling and unsalting with grained soap, or from the shavings of perfumed soap, to which only one third of cocoanut oil and two thirds tallow are added. If prepared from grained soap, from eighty to a hundred pounds of the clear of a boiled grain soap must be drawn off, and poured into a small furnace, and thinned with some water, and dyed brown with the proper dye. Care must be taken to stir it well till the soap thickens in the form, to prevent the appearance of white streaks. For that reason, a soap well prepared can only be made use of for this purpose.

If Windsor soap is to be made from shavings, they must first be melted and salt added till the soap separates from the lie, and a good grain appears. The dye is then applied, and the soap poured into the form, and stirred until cold, when it is to be perfumed.

For the perfume, two thirds oil of cinnamon and one third

oil of cloves are used, to which a little tincture of musk can be added. This tincture is to be bought at every druggist's, ready prepared, but any one can make it by pouring a little spirit on some musk. The cheapest way is to buy the shrivelled pods of musk, and when cut in small pieces, steeped in spirit for a fortnight, which will communicate the odor to it. Much soap perfumed by this method is found in commerce.—*Kurten.*

Progress of Locomotion Since 1834.

When, in 1834 (says the London *Examiner*), the Duke of Wellington despatched Mr. Hudson to Rome to inform Sir Robert Peel that he had been called upon by King William IV. to form a ministry, it was thought a marvel that the messenger was able to complete his journey on the twelfth day after that on which he left London. Bound on an analogous mission, a Mr. Hudson of the present day would give but a poor account of his journey, if he said that he was occupied upon it even a fourth of that time. By the old roads the distance was a little under one thousand three hundred miles. By railway, the distance over Mont Cenis passage of the Alps is one thousand three hundred and fifty-five miles. In 1834 the cost of Mr. Hudson's journey was about £250. Had he occupied eighteen days instead of twelve, and travelled by the ordinary postal conveyances of the period, he would have paid about £30. The first class fare between London and Rome now does not exceed £13.

The traveller who leaves London on any morning, let us say Monday, at half past seven o'clock, can reach Turin, seven hundred and ninety-nine miles, including a sea passage of twenty-two miles and fifty of ordinary road conveyance, across the Mont Cenis, as the chimes of the Duomo are striking the quarter before twelve on Tuesday night. When the Mont Cenis railway is open, the saving in the passage across the mountain will enable him to push on to Florence the same night; but until then he must repose at Turin until a quarter before eight the following morning. Resuming his journey, he will be in the capital of Italy, three hundred and twenty-three miles further south, at eight that evening, and he can start an hour afterwards, for the Eternal City. The distance from Florence to Rome, two hundred and thiry-three miles, can be accomplished in nine hours and twenty minutes, in which are included frontier *visa* both of luggage and of passport. After a break of four hours he may start again for Naples, one hundred and sixty-three miles further than Rome and fifteen hundred and eighteen from London, and here he arrives at 6:30 P. M. on Thursday evening, three days and eleven hours from the time he left home. When the Mont Cenis railway is completed, the time will be shortened by nearly twelve hours.

In 1834 the *Malle Poste* journey from Paris to Marseilles took eighty hours, the roadway being distance five hundred and thirty miles. In 1867 we leave Edinburgh at seven o'clock in the evening, the next evening at six we are in Paris—six hundred and ninety-seven miles—and the following day at noon we are at Marseilles. Yet Edinburgh and Marseilles are one thousand two hundred and thirty-nine miles apart—our pace, including breaks and stops, has been thirty miles an hour while traversing the whole distance; exclusive of the breaks and stops, five-and-thirty.

Roughly estimated, the number of persons who travelled by mail coaches throughout the United Kingdom in 1837, the year before the partial opening of the railways between London, Birmingham, Liverpool and Manchester, was 2,688,000. If to these be added twenty-five per cent, as representing travellers with post horses, in wagons and canal boats, we have a gross total of land and canal travellers of about 3,360,000; or an eigth of the total population of the kingdom at that time. In 1865, the latest year for which the Board of Trade returns have as yet been issued, the number of passengers carried on railways (including an allowance of one hundred journeys for each annual ticket holder), was 261,577,415, more than eight times the total population of the kingdom. The number of persons traveling on public roads to and from railways is believed to be fully as great as it was by roadway conveyances in 1837. In other words, land traveling in the United Kingdom has *de facto* increased nearly ninety fold in eight and twenty years. Comparing the population at the two periods the increase has been sixty-four fold.

In 1865, the number of third class travellers by railway, in England, was 151,416,269. There is something marvellous about the development of this third class traffic. In the seven years between 1859 and 1865, both inclusive, the yearly average increase of first class passengers was 1,494,122; of second class, 3,775,905, but the average yearly increase of the third class was 9,316,432. This increase must, however, be looked at in another way. In the four years, 1858 to 1862, its average was 4,893,310, but the increase of 1863 over 1862 was 15,617,917; of 1864 over 1863, 15,229,183; of 1865 over 1864, 15,114,688.

At the end of 1865 there were 7,414 locomotives in working order, and during that year they ran 139,527,127 miles with trains behind them. They evaporated as much water as would supply both Manchester and Liverpool with thirty gallons per inhabitant for each day in the year. In the generation of steam only they consumed about 2,625,000 tuns of coal.

The progression of the railway system of Great Britain has been as follows: On the 1st of January, 1843, 1,857 miles were open for traffic; at the same date in 1849, they had increased to 5,007 miles; on the 1st of January, 1855, there were 8,054 miles; eight years afterwards, that is, on the 1st of January, 1863, 11,551; that day twelve months they were 12,322; on the 1st of January, 1866, they were 13,289.

The latest statistics show that there are about 53,000 miles of railway in Europe. The following were the lengths open in different countries at the commencement of the present year: The United Kingdom, 13,382; France, 8,989; Prussia, 5,483; the Austrian domiaions, including the non-German provinces of Austria, 4,001; Bavaria, 5,208; Saxony, 1,587; Belgium, 1,910; Italy, 3,040; Spain, 3,316; Russia, 2,893; North and South America, 37,886 (of these 32,896 belong to the United States, and about 16,000 miles are in course of construction there); India, 4,070; Australia, 669. Railways are completed for opening all over the world, at the rate of 10,000 miles per annum; thirty-five miles for each working day throughout the year.

Science Familiarly Illustrated.

HEAT AND COLD.

We present for our young readers (and it may be for older readers) a verbatim report of a familiar lecture by Prof. Tyndall on the above subject, illustrated by engravings. It is a subject of great importance and is very imperfectly understood by people generally, although of value to both old and young. The genial style in which the information is given will commend itself to all our readers:

Now, I suppose all of us twenty times a day—perhaps more—make use of the word "I." Every boy here present says, "I eat," "I drink," "I sleep," "I feel;" but perhaps very few boys or girls either ever ask themselves, "Who is this *I* that does all these things?" and if you went to the biggest man in the world, or the greatest philosopher, you would puzzle him exceedingly if you asked him "Who is this *I* that sleeps, and drinks, and eats, and feels?" In fact, philosophers, great as they may be—and great they are—find that there are things altogether beyond their power to understand, and this wonderful human *I* is one of those things. Hence, I do not want you to be able to answer me if I ask, Who is this *I*—what is this *I*—that sleeps, and drinks, and eats, and feels, and makes use of its senses? In fact, as I have said, the best of us know very little about it; but we know a great deal of that peculiar instrument by which the *I* operates upon the world, and by which it understands the things that are going on in the world, and that instrument is the wonderful human body. When we examine that body, looking into its interior parts, we find bones and muscles and tissues of various kinds; and passing through these muscles we find strings of whitish matter—strings going from the spinal marrow, and going from a mass of matter that rests in this wonderful cavity called the head. I say those strings of white matter go through the body, and they are called the *nerves*: and it is by the intervention of these nerves and this wonderful brain that we human beings are able, so to say, to hold converse with the world round about us. Now, these nerves transmit the impressions from without. If I prick my finger a nerve is affected: it is lacerated by the pricking of the pin or the penknife, and that nerve thus lacerated sends intelligence through itself up along the arm to the brain; and until it arrives at the brain you do not feel anything. It travels up to the brain at the rate of about 180 feet in a second. This is one of these wonderful things that have been measured by able men. You do not feel the exact moment your finger is pricked.

Now, what the nerves in all these cases convey to the brain is something in the nature of motion; and in order to enable you to form an idea of this motion I have arranged a little experiment. And here I must call upon that power which every boy and girl here possesses—that wonderful power which is sometimes called "imagination"—the power of picturing things before the mind. I would ask you to picture one of these nerves going through the body to the brain; and I would ask you to figure that nerve burned, we will say. Now, how are you to conceive of this nerve? The nerve is made up of very minute particles to which we give the name of "molecules" or "atoms." They are sometimes called atoms. In fact a molecule is an aggregate of atoms. But what I want you to clearly realize, and which is perfectly in your power to realize, is that these nerves are composed of little particles—(I do not care about the name, whether "atoms" or "molecules"): and if you disturb the end of any nerve—if you burn it—if you prick it—what you do there is that you impart *motion* to the body. This motion runs along the nerve, and when it reaches the brain it declares itself in some form—of pain, or, it may be, of pleasure. Now, how is this done? You may, in fact, consider those nerves to be like the telegraphic wires that go through the streets. You have seen them passing through the air of London; and these telegraphic wires carry messages to and fro through various parts of London. I say, you may consider the nerves as being represented by those telegraphic wires, and you may consider the brain a great central station, so to say, with which the nerves communicate—to which they communicate their messages, and from which they receive their messages. In order to make this plain I have here arranged a little experiment—very simple indeed. You can make it yourselves with the glass balls used in the game of solitaire. You see I have there a series of these balls, and I want to enable you by these balls to conceive how motion is propagated through the nerves. There is nothing shot through the nerves: the motion is communicated from particle to particle. Observe, here. If I take hold of this ball and strike it against the first ball of this series, you will observe what occurs. The motion will be transmitted through all the series of balls. Each ball will take up the motion given to it by the preceding one, and pass it on to its neighbor and thus the motion will go through the entire series so that the last ball of the series will be the only one affected. Observe how the last ball is detached. There it goes away. The moment I hit this last ball the terminal ball flies off. Now, in some such way—in a way somewhat analogous to this—is motion propagated to the brain. Allow this ball to represent the brain. Now, if we take our series of balls thus, and strike, as I have said, the first ball, the blow will be communicated to the terminal ball, and that, liberated, will strike against the bell. The sound of that bell is something like a signal given in the brain. [The bell was sounded in the manner indicated.] Here you have the motion transmitted from the first ball, and finally the bell is thus affected. In the way somewhat rudely and roughly represented by this experiment the motion is transmitted to the brain, and when it reaches the brain it evidences itself, as I have said, as pleasure or pain, as the case may be.

Now, having exercised your imagination upon those particles which I have called atoms or molecules, I think we may go on to consider the character of this power that we have to deal with in this course of lectures; that is, this thing that we call "heat." Long reflection and many experiments on this important subject have caused men of science—learned men who investigate such things—to the notion that this thing that we call heat is a kind of motion. And now I should like every, even my youngest hearer (and that is a large demand) to figure, by this power of imagination, what I describe. Take any substance,—for instance, this body which I hold in my hand. This, like our nerves, is composed of little particles or atoms. It is not absolutely cold at the present time. Of course it may feel cold to my hand, but it is really not cold. Those particles that I have been speaking of are in a state of motion. Although they are too small to be seen, and although the motion is entirely too small to be seen even by our best microscopes, still we have every reason to believe that the particles of that body at the present time are vibrating. The little particles, remember—(picture them to your mind)—are vibrating to and fro; and the warmer the body is, the more intense is this motion; and, in point of fact, it is this motion of the smallest particles of the body to which, when communicated to the nerves, and through the nerves to the brain, we give the name of heat. Now, although I am dealing with some of the deepest things in science, still I expect all the boys and girls here to clearly figure to their own minds this substance as an assemblage of small particles, and those particles oscillating—vibrating; and the warmth that I feel when I take this in my hand is due to the multitude of these small motions that are going on within the body. Well, now, this motion of the particles of a body can be excited in various ways, and one of the most ordinary ways of exciting it is by friction. If you take, say a flat brass button, in your hand, and if you rub this button upon a surface of wood, as I am doing this which I hold in my hand, very soon, by rubbing this body [a short rod of metal] I make it so hot that I don't like to bear it against the skin of my face. In point of fact, the friction exerted against this substance produces the motion we call heat, and I very nearly burn myself. The rubbing throws the particles into this furious motion. If I place this body, before rubbing it, upon a flat piece of white wax, there it stands; but let me rub the end of the piece of metal for a time, thus, and then place it upon the wax, you observe it runs away; it melts the wax underneath it, and slides down in this way. This body [a similar short rod of metal] which has not been rubbed, will never melt the wax, and there it rests. The sliding of the other piece of metal is due to the heat produced by the friction. And in various other ways heat is produced by friction. For instance, if you take a saw, and pass that saw through wood, if you are careless and do not put grease upon the saw, then there is so much friction that the amount of heat developed in the saw becomes very great indeed. The saw becomes quite hot. And that is the theory and that is the reason why carpenters grease their saws when they use them. They do not want to make heat, for when this friction is overcome you actually *create* heat. Now, the carpenter is not anxious to make heat; he wants to get through the wood, and he wants to get through it with the least possible trouble; and, in consequence, he lessens the heat by putting grease upon the saw; he makes it as smooth as possible.

In this way, then, that is, by means of friction, we can actually generate, produce, create, this thing we call heat—this motion; and that is a very important point. It was thought for a long time impossible that heat could be generated. It was supposed that there was a certain quantity of heat in the universe, and that this was perfectly constant, no change occurring in it; but you see we have simply to produce this motion of the particles, and then that motion we call heat is set up. I have here an experiment that will still further illustrate this. When I was a boy—and I suppose I was like the average of boys—I was very fond of savages, and people of that kind. Now, I should like immensely to be able to transform myself into a New Zealand savage for the next five minutes. If I could do so I should be able to make a very beautiful experiment which it is not now in my power to do, for I am not so clever as these savages. My friend, Sir John Lubbock, who is a very great man on savages, has given me these two sticks. These are the genuine articles, brought from Australia. This stick is made of a particular kind of wood, pithy, and rather soft: and you see there are holes in one of the pieces of wood. This second stick is made of a harder material. Now, one of these native savages takes one stick and places the end of it in one of the holes of the other stick. He then clasps it, thus, and by the friction he uses he causes a little dust, first of all at the end. He works on until that dust takes fire; and then he manages by blowing, and by operating with far more skill than I can bring to bear upon the experiment, to actually produce flame. These are the very articles used by these New Zealand savages when they wish to produce fire by friction.

Well, I can illustrate still further this mode of producing heat. I have here, you see, a hollow tube, A, and I will place

in this tube a quantity of a certain liqnid which boils a little more readily than water. I might take water, but I will make use of ether for the purpose of making the experiment more rapidly. Now I will try whether I can not boil that liquid by friction. You see after putting the ether into the tube I cork it up thus, and then fix the tube on this instrument which is called a whirling table, and by means of which I can cause the tube of liquid to spin round with great rapidity.

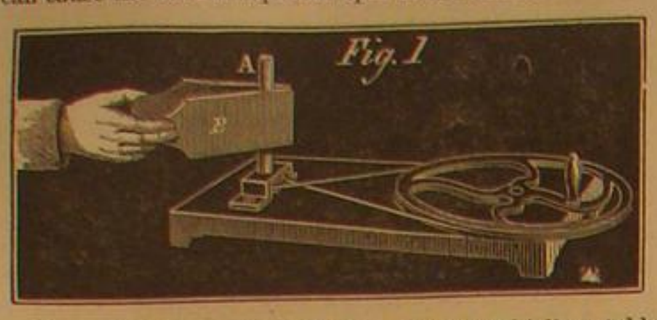


Fig. 1

The tube is now fixed firmly upon the whirling table, and we will there spin it rapidly round and round. I could boil that ether by simply clasping the tube in my naked hand. I have done so over and over again. The friction of my hand against this tube has been sufficient to boil this ether, but I have found it very hot and very unpleasant; and in order to protect my hand I will take a piece of flannel, B, and grasp the tube tightly with the flannel round it. Now, I want you to observe that if the experiment succeeds—(and experiments are always liable to fail)—the friction of the flannel against the tube which goes round and round will cause the ether to boil, and when that happens the steam of the ether underneath the cork will project the cork into the air. I want you now to observe the cork while I clasp the tube in the flannel. [In the course of a few seconds the cork flew from the mouth of the tube.] There it is, you see. Look at that!—boiled in half a minute—boiled by the friction of that piece of flannel against the tube. Well, now, I have here another tube, and I have here a quantity of metal. Look at it,—hard metal. There it is. Now, I break that metal into bits thus; and I purposely avoided putting it into this tube until now so that you might actually see the metal going in, and see that there is no delusion or mistake about the matter. Now, I will place some of this broken metal in this tube. We can put a little more in afterwards. I have put in as much as will go in now. I expect to be able to melt that metal by friction. I will cork the tube up tightly as in the former case, and when the metal is melted I will pour it out on this plate. [The rotation was commenced.] I am beginning to feel the heat now, and I have no doubt that very soon we shall have the metal in the tube molten. [Examines the contents of the tube.] Yes. I will put in more so as to get a greater quantity melted. I will pour it out presently, but you must first exercise your patience until we get it all melted. I put in as much as the cavity would hold in the first instance. Now, we will work the whirling table once more, and I will clasp it as before. [After a further interval]—Now the tube is so hot that I have no doubt the metal inside is melted. Yes, it is melted. Let us put in a last bit, and thus we shall get back the whole of that cake after it has been liquefied by the friction. I cork up the tube in order to keep the molten metal from splashing about. [The tube was caused to revolve again for a short time, and then detached from the whirling table. The metal was poured out, and found to be completely fused.]

Well, there are various other ways by which this motion that we call heat can be generated. It can be generated by percussion—by hitting with anything hard. For instance, I have here a piece of lead—a lead bullet; if I place this bullet upon an anvil, and strike it in this way, when I take it up afterward it is too hot to hold, and burns me. I have actually created that heat. I have called that heat into existence. By hitting this bullet I have thrown its particles into this peculiar vibratory motion to which we give the name of heat.

Now, how do we know the precise amount of heat produced by a stroke of this kind? I had intended to make an experiment before you in connection with this point; but you will understand the experiment without my taking up your time to perform it in your presence. Here is a piece of lead, and there I have upon the floor a thick plate of iron. I intended to send one of my assistants to the top of the house, and I intended him to drop this piece of lead down, and let it fall upon this plate of iron. Now, it so happens that the hight of this room is such that this piece of lead, having a certain amount of temperature on leaving the hand, would have that warmth augmented by one degree of temperature. I must here make use of the term "degree," although I cannot explain it till the second lecture; but you will remember that by the falling of this piece of lead from the ceiling, upon this plate of metal, we should raise the temperature of the lead one degree Fah. In like manner, if I sent up this liquid metal, which is called mercury, and had it poured out from the ceiling, and let it come down upon this plate, the mercury in falling from the top of the house to the bottom would have its temperature raised one degree. But if I took water it would be totally different. In this case I should have to go, not to a hight of 30 feet, but to a hight of 770 feet and a little more, in order that the water should have its temperature raised one degree. You will understand this difference between water and mercury and between water and lead, by-and-by. I now wish you to understand that we can tell the exact amount of heat which a shot falling from a certain hight can generate or produce; and we should find an increase of heat produced in all such cases if we had instruments of sufficient delicacy. No doubt many of you will see when you grow up that fine waterfall in Switzerland where the river Aar jumps or tumbles down a perpendicular precipice. I suppose it jumps from a vertical hight of 400 feet. Well, if you could place a thermometer at the top of that fall, and another at the bottom, the water at the bottom, if the thermometer were delicate enough, would be found warmer than ,the water at the top; and knowing the hight from which the cataract plunges, we can tell the exact amount of heat generated by its fall downward, through this power of percussion in developing heat.

When I was a boy instead of using percussion caps, which are now so common for firing guns, they used to employ an instrument of this kind in guns—[exhibiting an old-fashioned gun lock]. Here is a piece of steel, and this other substance is a piece of ordinary flint which you see moves forward in this way. Now, I can cock that gun lock, and then by pressing on the trigger I release the hold, and the flint falls against the steel, and you notice the sparks produced. This is a very old lock, and a very bad one; but still you see there are sparks produced when I liberate the flint, and it strikes against this steel. If we put a little powder in the pan beneath the flint we imitate what used to be the method of firing guns in former days. [The lock was then primed.] Now, you see when I let the flint strike the steel the gunpowder is exploded by the sparks produced. In the same way tobacco smokers and others used to get a light by igniting tinder by means of the sparks produced from a flint when struck on a piece of steel.

Now, what is the meaning of this experiment? What is the theory of that gun lock? It is this. You have seen that when I struck the lead I raised its temperature. A very great man who used to lecture in this room many years ago—Sir Humphry Davy—caused a lock of this kind to go off where there was no air, and when he examined the lock afterward he found that the flint had struck away little bits of the steel from the part of the lock against which it struck; and when he examined those little bits of steel he found that they had been fused; so that really the percussion of this flint against the steel surface is so strong that it raises those particles of steel which it breaks off almost to a white heat. When steel or iron is thus raised to a high temperature it is affected by a certain substance which is round about in the air. You must remember the name of that substance, it is so very important. It is called oxygen; and when iron or steel is raised to a sufficient temperature, this oxygen instantly attacks it—plunges against it. As before, I must ask you to exercise your imagination with regard to this oxygen. You must figure in your minds this oxygen as very small particles diffused throughout the air. Then, I say, when the iron or steel is raised to a high temperature the oxygen diffused through the air plunges against it, and hits it so hard that there is a kind of percussion. The oxygen hits the iron or the steel so hard as to produce this thing that we call heat, and produce it in such a degree as actually to render the body white hot. Now, I want to show you that this is the case. I have here the means of producing a flame of considerable size; and down stairs we have a pair of bellows. A man has just quitted the room to work those bellows. A current of air will pass through this tube, and we shall obtain here a flame of considerable power. Now, what I want you to understand is this—that if by means of this flame I heat particles of iron or steel, you will find that those particles of iron or steel will shoot out like stars because of the plunging upon them of the oxygen of the air. Here I have a vessel containing these iron filings, and as I throw them on the flame you see the sparks produced are very brilliant indeed. The iron is burned in this way. I have thrown in sufficient of it to illustrate what I have been saying. First of all these particles of iron were heated exactly as in the case of the gun lock; and when they were heated the oxygen of the atmosphere plunged against them, and plunged against them so violently as to produce these star-like forms which you have seen. Some call this force attraction or chemical affinity; but what I want you to see is this—that these particles of iron when heated to this temperature are showered down upon by the oxygen of the air. This wonderful substance of the air, called oxygen, forms but a small portion of the atmosphere—about one fifth of it by weight. Hence, if we had the whole atmosphere composed of oxygen those effects of combustion would be very much greater indeed than they are at present. I have here some pure oxygen obtained by proper methods, and I will just ask you to observe how much more powerfully this atmosphere of pure oxygen acts upon a body than does the oxygen in the ordinary air, where it is diluted, as I have said, to a considerable extent. I have here a piece of wood which I set fire to. I blow the flame out then, leaving the end red. You see the air has no power to make it ignite again. If I bring it into the oxygen see what occurs. [The incandescent end of the stick was introduced into a jar of oxygen gas, and immediately burst into a brilliant flame]. The oxygen when it is not diluted has this wonderful effect. And so I might take paper or other combustible bodies instead of the wood. In fact I might use iron. I will produce here a flame from a mixture of oxygen and another gas called hydrogen, and I will cause the oxygen to burn, not a piece of paper or wood, but actually a piece of steel. I hold a piece of steel here in my hand. It is the spring of a watch. A man has now gone down to start the apparatus. I shall very soon have a jet of gas passing through here. I will ignite that jet of gas, and then you will see the flame of the hydrogen—not a brilliant flame by any means. [A jet of hydrogen was then ignited]. I will presently mix with the hydrogen flame which you see a quantity of this oxygen, but I want first to raise this steel to a very high temperature, and then to allow the oxygen gas to act upon it. I will now throw into this jet of hydrogen a quantity of this wonderful oxygen. You will see that the flame becomes very much smaller; and now it is enormously hot. Observe what it can do with that piece of steel. Observe how it can burn it away. This substance called oxygen is playing upon that spring. If I take away the hydrogen you see no flame whatever, but we have only the pure cold oxygen; but when once the temperature of the steel has been raised sufficiently, the force with which the oxygen particles, or atoms as I called them, plunge down upon the steel is sufficient to produce this wonderful effect. [The watch spring continued to burn in the jet of oxygen].

Well now, we have the generation of heat exemplified in this way. I showed you first of all that it could be generated by friction to such an extent that you were able to melt metal with it. I then showed you that it was generated by ordinary mechanical percussion, as in the striking of two pieces of lead by the hammer. And now I ask your power of imagination to help me here in the case of the oxygen uniting with the iron or the steel, which is, to all intents and purposes, a case of percussion. It is, however, a case of the percussion of atoms, instead of the percussion of a hammer descending upon a weight. Now, I think that if you have followed me I have not uttered a word that you cannot perfectly understand. You can picture before your mind these little oxygen atoms showering down with this tremendous force upon the surface of the iron; and the object I have in lecturing to you, boys and girls, is that you may see with the eyes of your mind those things which are too small to be seen with the eyes of your body, and that is the power I referred to in the first instance—the power of imagination.

I have here a variety of jars of this oxygen gas. I do not want to spend too much time in operating with them, but one experiment I must make because it is of such importance and such historic interest in science. The great Sir Isaac Newton, regarding whom a great deal of nonsense and a great deal of wrong has been uttered lately in the newspapers and elsewhere, operated with a diamond in the course of his experiments on optics; and he concluded from his experiments on the diamond that that beautiful gem, the hardest of all substances, was an unctuous, peculiar substance like wax or grease. Long before the experiment was ever made, this Newton by that very power which exists in every boy and girl here present, and which I called upon in the beginning of the lecture, saw that this beautiful gem was a combustible substance; and now I want to show you that Newton was true in his prediction. I have here a small diamond—(for diamonds are very precious, as you know, and it would be a wasteful expenditure, of course, to use a large one); and I will first of all heat it by means of this very hot flame that we possess here. I have there some oxygen gas, and after heating the diamond I will plunge it into the oxygen gas, and I think you will find it will there glow like a little star. Perhaps the hydrogen cannot heat it strongly enough, but we will try it. [The heated diamond was lowered into a jar of oxygen]. Yes, there is the diamond burning before you. And now, how are you to figure that diamond? How are you to imagine the state of things going on there? At the present time it is surrounded by oxygen; and the oxygen atoms, as I have called them, are showering down upon the diamond, and showering down upon it with such percussive force as to render it that bright and brilliant star. Now, I think every boy and girl here present can picture before his and her mind what is going on. Imagine these atoms of oxygen showering down upon the diamond, and the force with which they do so raises the diamond to that temperature.

In all these cases heat is actually generated. There is called into existence heat which did not exist before. It is, as I have said, a kind of motion which can be generated in the way which I have indicated.

Having now obtained a general notion as to the methods in which heat is generated, we may pass on for a moment or two to investigate what it can do—how bodies are affected by it

I have arranged an experiment here, in the front of the table, which will enable you to see what heat can do; and here again I would call upon that wonderful power of imagination. Imagine the particles of a body getting gradually warmer, vibrating with greater and greater intensity. What is the natural consequence? That these particles should force themselves assunder, that the body should become bigger by being heated, that the volume of the body should be augmented by the augmentation of its temperature. Here I have a platinum wire stretched from this stand to this. You observe that at the end I have attached a straw with a piece of paper fastened on it. Here you observe a little wheel, and from that wheel you observe a weight descending. Round the axis of the wheel a platinum wire is coiled. Now the platinum wire is pulling in one direction, and the weight is pulling in the other direction, but if you relax the platinum wire the weight will instantly predominate and the index will rise up. Observe that index rises if I relax the wire by simply pressing this rod to which one end of it is fixed; and when I take my hand away the wire remains no longer relaxed, and the index falls back again. (A great portion of what we call "experimental science" consists of devices of this kind. This was devised by my assistant, Mr. Cottrell). But how shall I heat that wire? By a power which is far away from here, which I hope to be able to talk to you about at some future time. Coming up from the yard beneath there is a power which heats the wire; it is called an electric current. When the current comes the platinum wire will be heated and elongated, and the elongation of the wire will manifest itself on the index. You see this piece of paper smoking with the heat of the wire. If I stop the current, the source of heat is detached, and the wire cools. When the wire cools it contracts, and when it contracts the index falls in this peculiar way.

I have another experiment here to show how heat operates in causing bodies to expand. I have here two bars—one of

iron and the other of brass; and at the present time you see here in front of the table a little piece of apparatus the meaning of which you will understand immediately. I will show you that this wire which you see here in front is a little coil of platinum wire But before I show you this wire I should just like to show you what a power we possess for heating the platinum wire, when we augment our current. This current comes from a battery down stairs, which I trust to have the pleasure of explaining to you, not this year, but perhaps in some future year. Now the assistant will give me a powerful current, and I think you will see that this wire will be raised to redness throughout its entire length. [The electric current was then passed through the wire.] The platinum wire is now red hot, and the index goes up in this prompt way. You will see the glow of the red-hot wire now the light is lowered. Now, if I shorten the length of wire less and less resistance is thrown in the way of the current, and a greater amount of electricity passes through, and you have the wire raised to this much greater temperature. There is one thing to be observed here. You must not allow yourselves to suppose that this apparent thickening of the wire on being heated is due to a real thickening. The red-hot wire looks as thick as a quill. This appearance, which I have no doubt is visible to you, is not due to a real thickening. It is an effect produced by a bright light on the eye. A bright body is always seen larger than it ought to be, and this particular wire now before you is seen thicker by those in more distant parts of the theater than it is by those near at hand. This proves that it is a deception of the eye—a kind of illusion called "Irradiation." It is not a real thickening. [The platinum wire was still farther shortened and then parted assunder]. There, the wire is now fused by this electric current.

Now, I will call back your attention to this spiral, C, which you see here. Here on one of these supports, A B, is a piece

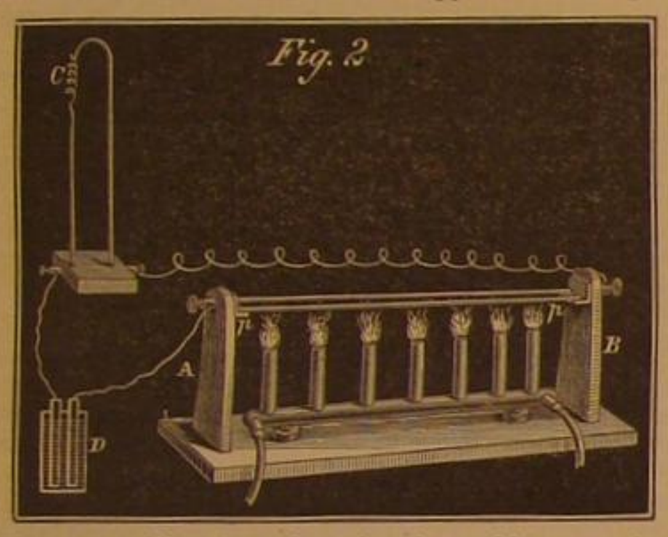


Fig. 2

of brass, p, and here is another, p'; and stretching across from support to support are two bars, one of brass and one of iron. At present they are not long enough to span the distance from one support to the other; but I will heat them, and then they will expand, and you will find that when they expand sufficiently to bridge this chasm from one support to another an electric current will pass, and then that spiral, C, will be like a voice telling us that the bars have expanded from one support to the other. We will now light the jets of gas underneath these bars, which at present are too short to span the distance between the supports. [After an interval]—Observe now that what I predicted a moment ago has occurred. The spiral is now ignited. If I remove this brass bar the spiral sinks. What I want to show you by this experiment is that the brass expands more than the iron. It was the expansion of the brass which bridged the chasm across.

I have told you that a great portion of experimental science is taken up by devices of this kind to render these small expansions evident. I think there is before you on the floor in front of the table a piece of apparatus more delicate than any that has ever yet been made. It is an apparatus intended to show, among other things, the expansion of volume by heat. You will understand this apparatus immediately by reference to this small sketch that I have drawn upon the blackboard. I have taken simply the essential parts of the apparatus, and you will understand them, I am sure, perfectly well.

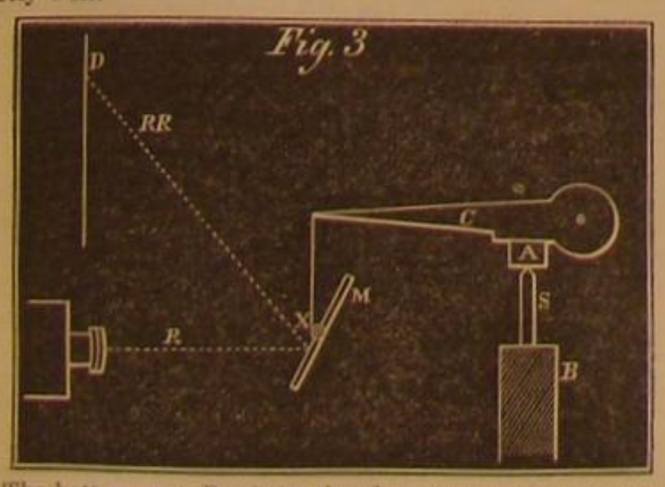


Fig. 3

The bottom part, B, of the sketch represents the upper end of that upright bar of metal which you see between those two brass pillars in the apparatus in the middle of the room. On the top of this bar rests a little brass stem, S; and the top of that stem is pointed and presses upon a very hard flat stone—a plate of agate, A. Now, conceive the top of this bar to be lifted, and to push this stem up against the plate of agate. What will occur? You see the arm, C, above the piece of agate. That arm moves upon a pivot which you see marked by a dot; a very little pushing of this arm causes it to move through a greater space than the body which pushes it. Now, attached to this arm is a piece of the hair spring of a watch, and that is carried round an axis, X, attached to which axis is a piece of looking glass—that is, a mirror, M. Upon that mirror a beam of light, R, is cast. The figure at the left of the sketch I suppose to be the front part of a lamp from which the light will issue. The beam of light will fall upon that mirror, and will be reflected upward, R R, and will mark itself as a spot of light upon the screen, D. Now, if you conceive the end of the bar to be lifted, and to push the arm upward, it will cause the axis of the mirror to turn round, and cause the mirror to take another position; and when the mirror takes another position, this beam of reflected light will travel with the mirror, and will travel with twice the velocity of the mirror. Thus, in this experiment, instead of having a straw for an index, I use a beam of light. You will understand the apparatus when I make the experiment. I think, as I have said, it is the most delicate instrument of the kind that has ever yet been made. Now I will try and get the apparatus in proper order for showing the experiment. I throw a beam of light upon the mirror, and there you see it reflected and quivering on the wall. I will bring it down so as to get it on the screen. You see it is exceedingly sensitive. That constitutes our index. And now I will ask you to observe what I am going to do. I will not touch that heavy bar of lead; I will not heat it with a flame; I will simply breathe against it; and I believe that this apparatus is so exceedingly delicate that the mere breathing against this mass of lead (and it is very large) will cause the lead to expand upward, and will bring down that spot of light from the top of the screen to the bottom. [The lecturer then breathed on the bar of lead, and the image of the beam of light gradually traveled down the screen]. The mere warmth of the breath is sufficient to produce this effect. Now I will pour upon the bar a little liquid that will chill it—make it cold; and I think you will find that as the bar cools it will contract, and that the beam of light will go back to the top of the screen. [The spot of light was successfully brought back to the upper part of the screen in the manner described.]

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

Mathematical Formulæ.

MESSRS. EDITORS:—I send you this communication under the impression that its publication will be an acceptable service to engineers and others, who may have occasion to make the calculations referred to. The formulæ are deduced from well-known principles of geometry by the application of algebra, and are, I believe, new and original.

When I speak of the center of the engine, the reader will understand me to mean a point in a vertical line passing through the main center of the working beam. Now, it is certain that the center of the cylinder should not be placed at a distance from the center of the engine, equal to the length of half the beam; or, in other words, under the "end center" when the beam is in a horizontal position; but should be placed under the middle point of a line representing the versed sine of half the arc, described by the "end center."

The formulæ given below will enable any one conversant with figures at all, to calculate not only the true distance from the center of the cylinder without reference to the "vibration" or versed sine, but also to calculate when the distance, as above, and stroke are given, what length of beam is required.

Let b—half the beam. d—distance from center of engine to center of cylinder. s—half the stroke.

Formula No. 1.— $$d=\frac{b}{2}+\sqrt{\frac{b^2-s^2}{4}}$$

Formula No. 2. $$b=\frac{s^2}{4d}+d.$$

Suppose I wish to set up an engine the beam of which is 20·8 feet, and the stroke 8 feet, what distance from the center of the engine shall the center of the cylinder be placed to work correctly? By formula No. 1. b—10·4 and $b\div2$—5·2, b^2—10·4²—108·16; and 108·16—s^2 or 16—92·16. 92·16÷4—23·04, the square root of which is 4·8; hence, 5·2 plus 4·8—10 feet, equal the distance required.

Suppose an engineer takes charge of a steamer, and by measurement finds the distance from center of engine to center of cylinder is 9 feet, and the stroke 9 feet, and he wishes to find the length of a beam, which shall work correctly.

By formula 2. s—4·5 and s^2—20·25. 20·25÷4d, or 36—0·5625; and 0·5625 plus d; or 9—9·5625, the true length of half the beam.

The formulæ above, if translated into words, would be as follows: No. 1. The distance is equal to half of one half the beam, added to the square root of the quotient of one fourth the difference between the square of half the beam and the square of half the stroke.

No. 2. Half the beam is equal to the quotient of the square of half the stroke, divided by four times the given distance, added to the distance.

N. B. WEBSTER, C. E.

Kenansville, N. C.

Slack Water Navigation.

MESSRS. EDITORS:—In your journal, No. 3, of the current volume, is an article on Slack Water Navigation, which very judiciously sets forth the many advantages to accrue from such a system properly managed. More than twenty-five years ago the State of Kentucky expended nearly $2,000,000 in a system of slack water improvements on the Kentucky and Green rivers.

The experiment, taking into account the increased value of lands, and corresponding increase of revenue from taxation, has proved the investment eminently wise, although proper frugality has not been observed in expenditures.

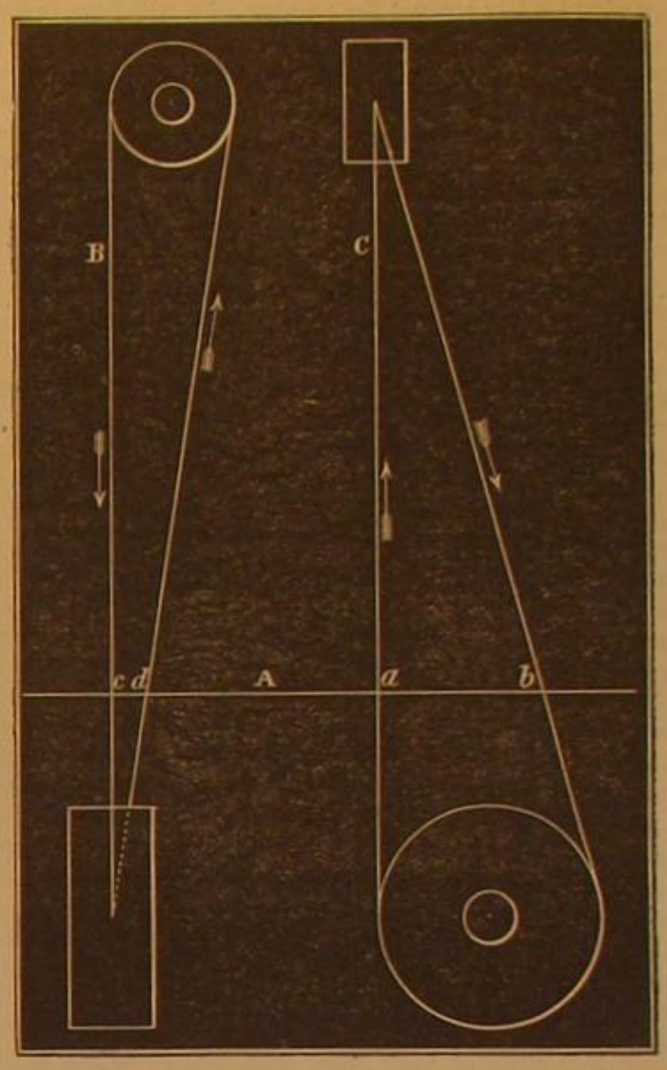
A private company is now preparing to lock and dam the Kentucky river for two hundred and fifty miles above the present limit of navigation. This will give constant, cheap, and safe transportation to an inexhaustible supply of coal, iron, and lumber. The experience of Kentucky fully indorses slack water improvements as useful and economical.

JOHN MASON BROWN.

Frankfort, Ky., January, 1868.

Belt Holes--Quarter Turned Belts.

MESSRS. EDITORS:—One of your correspondents asks how to lay out holes through a floor for a quarter-twist belt. The only proper method is by diagrams. Sweep a clean place on a smooth floor and set out with chalk line and "tram" two views of the pulleys and the floor, getting the distances as



accurately as possible, or lay them down on paper to a suitable scale. Notice that a belt to work at quarter twist must run *on* to both pulleys in a line parallel with the plane of rotation, as B, in the diagram, running on the lower pulley, or C, running in an opposite direction on the upper one. Therefore, drop the perpendiculars, B and C, as shown, and draw the diagonals, giving the distances, $a\ b$ and $c\ d$, on the floor line, A. Now drop a plumb line from each side of the upper pulley at the center of the face to the floor, and from one point so found, c, in the diagram, lay off the distance, $a\ b$, in a line parallel with the upper shaft, and from the other point, a, in the diagram, the distance, $c\ d$, parallel with the lower shaft; the points so found will be the centers of the belt holes. The twist to be given to the holes, if such a refinement is necessary, may be made a matter of judgment.

Rochester, N. Y. F. H. C.

[We have engraved and published the accompanying diagram for the purpose of illustrating a subject which seems to be somewhat puzzling to mechanics. On page 169 of Vol. XVII. we published some directions for laying out belt holes through floors, which we thought to be sufficiently explicit and plain to be easily understood without the aid of diagrams. But from a number of communications on this subject, since received, it is evident that the subject is not yet fully understood, and we publish our correspondent's diagram and description with a hope that they will make the matter plain. It is of very great importance to all mechanics, especially to millwrights, and we trust that this, with the article to which we have referred, will furnish the desired information.—EDS.

Patentability of Medical and Surgical Improvements.

MESSRS. EDITORS:—Knowing how great an interest you take in all matters pertaining to the welfare of the inventing class, and how ably you have heretofore defended their cause, I take the liberty to bring to your notice an abuse, which is now being carried on rather extensively, and which, if allowed to continue, will seriously endanger the prospects of many of our ablest inventors. I am sorry to say that the offenders of the patent law, to which I have reference, belong to a very respectable class of society, and this makes their offence still more aggravating.

Among the medical profession, it has always been a point of honor, that all discoveries made by doctors for facilitating the cure of diseases, should be surrendered to the whole profession. It is evident that to this arrangement the rapid development and present comparative state of perfection of medical science is mainly due, as we would, if each doctor had kept his discoveries to himself, be still on the same level with the physicians of ancient times. But this principle of mutual information and instruction seems to be misunderstood by a great number of the physicians of this country, as they appear to claim, under cover of the above principle, all the *mechanical* inventions made by their colleagues. I have

heard of a number of cases, in which doctors who have made valuable inventions in the construction of surgical apparatus, or of machinery for preparing certain kinds of herbs, or other medical substances, and who intended to secure the benefits of their inventions by applying for patents on the same, were threatened with immediate ejection from the medical society if they insisted in patenting their inventions. The non-inventors argued that the mechanical inventions came under the same head with professional suggestions, and had to be surrendered accordingly.

It may not be out of the way to call your attention to another danger which threatens the community, although at present only that of the State of New York. The convention now assembled to revise the State constitution, has a bill under consideration which has the object of taking from the physicians the right to prepare and forward medicines, such a right being solely vested in the apothecaries. This is a blow aimed solely against the homœopaths, who have to prepare their own medicines, and who will by this act be banished from the State. For allopaths, this bill may be very beneficial, but if the convention should be short-sighted enough to adopt it, they will destroy a branch of the medical profession which is already very popular, and increasing in the number of its adherents very rapidly. V. B.

New York city.

The Meteorograph an American Invention.

Messrs. Editors:—In your issue of January 11th, page 19, I have just read an extract from the *Nation*, describing partially an instrument called the Meteorograph, which is said to have been invented by Father Secchi, of Rome, and to have received a grand prize at the Paris Exposition. Doubtless, it was a very ingenious apparatus, and it has a very expressive name, but your correspondent had the honor to exhibit drawings, and explain the construction of an invention remarkably similar (except in its connection with a galvanic battery), at the Washington meeting of the American Association for the Advancement of Science, in May, 1854. Can the word, *Meteorograph*, be found in any publication prior to newspaper reports of that paper?

The "Proceedings of the Eighth Meeting of the American Association" contain a partial description of this automatic meteorological register, page 224. It is there described as recording for every minute of time, night or day, for periods of one week, on each paper, the direction and force of the wind; the hygrometric, barometric, and thermometric state of the atmosphere; also, the time of the commencement, duration, and other phenomena of rain storms, as well as the quantity of water precipitated. A brief reference is also made to this apparatus in the Annual of Scientific Discovery for 1855.

I inclose a description of the invention, from the Portsmouth (Va.) *Globe*, of April 24th, 1854, written by the editor who examined the Meteorograph in operation.

Prior to the writer's invention (and he made the name as well as the machine) the most efficient anemometer was Osler's, which was expensive and complicated, while this was described as "marvellously simple." A few cylinders, moved by a common eight-day clock, were covered with paper, on which the meteorogram was recorded as described, in the proceedings of the American Association for the Advancement of Science above referred to.

I send this communication for your consideration of the propriety of placing on record, in the widely circulated and carefully preserved columns of the Scientific American, the date and origin of the Meteorograph.

Kenansville, Duplin county, N. C. N. B. Webster.

Gold in Orange County, N. Y.

Messrs. Editors:—Very soon I think we shall be overflowing with petroleum and rich in gold. A gold mine has recently been discovered in Cornwall, about five miles below Newburgh, in this county, by John L. Davis, of that place. A stock company, with a capital of $100,000, has been formed, and preparations are being made for the working of said mine. Specimens of the quartz have been exhibited in this place. Whether it will amount to anything or not remains to be seen. The place where the gold was found is called "Bulter Hill," the place where the glass ore "Basalt" was extracted from. J. C. G.

Newburgh, N. Y.

Elevated Railroads.

In reply to several correspondents requesting us to give descriptions of elevated railways, we would state that nearly all of the plans that have lately been presented to the public are simply old devices revived. We have engraved and described many of them, as a reference to our back volumes will show. Here is one which we published in the Scientific American November, 1847—a little more than twenty years ago:—

"A number of inquiries have been made relative to Mr. Randall's invention, and as the model was exhibited lately we take this opportunity of giving some information regarding it. We have been informed that the model constructed by order of the Common Council of this city, is entirely of metal, and cost $4,000 and two years labor. It weighs about three tuns, is seventy-six feet long and nine feet wide It is to be erected only twelve feet above the line of curbstone. The passenger cars, which are to be propelled by stationary engines and an endless rope, do not stop to take in or let down passengers. This is accomplished by means of a tender, which passes along a side track, and by means of a brake, pressing on a brake plate fixed to each car, the speed of the tender is got up to be equal to that of the passenger cars, before they are fastened to each other for the exchange of passengers. To prevent the cars from leaving the railway, each car is confined by sixteen pulleys with vertical shafts, two to each of the wheels. It is also provided that if either the axles, the shafts, the car wheels, or the transverse beam which passes quite across the street, should break no danger would arise from the breakage. Passengers need not walk up the stairway but ascend by a screw shaft, containing a sofa, on which they ride from the pavement to the promenade. The model was constructed by Mr. Randall, the inventor, by whom it is patented."

The London Underground Railway.

From an English engineer now traveling in this country, and who was before connected with the construction of this work, we learn several items of interest. Thus, the engines employed are not, as is generally supposed, specially arranged for the suppression of smoke, etc.—in other words, of what is here known as the dummy pattern,—but are precisely of the usual form, with the exception of two points. In the first place, they are so arranged that the exhaust may be, at will, turned into the tank, in place of the chimney; and secondly, the furnace may be shut up air-tight at a moment's notice.

The plan of working them is as follows:—The road, we should premise, is not a continuous tunnel, but a series of alternate tunnels and open cuttings. In the open cutting the engines are run as on any other road; but as soon as a tunnel is reached, the exhaust is turned into the tank, the firebox shut tight, and the engine run through by the accumulated heat in the furnace and boiler. The cost of this road, it may also be interesting to know, was about $4,000,000 per mile.—*Journal of Franklin Institute.*

Newspaper Change.

Mr. Moses S. Beach has sold the New York *Sun* establishment to the *Sun* Printing Association, an incorporated company, and Mr. Charles A. Dana, formerly assistent Secretary of War, has become the Editor and Manager. The *Sun* is one of the oldest and best papers in the city, and has a daily circulation of over 50,000 copies. It has passed into the hands of an able management, and will long continue we trust, brightly to shine for all. Mr. Beach continues as a large shareholder in the concern, but retires from active business.

The Weidenman Rubber Shoe Stay.

In No. 4, present volume, we published an engraving and description of a contrivance under the above title, which might possibly mislead the reader in one statement. Instead of the stay being introduced into the shoe in the process of manufacture, it is entirely independent of the shoe, and may be fastened into any rubber shoe by an eyelet and hook. Its advantages can be understood by a reference to the engraving.

Editorial Summary.

Poisonous Visiting Cards—There is a style of visiting cards introduced to the public some months since, under the name of crystallized, or "Mother of Pearl" cards, and from their unique and attractive appearance they have been very much admired. But a chemical investigation of the crystallized surface shows that its composition is quite as dangerous a poison as was used in the once popular enamelled cards. The fact is first brought to our notice from a foreign source. A writer from Munich to the *Journal of Pharmacy* asserting that these novelties had been imported from our country, and for a time enjoyed a great run of popularity, the demand far greater than the supply. But, unfortunately for the manufacturers, one of them fell into the hands of the Medical Director of the Sanitary Department of Munich, and an examination showed that a card two and a half inches wide and four inches long, weighing 33½ grains, yielded as its crystallized coating 6.6015 grains of acetate of lead, a poison the more dangerous, especially to children, from its pleasant, sweet taste.

Determining the Colors of the Stars.—To the astronomer this is a subject of much interest, and different observers vary greatly in their opinions in this respect as to particular stars. For the sake of a more definite and reliable means of determination, a simple contrivance has been recently invented, consisting of a series of vials filled with solutions of known tints, and attached to a revolving drum. A platinum wire is rendered incandescent by means of a galvanic battery, and as the vials are brought before the light their colors can be distinctly seen at night, and by successive comparisons with that of the star the exact shade is found.

A Devotee to Science.—M. Dollus Assuet has determined to erect a chalet on the summit of Mount Blanc, and establish therein a meteorological observatory, which will therefore be placed at an elevation of about 16,000 feet above sea level. He has hired two guides to spend the summer months in this desolate station, for the purpose of making observations. During the past twelve months this same *savant* has supported three guides in a chalet on the Col de St. Theodule, at an altitude of 10,500 feet, and the value of their meteorological observations has induced him to make a fresh experiment.

A Stock Company has been formed at Cornwall, on the Hudson, for the purpose of bridging the Hudson River from "Storm King" to "Butter Hill," the bridge to be of wire cable and strong enough to allow the passage of trains, perhaps for the Hudson River Railroad but more likely the Dutchess and Columbia cars, will take this route. The plan appears to be feasible and the people generally in favor of it.

A correspondent writing from Mossy Creek, Jefferson County, Tenn., states that a New York Company is now erecting zinc paint works of an extensive character at that place. The ore is said to be all that could be desired. Tin is reported as having been found in the Smoky Mountains.

Manufacturing, Mining, and Railroad Items.

In his annual message, the Governor of New Jersey very justly places great importance upon the mineral wealth of that State, particularly its mines of iron and zinc. Last year more than 250,000 tuns of the richest iron were transported to market, an amount valued at the mines at one million dollars. The zinc mines yielded, during the same period, 24,000 tuns of ore, all of which was manufactured into spelter, or zinc oxides, within the State. This product is more than half the yield of the United States, and exceeds the supply from all the British mines.

The gathering of sponge among the Bahama Islands, for use in upholstery or, as noticed in another part of this paper, for textile material, has become a business of great magnitude. The Nassau *Herald* speaks of no less than fifty-seven vessels engaged in the trade, and recent sales were made of 12,500 strands of sheep-wool sponge at $1.00 per strand.

The Paris correspondent of one of our daily papers writes that the street cars in that city run on flat rails, with wheels without flanges, the whole being kept in place by a fifth wheel, but a half inch thick, running in a grooved central rail, laid for the purpose. This additional wheel being attached to the carriage by a lever, can be raised at will by the driver, and the car runs off the track. This is done to turn out either for a car running in the opposite direction on the same track (which saves a double track on a road but little used), or for another vehicle, or to run more conveniently on a down grade.

Quicksilver has recently been found in Macon county, Tenn., at a point thirty miles from the line of railroad from Cincinnati to South Carolina. The yield has been 7½ per cent, or 150 pounds of quicksilver to the ton. All that is required for separating the metal from the gangue, is simply retorting it.

The manufacture of leather is one of the most important national industries of Italy. The number of leather manufactories in the kingdom amount to 1,175, employing about 12,500 workmen, and producing about 282,346 cwt. per annum, to the value of $1,250,000. The art of making parchment is carried on to a large extent at Arpino and Sulmona, from whence are annually exported about 6,600 lbs.

It appears that the Gatling revolving gun, illustrated and described in our columns, is to be very generally introduced into European armies. According to the Ausburg *Gazette*, the agents in Carlsruhe have received orders for one thousand of these guns. Of this number, 400 are designed for France, and 200 for Russia, the remainder being equally distributed between Austria, Italy, Belgium, and Holland.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

Railrod Switch.—J. B. Spurgin and T. A. Kirk, Kansas City, Mo.—This invention has for its object to furnish an improved railroad switch so constructed and arranged that no switchman will be required; that two trains can pass each other in motion upon the switch with safety, that trains may pass over the switch at full speed without danger of accident from false switching; and that the engineer by simply moving his train forward and backward can transfer it from one main track to the other or to the switch track as he may desire.

Globe Valve.—H. H. Hendrick, Dayton, Ohio.—This invention consists in forming the valve of chilled or case-hardened iron and so attaching it to the valve stem that the valve is self adjusting.

Adjustable Spirit Level.—William J. Tate, New Haven, Conn.—This invention relates to a new spirit level which is so arranged that it can be reset with great ease when not quite correct.

Rolling Maching.—George Hastings, Jr., Wheeling, West Va.—This invention relates to a method of constructing machines for rolling iron and steel into sheets or plates and for scouring the same for making nails and for other purposes.

Puddling Furnace.—William Stevenson, Allegheny City, Pa.—This invention consists in an arrangement whereby the pig iron used in puddling furnaces may be heated by the heat generated in the furnace previous to being put in the furnace, thereby utilizing heat that would otherwise be lost and greatly facilitating and expediting the process of making iron.

Tweer Iron.—Lyman M. Bailey, Landgrove, Vt.—This invention relates to an improvement in what is known as the concave tweer iron for blacksmith's fires, and it consists in the arrangement of a valve whereby the fire may be regulated to suit the work in hand as may be desired.

Drawer Truss.—Zalmon Taylor, New York city.—This invention relates to a truss for obtaining pressure on ruptures, whereby the inconveniences and objectionable features of the ordinary spring truss are overcome.

Ox Yoke.—Joseph Langenbach, Dorchester, Iowa. This invention relates to a new manner of arranging ox yokes so that they can be readily fitted and secured on the necks of the animals and that they can be adjusted to fit large or smaller necks.

Handles for Metal Tea and Coffee Pots.—William Bellamy, Newark, N. J.—This invention consists in having the handle hollow or tubular, and filling it with plaster of Paris which will keep the handle in a cool state

Reaper or Grain Harvester.—J. B. McCormick, St. Louis, Mo.—This invention relates to a raking and a gavel-delivering attachment for reapers, whereby the cut grain is raked from the platform of the machine upon a tilting table which is operated in such a manner as to deliver the cut grain raked upon it to the binders. The invention consists in a new and improved means employed for operating the rake over an inclined curved or segment platform and in the use of the tilting gavel-receiving table also operated in a peculiar manner.

Cork Screw.—George Twiggs, Birmingham, Eng.—This invention consists of the handle of the same, being provided in the center with a nut, fitting the screw thread on the shank of the cork screw, so that by turning the handle in one direction the nut will bear upon a shoulder on the bell or barrel of the same, and thus draw the cork screw and any cork attached thereto up into said barrel or bell.

Corn Cultivator.—Charles Rich and Oscar L. Neisler, Poughkeepsie, N. Y.—This invention relates to a new agricultural machine, which can be used for cultivating corn, or for broadcast harrowing or tilling, and which is adapted to straddle a row of corn of a hight of more than five feet.

Culinary Vessels.—Wm. H. Bennett, New York city.—This invention consists in discontinuing the perforated bottom of the inner vessel of a cooking apparatus, so that it may not reach beyond the perforated inner wall of the vessel, to permit the space between the perforated inner and the outer wall of the vessel to be cleaned.

Sash Fastening.—C. M. Amsden, Wooster, Ohio.—The object of this invention is to hold the sash more firmly in place, and at the same time to secure a free and easy movement for it.

Cotton Press.—Paul Williams, Wilona, Miss.—This invention relates to an improvement in cotton presses, and consists in the combination of a lever having a long and short arm with a vertical screw, to actuate the same, whereby the follow block receives its motion from the shorter arm of the lever, and is forced down with great power. Other devices perfecting the whole render this press more simple than, and equally effective with, any cotton press heretofore known or used.

Washing Machine.—Benj. F. Stover, Ladoga, Ind.—This invention refers to improvements in machines for washing clothes, and consists of an inclined plane and curved surface, joined, over which a smooth roller is actuated, together with other parts perfecting the whole.

Constructing and Protecting Subaqueous Tubes.—T. F. Rowland, Greenpoint, N. Y.—This invention consists in constructing and protecting subaqueous iron tubes, and it consists in encompassing the same with blocks of cement or tile, arranged or applied in such a manner that the water cannot come in contact with the iron tube, nor the tile or cement blocks become detached from the tube.

PAPER PULP.—Hippolyte Emile Ballière, Hoboken, N. Y.—This invention relates to the manufacture of paper pulp, half stock binder board, papier maché, etc., and fibers for textile fabrics or materials from bamboo, cane, and other vegetable and woody fibrous substances which have been previously disintegrated by the process embraced in the Letters Patent granted to H. S. Lyman of New York city, on the 3d day of August, A. D. 1858, and now commonly known as the "Lyman Steam Blowing Process," or by any other equivalent process or processes.

PLOW.—W. T. Howell, Alfred, N. Y.—This invention relates to an improvement in that class of plows which are commonly termed "shovel plows," and it consists in a novel and improved manner of attacking the blade or share to its standard, whereby a very firm attachment is obtained and one which will admit of the share being very readily applied to and detached from the standard.

PLOW.—D. W. Hughes, Quincy, Ill.—This invention is designed to reduce friction draft in plows and consists in dispensing with the ordinary land side substituting therefor a supplemental share which is placed at the rear of the front plow and has a reverse angular position to the latter, so that the lateral pressure exerted against one share in one direction, will compensate for that exerted against the other in an opposite direction. The invention further consists in placing the plows at the outer side of the wheels, so that both the latter will travel over unplowed ground.

AXLETREES.—Charles E. Buck, Racine, Wis.—This invention relates to an improvement in wooden axletrees for wagons, and it consists in the application of a rod to the axletree, whereby the axle is greatly increased in strength.

FLOUR SCOOP.—Rufus S. Mitchell, Elizabeth, Ind.—This invention relates to an improved flour scoop, and consists in combining a sifter and scoop in one device.

BOOT CRIMP.—J. Tipton and J. Carl, Malaga, Ohio.—This invention is an improved device for crimping leather for the manufacture of boots, shoes, etc., by which the operation can be performed more easily, quicker, and better than by the methods hitherto in use.

SELF-SUSTAINING HOOF EXPANDER.—John Tipton, Malaga, Ohio.—This invention is designed to expand the hoof of a horse in case of its contraction from corns, or other diseases of the foot, or from any other cause.

MACHINE FOR SAWING SHIP TIMBER.—John L. Knowlton, Philadelphia, Pa.—In this invention the saw is supported by a yoke which allows it to be inclined in any direction, vertical or horizontal, for the purpose of changing the direction or inclination of the cut. The yoke is attached to a carriage which feeds the saw to the log, the latter simply moving backward and forward in the same line for all the different cuts.

RAT TRAP.—John C. Guerrant and Benton J. Field, Leaksville, N. C.—This invention relates to a rat trap provided with a movable platform upon which the rat stands in order to get at the bait, the pulling of which draws a stop pin away from a lever, which when thus released is actuated by a spring and through suitable connections made to suddenly jerk the platform from under the rat, which in falling into the trap, strikes a rod, which causes the spring lever to be again actuated, so as to restore the platform to its original position.

MACHINE FOR CUTTING DYE WOODS.—Onsville E. Pray, Portsmouth, N. H.—This invention relates to an improved machine for cutting dye woods into pieces or chips direct from the log. The invention consists of a rotary drum provided with cutters at its periphery, and arranged in relation with an inclined trough containing a feed bar, which is operated by a rack and pinion.

DEVICE FOR FACILITATING THE NAILING OF LATH TO JOISTS OR WALLS.—Thomas Hill, New Centreville, Wis.—This invention relates to a device for facilitating the nailing of lath to joists or walls, and it consists in a novel construction and arrangement of parts, whereby a number of lath may be adjusted together and held in proper position, so that they may all be applied to the joists or wall at the same time, and nailed thereto.

MACHINE FOR MANUFACTURING SHEET LEAD AND LEAD PIPE.—Andrew Dow, Brooklyn, N. Y.—The object of this invention is to arrange a machine for making sheet lead in such a manner that the same can be easily converted into a machine for making lead pipe.

MACHINE FOR SAWING HOOPS.—Abraham Lutz, Orangeville, Ill.—This invention relates to an improved arrangement of springs and bearings in machines for sawing hoops from poles, whereby the pole is more easily and securely held in its proper position while being fed to the saw, and which improvement is applicable to ordinary sawing.

TRUSS, ABDOMINAL SUPPORTER, ETC.—Jules Lecocq, New York city.—This invention has for its object to furnish a simple, light, and effective truss, etc., which may be worn without annoyance or fatigue, and which will not chafe the body of the wearer.

STEEL TRAP.—C. P. Goss and Adrian Rais, Waterbury, Conn.—This invention relates to an improvement in the construction of steel traps for catching rats and other vermin, and consists in making a combined spring and bottom plate or support of the trap out of one piece of metal.

GOVERNOR.—Wm. L. Collamore, Warren, R. I.—This invention relates to a governor for steam engines and for other purposes where governors are usually employed. The invention consists in a novel application of a supplemental weight or weights to the ordinary ball governor, whereby the governor is rendered far more sensitive than at present and a material saving of steam and fuel effected.

ATTACHING OR SECURING SPRINGS.—Daniel Witt, Hubbardston, Mass.—This invention relates to a mode of securing or holding springs, and is more especially designed for securing or holding in position upholstery springs and those which are applied to chairs, etc., etc. The object of the invention is to obtain a simple and economical means which will admit of the springs being readily attached to the fixtures designed for them, and which will firmly hold the springs in position.

FILLING SYPHON BOTTLES.—William Geo, New York city.—This invention relates to an apparatus for filling glass syphon bottles, those designed for holding liquids impregnated with carbonic acid gas, and which are provided with a faucet or valve to admit of the liquid being drawn from the bottles as required for use. The object of the invention is to obtain a device for the purpose specified, which will admit of the bottles being charged or filled with the greatest facility, without material waste of liquid, and which will admit of being adapted for filling or charging bottles of different shapes or patterns and capable of being adjusted to suit the hight of different operators, so that a man or boy may use the apparatus.

DASHER.—Morgan O. Davis, Warrensburg, N. Y.—This invention relates to a new method of constructing dashers for churns, by means of which the butter is separated from milk in a much shorter time, and the same is more easily taken apart to be cleaned.

FENCE.—Daniel Kaufman, Boiling Springs, Pa.—This invention has for its object to furnish an improved fence, simple in construction, light, strong, and durable, and one which can be easily and quickly put together.

MACHINE FOR FILLING SAUSAGES.—Martin Feuerstein, Williamsburgh, N. Y.—This invention relates to a machine for filling sausages, and consists in the use of a cylindrical vessel into which the material to be filled into the skins is placed, and in which a piston is arranged, by which the contents are gradually forced downward.

COMBINED HARROW, PLANTER, AND CULLIVATOR.—J. G. S. Garwood, Vermillion, Ill.—This invention has for its object to furnish a simple and convenient machine which shall be so constructed and arranged as to be easily adjusted for use as a harrow to prepare the ground, as a planter, to drop and cover the seed, and as a cultivator to cultivate the crop.

GAGE COCK.—W. G. Thomas, Centralia, Pa.—This invention relates to an improvement in gage cocks for steam boilers, and consists in forming the same in several removable parts, so that the certain parts which may require repair can be taken off and repaired while there is steam in the boiler.

DREDGING MACHINE.—Thomas Walsh, and Augustin Walsh, New York city.—This invention relates to a new mode of dumping the contents of buckets of dredging machines, by means of having the buckets made in the form of a quadrant, with hinged arms attached to them in such a manner that they can be opened and closed at the pleasure of the operator.

MEDICAL COMPOUND.—James T. Stewart, Peoria, Ill.—This invention has for its object to furnish an improved tonic, stomach bitter, and, as a secondary effect, blood purifier, which is applicable to all cases of debility, and especially those resulting from and following ague and other malarial fevers, and which may be taken freely and for a great length of time without producing headache or other unpleasant symptoms.

RAILROAD CLAMP.—John E. Watkins, Smithfield, Ky.—This invention has for its object to furnish an improved clamp for railroad rails, by means of which the end of the rails may be kept in line, both vertically and horizontally with each other, and which shall hold the ends of the rails firmly and securely, at the same time that it does not interfere with their contraction and expansion.

WASHING MACHINE.—Henry Helm, Pittsburg, Pa.—This invention relates to a method of constructing washing machines, whereby the same are more convenient, and clothes are more thoroughly and quickly washed.

CANDLE HOLDER.—S. J. Rockwood, Elsah, Ill.—The object of this invention is to construct a holder for a candle in such a manner that it will receive and hold candles of varying sizes, whether large or small in diameter, and without either cutting or wrapping up the candles.

HAND HOLE COVER FOR STEAM BOILERS.—Gilbert White, New York city.—This invention consists in a peculiar modification in the application of the packing or gasket of a hand hole cover for steam boilers, whereby a tighter or closer joint is obtained than hitherto, and the packing or gasket rendered less liable to become injured or deranged in applying the cover to the hole, and taking it therefrom.

ROTARY BLOWER.—P. H. and F. M. Roots, Connersville, Ind.—This invention relates to a new manner of constructing the shells of that class of rotary blowers and engines, in which two revolving pistons, whose peripheries are formed by arcs of different diameters, connected by suitable sides, are arranged. The invention consists in forming within the shell at suitable distances apart, projecting packing straps, against which the outer peripheries of the pistons work.

APPARATUS FOR FLOCK MACHINES.—Henry Turner, New York city.—This invention relates to a device for automatically feeding the fibrous material from which flock is to be made, from a box or other suitable receptacle to the grinding or tearing cylinder, and consists in arranging agitators in the aforesaid box or receptacle, by which the material is constantly stirred and fed to an endless apron, which is provided with cups, for carrying the said material to the hopper on the tearing cylinder. Plungers are provided on a crank shaft, which is arranged above the hopper, by which plungers the material is received from the apron, and delivered to the cylinder, and by which it is prevented from becoming clogged in the hopper.

VIOLIN.—Bambridge Bishop, New Russia, N. Y.—This invention relates to violins, bass viols, guitars, and other similar musical instruments, and consists in continuing the finger board over the sound board to the foot of the instrument, and in there fastening the end of the strings, whereby the finger-board is made to support the whole tension of the strings. And in combination with the above, the use of a supplementary bridge resting upon the finger-board in such a manner that the pressure of the strings upon the sound board bridge can be controlled without altering the pitch of the strings, or the hight of the sound board bridge, thereby giving the strings the pressure in the sound board bridge requisite to produce the most perfect tone, within the power and capability of the instrument, and the sound board is relieved of all contact from dead wood, and thus left freer for vibration, and consequently to give out a fuller, more even tone.

BUCKLE.—C. W. Martin, Mount Pleasant, Iowa.—The present invention relates to a buckle intended more particularly for use upon traces to harnesses of horses, the nature of the invention consisting in providing a means by which the chafing of the sides of the animal is prevented, and the possibility of the tongue to the buckle pulling and splitting out the trace, from the strain by the animal, is obviated.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisemets at $1 00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

P. C., of R. I.—Strong nitric acid will set fire to turpentine charcoal powder, or sawdust. There is danger of fire if it is stored where it is liable to leak out on straw or shavings.

J. H. T., of Pa., asks how to render leather hard without destroying its fiber. It can be done simply by saturating its substance with shellac dissolved in alcohol or glue applied quite warm, and not injure its fiber.

P. D., of Va., sends us a small package of shiny black grains and asks their nature. They are particles of the magnetic oxide of iron. Such sand often contains gold, but where it is abundant, even if not auriferous, it is valuable, yielding iron of excellent quality. We have no doubt large deposits exist in this country which have not yet been reported.

F. S. C., of Mass.—Bone and ivory may be softened by soaking in hydrochloric or acetic acid. The acid dissolves the mineral matter upon which the hardness of the material depends.

J. W., of Mass., wishes to know how to prevent his flour paste from molding. Add a little creosote, carbolic acid, or bisulphite of lime. Neither of them will impair its adhesive qualities.

P. J. P., of N. Y.—When the vapor of water is compressed it returns to the liquid form. A common rule for estimating the comparative volumes of steam and water is to reckon one cubic foot of steam equal to one cubic foot of water.

W. H. N., of N. J.—The French emperor has taken the initiative in the unification of coinage by minting gold coin stamped "5 dollars—25 francs."

J. M. S., of Vt.—Sulphuric, nitric, and many other acids can be detected by dipping a piece of litmus paper in the solution suspected of containing the acid. If it is present the blue of the litmus paper will turn to red. The paper can be obtained of any druggist.

A. C. D., of Pa.—White lead is not an acetate of lead; it is called carbonate of lead. The method usually employed in this country for its production is to expose very thin sheets of the lead, rolled loosely into cylinders, to the hot fumes or vapors of acids in closed receptacles. The acid vapors disintegrate the lead and the carbonate falls in the form of a paste or wet powder. It is then washed to separate the acid and ground with oil.

M. S., of Conn.—Glycerin and nitro-glycerin are two entirely different substances. One is an emollient, useful in the toilet and in medicine. Nitro-glycerin is a highly explosive substance and dangerous. Glycerin is a thick, syrupy liquid, having but little color, no smell when pure, oily or sticky to the touch, and sweet to the taste. It is entirely innocuous. Nitro-glycerin is the union of glycerin and nitric acid. Like many other compounds it does not show the characteristics of either of its elements.

D. A. K., of Md.—Whiting, or Spanish white, is a preparation of chalk, merely ground fine and washed. French chalk or tailors' crayons is a variety of talc or steatite—soapstone—colored by any coloring matter to give it body and shade.

A. J. K., of Wis.—Spanish gun barrels were formerly very highly valued, their superiority being attributed to the excellent iron which was made almost exclusively of stub nails and old horse or mule shoes.

W. P. T., of N. H.—If you desire to give your brass levers density and hardness not obtainable by the quality of the com position, it can be done by hammering them after leaving the foundery. This will harden the brass and give it greater resistance to wear. It must be hammered when cold.

J. B. P., of Mass.—"Suppose a hole be made through the earth from pole to pole, and a cannon ball be dropped in at one of the poles, what would be the course of the ball? One person maintains that the ball would go only to the center and there stop. Another that it would go beyond the center and then return; and that this movement or oscillation would be repeated, but gradually becoming feebler till the ball rested at the center. A third claims that if there were no obstruction or resistance, the ball would fall through to the opposite pole and would then return to the starting point; and that this oscillation from pole to pole would go on forever." The first philosopher is wrong. The second and third are about right. The question discussed is a very old one.

F. R., of Mass.—Patent drawings may be signed by an inventor or his attorney. . . The process for making parchment paper is correct, with sulphuric acid and water equal parts. Your failure is probably due to using an unsuitable paper, or to using the acids too warm.

J. S. B., of Me.—The English monetary unit, the pound sterling equals in value 20 shillings, or 240 pence. Anciently 240 pence weighed a pound of silver; hence the origin of the term. Now, the equivalent weight of the pound is over three and one half Troy pounds. The signature, a pound sterling, is the initial letter of the Latin word "libra," a balance, the horizontal marks serving simply to distinguish this L from the ordinary letter. We have previously published a history of the dollar mark, and refer you back to that explanation.

F. S. B., of Conn., asks "why, in the case of streams near their debouchure into the sea, the effect of the changing tides is first noticed on the sides of the river, so that near both banks a rising tide gives two up-currents while the main body of water is still running down and so *vice versa* when the tide changes." The momentum of the greater body of water which is in and near the channel of the river requires a longer time to be overcome than is the case with the shallower parts of the stream.

L. F. S., of N. J.—Entomologists divide the insect world into seven classes, the *orthoptera*, or insects having straight or longitudinal folding of their wings, and of which grasshoppers, cockroaches, and crickets are examples; the *hymenoptera*, or honey bearers, of which the bee forms a characteristic example: the *neuroptera*, or the order having, like the dragon fly, four membranous and transparent wings; the *lepidoptera*, insects with four membranaceous wings covered with fine imbricate scales like powder, as the butterfly; the *coleoptera*, or order to which the beetle family belong, all having crustaceous shells which when shut form a longitudinal suture along the back, and cover the wings which lie beneath; the *diptera*, having only two wings, and two poisers, as the house fly; and the *aptera*, or wingless insects.

Business and Personal.

The charge for insertion under this head is one dollar a line.

For Gas-Pipe Screwing and Cutting-off Machines for Hand or Power, or any tool used by Steam and Gas Fitters, address Camden Tool and Tube Works Co., Camden, N. J.

A Large Marble Factory to rent on the Hudson River. Address Davis' Machinery Yard, 124 Hudson st., Jersey City.

Wanted, address of parties wishing scale removed from boilers by Winans' Anti-Incrustation Powder, 11 Wall st., N. Y., 12 years' recom'n.

Wanted,—To be used in Elk county, Pa., a portable engine and boiler, of 30 horse-power, a circular saw mill, 30-foot carriage, planer, edger, shingle machine, and jack saw. Also, any other machinery connected with saw mill and tannery, if they are sold cheap. Address J. Schultz, Ellenville, Ulster county, N. Y.

One Third Interest in the Athens Foundery and Machine, Works for sale. Having an extensive collection of tools and patterns, a large circuit of custom, being in a healthy section of country, located among factories and mills. It is a desirable investment for a practical man. For full particulars address R. Nickerson, Agent, Athens, Ga.

Agents wanted everywhere—enormous profits. Sample doz. $1 50. Retail for $3 each. Thomas Powell, Milroy, Ind.

Parties in want of Fine Tools or Machinists' Supplies send for price list to Goodnow & Wightman, 23 Cornhill, Boston, Mass.

I will give a half-interest in a valuable invention to any one who will get it patented in Foreign Countries. A. Lake, Smith's Landing, Atlantic county, N. J.

For Paper Collar Machines and Bosom Plating Machines, address W. H. Tolhurst, Troy, N. Y.

Steel.—To Dealers and workers in Steel—A simple and reliable method of testing the quality and detecting the imperfections of steel, for sale. Price $1. Full instructions by return mail. Address P. O. Box 2,993, Boston, Mass.

Second-hand Barrel-head Rounder, with iron frame, in perfect order, for sale, price $100. Will make 4000 heads per day. Address Owen Redmond, Rochester, N. Y.

Parties wishing Machinery or Patents of any kind sold on Commission. Address Geo. P. Everhart, Shrewsbury, York county, Pa.

I wish to correspond with manufacturers who can build my Self Track-Laying Cars, Patented Jan 23d, 1867. Address J. S. Lake, Smith's Landing, Atlantic county, N. J.

NEW PUBLICATIONS.

THE GALAXY.

The February number of this widely circulated and popular magazine, comes to us laden with very choice original articles from the pens of a variety of well known and well paid contributors. Messrs. W. C. & F. P. Church, 39 Park Row, New York, are the publishers of the *Galaxy*, and also of the *Army and Navy Journal*—both first class publications in their respective line. The *Galaxy*, (monthly,) $3 50 a year. The *Army and Navy Journal* (weekly,) $6 00 per annum.

GEMMA—T. B. Peterson & Brother, Philadelphia, Pa. Price, bound, $2; paper, $1 50.

A Novel of 450 pages by T. A. Trollope. The *Athenæum* thus reviews it:—"Mr. Trollope again gives us one of his novels of Italian private life of the present day. The descriptions of the city of Siena—of the country around—of Savona, the desolate town of Maremma—are wonderfully graphic, and bear witness to their having been done from the life by one who has lived in the places and loved them. The scene in the great church of Savona is brought vividly before the reader, who will not easily shake off the impression it produces. We would recommend the reader to learn for himself the unravelling of the plot and the final result. The story will repay perusal and the interest increases as it proceeds."

DAVID COPPERFIELD—By Charles Dickens. Cheap edition, paper, 25c. T. B. Peterson & Bro., Philadelphia, Penn.

ATLANTIC MONTHLY—February number just out. Ticknor & Fields, Boston, Mass. $4 00 a year.

Improvement in Lathe Chucks.

The accompanying engravings give different views of a chuck for holding drills, wire, etc., in the lathe, which was patented by Isaac Smith, of New York, July 10, 1866. It differs in many respects from all others, employing no spring to open the jaws when the gripe of the screw is relaxed, all the movements being absolute. There are neither holes nor projections on the exterior case to become filled with dirt or to catch into the clothes of the workman. Fig. 1 exhibits perspective views of the different parts, and Fig. 2 a vertical section and a perspective of the chuck complete. A is the conical screw which gives motion to the jaws, having a shank for attachment to the lathe spindle. Over this slips a shell, B, having three or more slots in its periphery in which fit the movable jaws, C. These are threaded on the under side to fit the thread of the conical screw. The whole is

Fig. 1

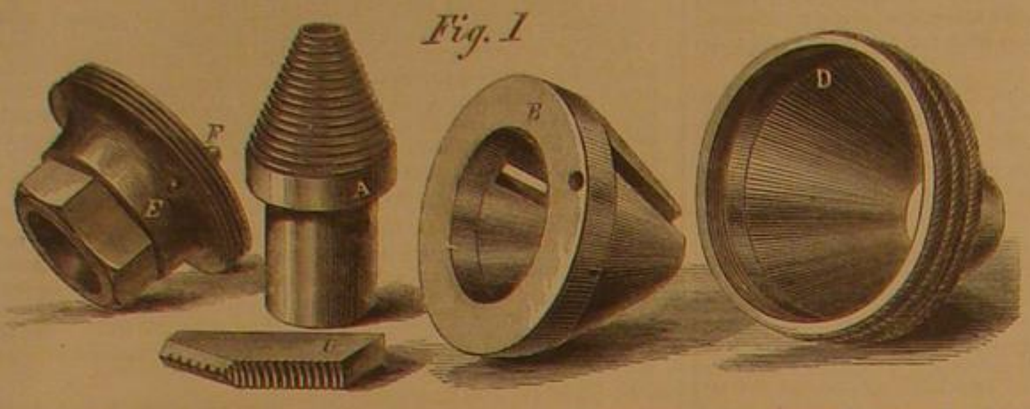
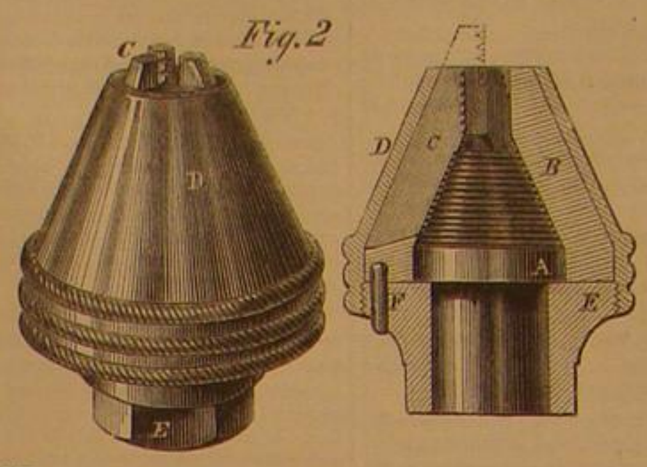


Fig. 2



SMITH'S PATENT DRILL CHUCK.

covered by the case, D, held in place by the cap nut, E, which is connected to the slotted shell, B, by a pin or screw, F.

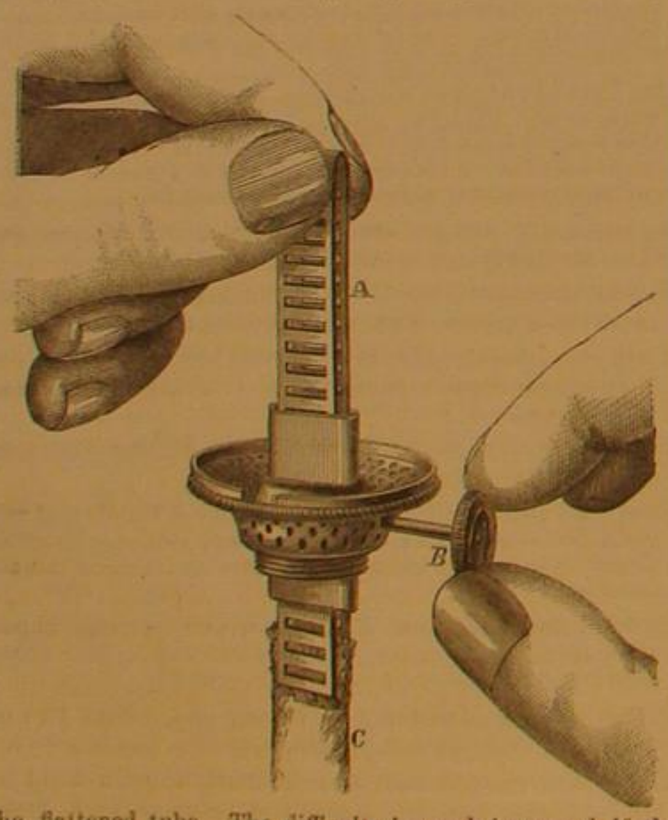
In operation the chuck may be turned with the hand, by means of the milled beading on the outer case, sufficiently hard to hold the drills, and if more force is required a wrench may be placed upon the nut, E. The chuck is very neat in appearance, and the jaws, whether open or closed, are always parallel.

This chuck is peculiarly adapted to screw making from wire, and to screw machinery, having a hole through its entire length as large as the opening of the jaws. Used upon a hollow lathe spindle wire of any length may be chucked for turning or screw cutting. It will receive a long or double drill, an advantage appreciated by all machinists.

All communications, orders, etc., should be addressed to the Excelsior Chuck Co., No. 10 Park Place, New York city.

BLAETTERLEIN'S DEVICE FOR INSERTING LAMP WICKS.

All who use kerosene or other lamps which require the flat wick, understand the difficulty of passing the wick through



the flattened tube. The difficulty is much increased if the stiffened end of the wick becomes frayed or softened. The simple device shown in the engraving will enable the clumsiest or most inexperienced to pass a wick through the tube. It is a strip, A, of sheet metal, punctured with transverse slots, calculated to engage with the teeth of the pinion or spur on the elevating shaft, B, and furnished with inward bent teeth at each end. The strip is bent or doubled at the middle, so that the teeth on the ends come opposite each other.

Its operation is thus: The threader, taken in the hand, is made, by its teeth, to grasp the end of the wick, C, and then the doubled end is passed into the tube from the bottom, when, by turning the elevating pinion, its teeth "take" in the slots of the threader until the wick engages, when, of course, the spurs take the wick and the threader can be removed. Its simplicity and utility will recommend itself to every housewife.

Patented through the Scientific American Patent Agency, Dec. 31, 1867, by F. A. Blaetterlein, to whom, at West Meriden, Conn., all communications relative thereto should be addressed.

Manufacture of Artificial Stone.

It has long been known that a mixture of sand, magnesia, and bittern water, a refuse of salt works which contains chloride of magnesium, will form a strong mortar, which soon hardens, and when molded into blocks makes a good artificial stone. Many forms of these mixtures have been made. D. and W. McCaine, of Groton, Mass., have recently patented the idea of using pulverized stone, brick, etc., instead of sand.

Blocks thus made are more costly, but not any better, apparently, than the previously made blocks. The patentees give the following particulars:—

"In the preparation of such stone, we use, as a cementitious agent or agents, calcined magnesia and bittern water, and our invention consists in an artificial stone, made by combining, with stone chips and finely pulverized or powdered stone, magnesia and 'bittern water,' the residuum from salt works.

"The proportions and the process of combination preferred by us are as follows: To twenty parts, by weight, of comminuted stone and chips of stone, we add about one part of calcined magnesia, and mix them together, with sufficient bittern water to form a stiff mortar, which mortar may be molded and pressed, or simply molded, or applied with a trowel.

"Heat may be used to hasten the hardening process; but this is not generally necessary, as the stone dries well in the open air, and indurates perfectly in two or three weeks, without any application of artificial heat.

"By this process, sand, soapstone, marble, or other mineral substances, in broken, pulverized, and comminuted form, may be used for the production of blocks and slabs, the invention being particularly valuable for the utilization of chips in stone quarries, and of marble, soap-stone, and slate stone dust and chips, in places where these minerals are worked. The stone so made answers perfectly for building purposes, for tiles, for stone sinks, stoves, etc., and, generally, the same purposes for which bricks, clay, and stone blocks and slabs are employed.

"The relative quantities of finely pulverized and of broken materials that are used depend somewhat upon the size of blocks that are to be formed; but it is only necessary for the producing of the stone that the mortar, made up of the pulverized stone and the calcined magnesia and bittern water, should fill all the interstices and spaces between the broken stones or chips."

Filling of Wood for Carriage Bodies, etc.

Many cheap methods of filling the pores of wood, prior to the application of paints, have been introduced. These fillings have the effect to keep the paints and varnishes upon the surface of the wood, where they solidify and form a very smooth and elegant surface. George Chambers, of Ithaca, N. Y., in a recent patent, says:—"To any convenient quantity of boiled linseed oil I add, over and above the ordinary drying use of the article, any free and large excess of litharge, and also a small quantity of chalk, or of chalk, and whiting, and starch. This makes a thick, glutinous semi-fluid mass. Next, the surface of the wood being cut, planed, or sandpapered, or otherwise smoothed or polished, but having no preparation or mixture of any kind on it, I coat it over with the above preparation, rubbing it freely into the pores and grain of the wood. Then I at once apply a thick dusting or coating over the wood thus covered with sulphate of lime or plaster of Paris. I let it stand for a few moments, that the fluid parts of the oil may be absorbed by the sulphate of lime. Then I proceed at once and polish the surface, using if necessary, more plaster of Paris in so doing. Brushes, woollen cloths, and other articles in rubbing and polishing, are used. Further, to suit the color of the wood, I use in my preparation, and in the plaster of Paris, various coloring substances, the mineral ores being especially useful, as Vandyke brown, umber, Spanish yellow for black walnut and oak, chalk and whiting (in additional quantities) for maple and cucumber and satin wood, and so of other colors and woods. These I mix in the preparation before it is applied to the wood, and, if necessary, in the plaster of Paris in polishing. The result is a fine, clear, even polish, that hardens, and is dry and ready for use, in much shorter time than varnish or other ordinary articles and modes."

The Eruption of Vesuvius.—Professor Palmieri, of Naples, who is engaged in making observations in all phenomena connected with the last fire outbreak of this volcano, states that he has never seen the magnetic needle so frequently or seriously disturbed as it is at present, and the seismometer records at least ten distinct earthquake shocks daily.

How to Have Warm Feet.—It is said that the wearing of cotton stockings under woolen ones will prevent cold feet. It no doubt will when caused by moisture. The woolen stockings will absorb the moisture as it accumulates in the cotton sock, and keep the latter comparatively dry. But when the cold arises from the lack of circulation, the woolen sock will be found the most comfortable worn next to the foot.

Recipes for Steel Having Various Qualities.

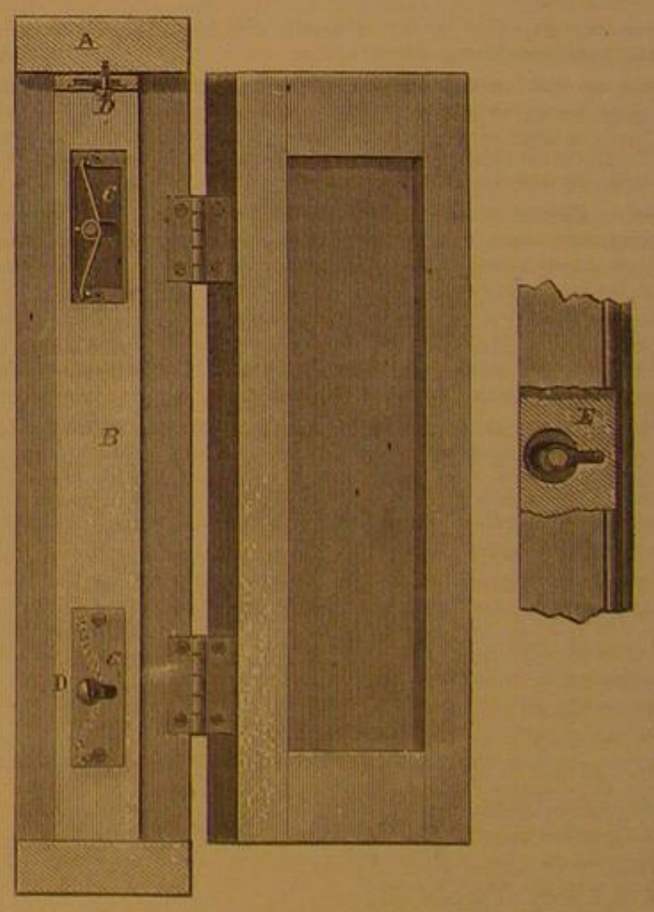
James R. Bradley and Moses D. Brown, of Chicago, Ill., have lately patented the following:—

"For treating scrap iron or malleable iron of good quality, produced by the ordinary processes, and producing therefrom different kinds of steel, we melt the scrap or malleable iron in crucibles, adding thereto chemical ingredients of different properties, and in different proportions, as follows, to wit: To make shear steel, to a pot of 50 pounds, add potash, 1¼ ounce; sal-ammoniac, 1½ ounce; manganese, 4½ ounces; charcoal, 7 ounces; sodium, 3 ounces. To make cast steel, to a pot of 50 pounds, add potash, 1½ ounce; sal-ammonia, 1½ ounce; manganese, 4½ ounces; rock salt, 3½ ounces; charcoal, 7 ounces. To make German steel, to a pot of 50 pounds, add potash, 1½ ounce; sal-ammoniac, 1½ ounce; manganese, 4½ ounces; charcoal, 7 ounces. To make Damascus steel, to a pot of 50 pounds, add potash, 1¼ ounce; sal-ammoniac, 1¼ ounces; manganese, 5 ounces; saltpeter, 4 ounces; charcoal, 7 ounces. To make saw steel, to a pot of 50 pounds, add potash, 1¼ ounce; sal-ammoniac, 1½ ounce; manganese, 4½ ounces; charcoal, 8½ ounces: common salt, 3½ ounces; saltpeter, 1 ounce. To make silver steel, to a pot of 50 pounds, add potash, 1½ ounce; sal ammoniac, 1¼ ounce; manganese, 4¾ ounces; charcoal, 8 ounces; salt, 3½ ounces; alum, 1 ounce. To make file steel, to a pot of 50 pounds, add potash, 1 ounce; sal-ammoniac, ¾ ounce; manganese, 4 ounces; charcoal, 9 ounces; salt, 3½ ounces; alum, ¼ ounce. To make rifle steel, to a pot of 50 pounds, add potash, ¾ ounce; manganese, 4 ounces; charcoal, 3½ ounces; salt, 3 ounces; alum.

"What we claim, as new, is—The improved processes for making steel of different kinds herein described, by mixing the several ingredients in the proportions, and melting the same with malleable or scrap iron, as specified."

BUTLER & WARING'S WEATHER STRIP FOR DOORS AND WINDOWS.

Slamming doors and rattling windows are annoying to the strong and healthy as well as to the nervous and feeble; and ventilation by ill-fitting sashes and doors is neither healthy nor economical. The engraving represents a self-acting or automatic weather strip which is cheap, durable, not liable to derangement, and can be easily applied. It is a simple strip of wood secured to the inside of the window sash, or door



jamb, by screws through slots, the strip being held in place by springs.

A, in the engraving, is the section of a door or window frame, and B is the weather strip. A plate, C, mortised into the strip, has a transverse slot through its center through which the screw, D, passes, engaging with the elliptic spring under the plate. As will be seen, when the door comes in contact with the edge of the strip the springs allow the strip to recede and yet holds it snugly against the door. Its action on window sashes is similar. The strip may be carried up both sides of a door or window and across top and bottom without adding perceptibly to the labor of closing. The small figure, E, shows a simpler form of the spring and plate, the first being simply a spiral and the latter a washer under the head of the screw.

It is evident from the description and engraving that this strip is very simple. Any other form or material of spring may be used, as deemed desirable. The patent—secured through the Scientific American Patent Agency—is dated June 4, 1867. Rights are for sale by Butler & Waring, who may be addressed, Box 119, Hudson, N. Y.

In taking up belts the time used in carefully cutting the belt square is always time saved.

Scientific American.

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WASTE OF OIL IN SHOPS AND MANUFACTORIES.

It is doubtful if either employers or employés in our manufactories have an adequate idea of the amount of lubricating oil which is sheerly and heedlessly wasted in the different processes of iron, cotton, woolen, and other manufactures. But employers know well that their bill for oil bears a large proportion to their other expenses. It is not likely that employés, generally, wantonly waste the property of those by whom they are employed, but the probable fact is that there is a want of consideration or a lack of knowledge as to the proper use of the material.

Take the machine shop for instance. It would not be extravagant to assert that fully one half the oil ostensibly used in shops is really wasted. If a workman wishes to oil his file for finishing he will pour a stream over its surface, allowing two-thirds or more to drip on the floor, when the file could be sufficiently moistened by a small bunch of waste, or better, a small sponge saturated with oil, without wasting a drop. Some workmen in machine shops seem to think that their status as workmen depends on the amount of "gurry" and oil they can carry about on their persons, so that they may be considered "greasy mechanics" *par excellence*. We believe that it is not necessary for a machinist to be repulsive because of grease on his person; although a finical workman is abhorrent—one who pays more attention to his personal appearance than to his legitimate work.

If a hole is to be tapped in iron, whether cast or wrought, the workman too often prefers lubricating oil to patience and "elbow grease," and pours on the oil until he saturates the substance or fills the pores of the iron. In ordinary cast iron, a tap, properly made and judiciously used, can be run without oil, or with a very small quantity, and in this work, as in many other processes, a saponaceous liquid is equally as effectual and much cheaper. It is an old and worn-out notion that almost every operation on the metals, and almost every use of a tool, must be accompanied with oil; neither is it correct that oil alone is a lubricant. Holes *may* be drilled and tapped and surfaces finished without the use of oil, although some lubricant may be necessary. The addition of oil to an already clogged file, milling tool, saw, or rotary cutter is not only a waste, but is no aid to the progress of the work. Either of them may be quickly and effectually cleaned either by wiping with waste, combing with the card, or heating over the forge fire; when they will do the work required much better than if they had to overcome the resistance of a body of viscid oil.

In the lubricating of shafting, also, great waste is occasioned. Where shafting is suspended in ordinary boxes most of the oil leaves the journal almost as soon as poured into the box, and finds its way, dirty and fouled, into the dripper; once there it is nearly worthless for shop use. Gummy, dirty oil, charged with foreign matter, and half oxidized by exposure to the atmosphere, although often used for tapping and screw cutting, is unfit for even these purposes. It corrodes the taps and dies, and by its adhesive quality, adds greatly to the power required to do the work.

Journal boxes are now made which retain the oil and require replenishing only three or four times a year. Their additional cost over the old style is but trifling, and their use will save a large expenditure. They should be adopted by every "live" mechanic. Pouring oil on heated journals is wasteful; water is much better. Indeed, water is an excellent lubricant so long as it remains in place between the journal and box. If, like oil, it could be kept there, it would afford one of the best means of lubrication. Oil after passing between a heated journal and box is comparatively worthless for lubricating purposes.

These considerations, crudely presented, may serve to direct the attention of our mechanics to a subject well worthy of notice; the qualities of oil, its changes under different circumstances, and its substitutes, comprise a subject of very great importance, on which all managers and workers of machinery should have some theoretical as well as practical knowledge.

SPONTANEOUS COMBUSTION.

It may be that some fires now attributed to the wickedness of human incendiaries might be found to have their origin in the operation of natural laws, and that their attribution to other causes is merely the result of our ignorance of those laws. Spontaneous combustion is undoubtedly a prolific source of fires. This is produced in various ways. It is well known that a spongy, fibrous substance, as cotton waste, or tow, saturated with linseed oil, if exposed sufficiently long to the sun's rays, or even the atmosphere, will take fire. Authenticated instances of destructive fires originating in buildings where rags or cotton waste were stored, are sufficiently numerous to prove the impropriety of keeping these substances piled in mass a long time. Factory waste is always more or less saturated with oil, which oxidizes on exposure to the atmosphere and gives out carbonic acid and hydrogen. If the waste is in quantity sufficient to compress the fibers, the danger of fire by the accumulation of heat is considerably increased.

Bituminous coal in large heaps oxidizes, and undergoes always a slow combustion without being inflamed; but sometimes, when wet by frequent rains, the coal actually takes fire. This is aided by the sulphuret of iron generally contained in bituminous coal.

Quicklime absorbs water so rapidly that sufficient heat is developed to ignite inflammable substances when brought in contact with it. It is therefore a dangerous commodity to store where there is a possibility of its being exposed to moisture, and its carriage by water is always attended with risk.

Newly burned charcoal in mass is liable to absorb moisture so rapidly as to produce ignition; so, also, it is asserted on good authority that wood ashes will ignite spontaneously without the presence of live coals.

It may not be commonly known that iron borings, turnings, and filings are also dangerous when left in heaps or stored in boxes. They are always wet, especially where they have been allowed to remain under lathes upon which water polishing has been performed. We have seen a heap of this material burning with an intensely blue flame. The oily waste, which is not unfrequently thrown into the iron shavings, adds greatly to the danger of fire from this source. The sweepings of the machine shop, if kept on hand, should never be placed in a wooden box or left in the shop.

A knowledge of these simple facts, combined with ordinary care, may prevent the occurrence of some fires which are now deemed mysterious in their origin.

WHAT SHALL BE DONE WITH OUR BOYS?

A correspondent of the Washington *Chronicle* writes to the editor of that journal as follows:

"I wish to call your attention to a great wrong that is now being inflicted on the boys of the present generation. I allude to the difficulty—I might say impossibility—of putting boys to trades. Several instances have recently come to my knowledge of parents in this city trying in vain to apprentice their boys to mechanical occupations. In these endeavors they are invariably told that the rules of the journeymen prevent master mechanics taking apprentices beyond a very limited number. That number every employer within my knowledge already possesses, and still it can be safely said that there are hundreds of boys at present in Washington unable to learn occupations that would enable them to earn respectable livings during their minority, and become useful citizens afterward. What is to become of these boys? Have we any right to interpose obstacles to their efforts to become good and useful men? and will it be any wonder if, in a few years, many of them are useless, or worse than useless, members of society?

"I believe fully in the right of mechanics to regulate their wages and hours of labor; but I do not believe in any of their laws that virtually tell a widow that she shall not bring up her son to the business that son may choose to earn a living at, by which he can support his mother in her declining years.

"This is no fancy sketch, Mr. Editor; and to prove it I refer to any employer to endorse my statement. You will see yourself the inevitable evil that must spring from a continuance of such a state of things. If any master tradesman in this city were to advertise for an apprentice to-morrow, I believe he would have at least fifty applicants for the situation before night. Should this statement be doubted, let the experiment be tried."

We copy the above simply to call the attention of employers, mechanics, and our readers generally, to a state of affairs which is in no wise overdrawn in the letter of the correspondent. We frequently have applications from parents and from young men for counsel or assistance in this matter, and always experience the same difficulty of which the correspondent speaks; the proprietors of our shops evincing considerable reluctance to receiving apprentices. It may be possible that in some localities the journeymen, as the writer intimates, may assume to dictate to their employers as to the number of apprentices they may receive; but we doubt if the practice is very general.

It is not American, and we hope is not in danger of becoming naturalized in this country. We recollect, twenty-five years ago, when the business of designing and engraving for calico printers was almost entirely in the hands of foreigners, that the rules of their trades union prescribed the number of apprentices to be received, thereby often proscribing the would-be apprentice. At that time these employments were highly remunerative, as compared with others, and it was not surprising that those who had served a long apprenticeship and paid for their knowledge should desire to protect themselves and their business. It is not an easy matter, in England, for a young man or boy to become an entered apprentice to any mechanical business. They, or their parents or guardians, are compelled to pay a bonus for the privilege of being taught a trade; and in addition seven, instead of as in this country, three, or at most, five years, is exacted as the term of novitiate. Under these circumstances the apprentice and the journeyman set an adequate value upon the skill they have attained.

Possibly a portion of the difficulty of procuring positions for apprentices is caused by the want of honor among apprentices themselves, and the impossibility of protection to the employer under the loose system, or rather want of system, so prevalent here. Too often apprentices leave their masters soon as they have attained sufficient expertness and knowledge of the use of tools to be of some profit to their employers. If some system were generally adopted which would adequately protect employers, binding the apprentice to the performance of his portion of the contract, it would not be so hard a matter to secure situations as at present. Something, however, should be done to give our boys greater opportunities to become practical mechanics. The ratio of apprentices in most shops is not nearly what it should be, yet to these we must look for the successors of our present workmen.

TUNGSTEN AND TUNGSTEN STEEL.

The metal tungsten is found in small quantities in the form of tungstic acid combined with lime, in the mineral known as *Scheelite*, also in the tungstate of iron and manganese, a mineral known as *Wolfram*, and in the tungstate of lead, or *Scheelenite*. Both wolfram and scheelite are found in the United States, the former at Lane's Mine, Monroe county, near Mine La Motte, Mo., and near Blue Hill Bay, Me.; the latter has been met with at Monroe and Huntington, Conn., associated with wolfram pyrites and native bismuth in quartz. Tungsten was first obtained in the metallic state by the brothers D'Elhuyar, Spaniards, in 1783. In communicating their results to the Academy of Sciences at Toulouse, they described the alloys of the tungsten with gold, platinum, copper, lead, tin, antimony, bismuth, zinc, manganese, and white cast iron, not, however, with malleable iron or steel. All they state in regard to the iron alloy is that "with white cast iron it formed a perfect button, of which the fracture was compact and grayish white; it was hard and easily broken."

Tungsten fuses easily before the oxy-hydrogen blowpipe, but then the larger part burns to tungstic acid. Mr. Riche has succeeded in melting tungsten by means of a current from a battery of 200 Bunsen cells. In reducing tungstate of ammonia in a current of hydrogen gas at red heat, Percy obtained the metal in the crystalline state, with tin white color and bright metallic luster. The specific gravity of the metal ranges from 17·22 to 17·6. It is very hard, a file scarcely scratching it. It is less readily fusible than manganese, and exhibits either a tin white, steel gray, or grayish white color, according to the manner of its preparation.

We are indebted to the Duc de Luynes for a memoir on the manufacture of cast and damask steel, and in nine analyses therein published of various kinds of this celebrated steel, tungsten appears in eight. In six of these, only traces of that metal were met with, while of the other two, one contained one half and the other exactly one per cent. The quality of that highly estimated steel could then, according to these statements, scarcely be attributed to its amount of tungsten, for from one to three per cent of this metal produces but little change in the iron.

Some highly important experiments were made some years since by Bernoulli at the royal foundery in Berlin. We will in a few lines present a short abstract of his report which may be found in the "Annalen d'Physik u Chemie" of Toggendorff. Cast iron fused in various proportions with tungstic acid gave the following results:

"With from 4 to 5 per cent a slight change was perceptible in the iron; not so with from 1 to 3 per cent. With 10 per cent the iron acquired steel-like properties, it was of a light grayish color and possessed an extremely fine-grained, somewhat conchoidal fracture. It was also found to be a little malleable. An alloy of 15 parts of the metal with 85 parts of iron formed almost pure steel, but of little malleability. With 20 per cent it grew still harder and less malleable, and beyond this limit the deterioration in these respects increased until with 50 per cent it can no longer be hammered. A similar series of experiments was made in fusing tungstic acid with white cast iron, but no alloy was produced except when charcoal powder was added.

The conclusions at which Bernoulli arrived are that only the graphite or mechanically-combined carbon in cast iron can reduce tungstic acid, and the combined carbon has no such effect; by melting gray cast iron with a suitable proportion of tungstic acid, cast steel may be directly produced.

Tungsten steel was first made on a large scale in Austria, and was exhibited in 1858 in Vienna in various forms, at the Congress of miners and melters. The steel was remarkably fine, uniform, compact, and of a conchoidal fracture. Swords exhibited were sharp, hard, tough, and elastic. At the international exhibition of 1862 such steel was exhibited, but did not attract much notice. Lately, however, a trial with tungsten steel has been made in Westphalia and elsewhere, and the general conclusion has been arrived at, that tungsten steel furnishes much more advantageous results than the best cast steel employed at the present time in commerce.

There is much tungsten steel sold to consumers in which there is not a trace of this metal. Dr. Feuchtwanger exhibited lately at the Polytechnic Association of the American Institute a tungsten ore from Nevada, occurring there in heavy beds, and Prof. Van der Weyde showed a steel knife containing tungsten, which cut glass readily like a diamond.

European and American Locomotives.

A writer in the London *Herald*, comparing different kinds of railway apparatus, gives the following interesting account of some of the peculiarities of European and American locomotives:—

"In England, we see the locomotive engineers, as a general rule, aiming at high speed, as little complication as possible in the parts of the engine, utmost simplicity in all things, perfection of adjustment and workmanship, and high boiler pressure. Upon this last point we may note that a few years since fifty pounds to the inch was considered high; now one hundred and twenty pounds and one hundred and thirty pounds are ordinary pressure, and on the North London line engines are being run at one hundred and eighty pounds.

"France has slow speed and very heavy trains; her engineers aim at large tractive force, do not spare complication, use large quantities of material, and couple numbers of driving wheels together, making, for example, twelve-wheeled coupled engines, things utterly unknown in England, but at the same time they put light weight on those wheels, not more, in fact, than ten or twelve tuns on an axle. The French deserve credit for having developed their engines into a form suitable for their shareholders's ideas of traffic, that is, a heavy engine at slow speed pulling a long load. One expensive necessity has already been evolved in our own country by the quick running of small trains, namely, the necessity for laying down third and fourth lines of rails to accommodate the traffic, at an enormous expense to the proprietary, and which could have been avoided if the trains had been worked as on the Great Northern of France. The fuel for a heavy train is much the same as for a light one, or very little increased; but in running double sets of trains over double lines of rails, the wages are doubled, the first cost—that is, line accommodation—is doubled, the number of engines is doubled, while the wear of engines and road is quadrupled.

"The American idea is cheap engines. Their locomotives have their parts very accessible, and they run them at fair but not high speeds. The American engines have special arrangements for clearing and lighting the road, and for burning wood in their furnaces. Notwithstanding the superiority of English made engines, not one of them can run over American lines with any thing like the speed, safety, or endurance of their own. Strange as this may at first appear, it is easily accounted for, and the explanation bears on the points we shall presently bring forward. The explanation is, that the leading ends of the American engines are supported on four-wheeled trucks, or bogies, which, while giving a long wheel-base, and consequently steadiness, allow the engine to travel on exceedingly bad roads, and to traverse sharp curves with ease and security.

"The German engines go even slower than the French. The quickest French lines are those from Lyons to Paris, and from Paris to Calais. The proportions of parts of all the foreign engines—particularly the German—were very bad. For instance, the cranks in many cases had double the quantity of material necessary for the strength required, and this extra portion so disposed as to be a perpetual stumbling weight in their revolutions. Of the Italian lines we know of nothing specific to be said.

"The Belgians run their engines at speeds intermediate between the German and French; they follow a medium of English and French make in their construction, and their lines contrast favorably in their working with many others on the continent. This may be attributed to their being under the general superintendence of an Englishman, Mr. Cabrey.

"The Russians are much the same as the Germans. The engines are mostly of English type, in some cases a cross between the English and American."

Diamonds---Their Utilities.

The popular taste for diamonds, above all other jewels, has lately become a striking American peculiarity, but it is being followed at the present time by the middle classes of the rest of the world. From very ancient times the hardness and brilliancy of these precious stones have been observed and prized most highly, but it is only within the last three or four hundred years that the estimate of them has risen to anything like the present mark. Almost every year the demand for them increases beyond the supply. Gold is found in greater abundance, but diamonds are relatively scarcer. It is not their intrinsic worth or applicability to purposes of varied usefulness, that creates the demand for them. Their brilliancy, scarcity, purity, and hardness, form the foundation of their price. They are crystals formed of pure carbon, and capable of being consumed under sufficient heat, leaving no residuum except carbonic acid gas. Brazil is now the most celebrated market for diamonds, and great are the precautions taken at the mines where they are found to prevent peculation; but Golconda, Viaspour, Borneo, and Bengal used to be celebrated for their diamond mines, the last named being of the most ancient renown. At the commencement of our late war, when property was thought to be particularly uncertain, large investments were made in diamonds, and large numbers were brought over from Europe. Jeffries supposes the value of these stones, when in the rough state, to be, on an average, about ten dollars per carat at a medium. But, then, to find the value of diamonds of greater size, it has been said we should mutiply the square of their weights by two, and the product will be the value required. Thus the square of the weight of a rough diamond of two carets would be four, which, doubled, would be sixteen pounds sterling, or eighty dollars.

In 1837, the Nassuch diamond, a part of the Deccan booty, was sold in London for only seven thousand two hundred pounds, though it weighed 357½ grains, and was of the purest water. But in December, 1858, a diamond weighing sixty-one carats brought thirty-three thousand pounds, and a pair of drop-shaped stones for ear rings brought fifteen thousand pounds. The largest diamond known is that owned by the king of Portugal. It weighs 1680 carets. But that which has attracted the most attention in recent times, is the Koh-i-noor, or Mountain of Light, now one of the jewels of the Queen of England. It was found before the Christian era, according to tradition, in the mines at Golconda, but, in the fourteenth century, was added to the treasures of Delhi. On the annexation of the Punjaub to the East India Company's territory, it passed, not without strong coercion, however, into the possession of the Queen of England. It weighs, after being re-cut, 186 carets, and is, therefore, smaller now than the Orloff diamond, purchased by Queen Catharine of Russia, which weighs 195 carats, and is about the size of a pigeon's egg. This last was, probably, stolen by a French deserter from a famous idol at Pondicherry, and was finally sold to the Queen for four hundred and fifty thousand dollars, and an annuity of twenty thousand dollars, together with a title to nobility.

The process of collecting diamonds in Brazil is similar to that of collecting gold in the alluvial deposits. A stream of water is admitted into a long box, in which the gravel is washed by negroes. He who finds a diamond weighing as much as 17½ carats, is liberated. Some years ago a negro seeking for diamonds in the bed of a river, broke with his iron bar through a crust of sillicious matter, in which he discovered a bed of diamonds that afterwards sold for $1,500,000. Being carried to England, it fairly broke down the market for the time. Small, irregular and imperfect diamonds are crushed in steel mortars, while the splinters are made into drills. The dust is very valuable for cutting and polishing other diamonds and jewels, while the drills are used for piercing small holes through sapphires, rubies, and other hard stones, especially for watches. There is a general feeling that more scientific attention might yet be profitably employed upon the diamond; not, perhaps, in the manufacture of artificial stones—this hardly can become remunerative—but as to their origin, the process of their formation, and, above all, the uses to which they can be profitably put, much remains yet to be ascertained.—*Phil. Ledger.*

Portrait Figures with Natural Landscapes.

I observe that considerable interest has been of late excited by some prints in which portrait figures have been combined with well-executed landscapes, with a perfect union of the full form. The following idea may or may not be that employed by the maker of the prints in question; but it would, I think, undoubtedly yield better results than the methods commonly in use, and, in some respects at least, with less labor. I give it for what it may be worth, not having had leisure to make any experiments myself:—

Provide some pieces of glass and of mica of exactly the same size as the glass. Pose the model, supposed to be a standing figure (or any number of standing figures—it being one great merit in this plan that a whole group may be introduced into the landscape with no more trouble than a single figure), against a black background and *upon a black floor*, and take the portrait (or the group) on a piece of mica. After fixing and varnishing, apply some thick water color on the back of the mica, behind all the transparent parts of the figure. Outside of the figures all of course will be transparent; this is the object of having a black background and black floor.

Now select any view at pleasure. This may be a natural view, or an engraving, or a photographed view on paper (*i. e.* a positive paper print). Prepare one of the pieces of glass as a dry plate. Put it in the dark slide with *the mica portrait in front of it*, and so expose at the view, engraving, or photograph. Take off the mica, develope the plate, fix, and varnish. There will then be obtained a landscape negative with blanks exactly corresponding to the figures. Then attach firmly to it the mica plate, first, of course, cleaning off the color previously applied on the back of the mica behind the transparent parts of the figures. In attaching the mica, the figures must be made exactly to correspond with the blanks, and then it is cemented fast.

I think it will be seen at a glance that this method offers some striking advantages over any of the usual plans—especially in this, that the result is not two negatives to be printed with the utmost care into each other, but a compound negative that any tyro can print as easily as an ordinary one.

The atmospheric effects in the print, supposed to be got by faintly and delicately shaded backgrounds, are probably caused by the faint light which comes even from a black background; and, as more of this light is reflected from the upper part of any screen than the lower, this would exactly cause the atmospheric effect spoken of, by throwing a slight haze over the upper part of the picture. At any rate, this effect could be increased as much as might be desired, if found insufficient.

This idea of a double negative, the front piece consisting of a transparent piece of mica carrying the figures, is, I believe, entirely new, and, in ingenious hands, might be made to produce a variety of interesting effects, especially in the combinations of objects which cannot, with portrait lenses, be brought simultaneously into focus—with the advantage, too, of perfect simplicity and ease in the printing.—M. CAREY LEA in the *British Journal of Photography.*

[The use of mica as proposed by Dr. Lea may be new, but the taking of portraits with special backgrounds is quite old. We have seen equestrian photographs beautifully done in this way. The photographer arranges in his studio a wooden rail of the right hight, on which a side-saddle is placed, and the lady, dressed in equestrian costume, mounts, takes position as in riding, and is duly photographed. A paper print of this negative is then made, out of which her figure is carefully cut, blacked and pasted upon the engraving of any handsome steed that the lady choses to select. A negative of the horse is then made which has a blank space corresponding to the figure of the lady. Two printings are required to produce the picture; one from the negative of the lady, the other from that of the horse. Instead of engravings, photographs from living animals may be used.—EDS.

Sponge for Textile Fabrics.

A. Paraf, of Mulhouse, France, has lately obtained a patent in this country, in which we find the following:

"The best quality of sponge is gathered in the Mediterranean sea; but an excellent quality, as well as an inexhaustible quantity is found upon the rocks of the Bahamas and the coast of Florida. The sponge, when torn from the rocks to which it adheres, appears at first as a heavy black-looking mass, having a strong and offensive odor. In order to clean the sponge, it is buried in the earth for some weeks, at the end of which time all the organic matter will be decomposed, only the pure fibrous skeleton remaining.

"The sponge, when purified, is liable to become exceedingly hard, and, therefore, unfit to be used as a material for weaving cloth. To obviate this, I first take the purified sponge, and immerse it in water containing from ten to twenty per cent of glycerin, then squeeze it dry, after which it will be entirely soft and elastic. It is then cut into small pieces, and put through the carding process, and then felted. Only certain qualities of sponge are capable of being spun. One of them is the kind known as "chipoul," which has comparatively a long fiber. The felted sponge may be used for hat bodies, carpets, etc., the sponge cloth for clothing, etc.

"Sponge thus prepared may be worked in the preparation of fibrous and textile fabric, with or without the admixture of other ingredients or fibers; for instance, it can be used to advantage in connection with woollen and other similar substances."

Deodorizing and Perfuming India-Rubber, Gutta-Percha, etc.

In a recent patent of Edward de la Granja, of Boston, he says:—"I have invented a new and useful improvement in deodorizing and perfuming india-rubber and gutta-percha. I steep or macerate the rubber or percha, in a solution of iodine, permanganate of potash, iodide of potassium, glycerin, sulphite of soda, sulphite of lime, sulphite of potassa, and water. This macerating process I carry out for twenty-four hours in a close earthen or china vessel, the solution being all the time cold. At the end of the twenty-four hours, I gradually heat the solution containing the rubber or percha, in the same earthen or china vessel, until it reaches the boiling point, at which degree of heat I keep the solution, uncovering the vessel, until one eighth part of it is lost by evaporation. Then I allow the mixture to remain in the solution until it becomes quite cold, when I take it out and expose it to a current of fresh air. Having thus deodorized the rubber or percha, I perfume it if desired by subjecting it to a dry heat below the melting point, and steeping it while hot in an aqueous or alcoholic aromatic solution of any desired strength, and perfumed *ad libitum*.

"The elementary proportions of the solution for deodorizing india-rubber and gutta percha are, iodine, fifteen grains; permanganate of potassa, twenty-four grains; iodide of potassium, sixty grains; glycerin, four ounces; sulphite of soda, four ounces; sulphite of lime, four ounces; sulphite of potassa, four ounces; water, one gallon and a half to two gallons."

[The above is a queer mixture of chemicals, the effect of some of them being neutralized by others.—EDS.

Fun at Home.

The *New England Farmer*, published in Boston, contains every week sensible hints for family rule and life. The annexed article on home amusements is worthy of regard by the heads of families everywhere:

"Don't be afraid of a little fun at home, good people! Don't shut up your house lest the sun should fade your carpets and your hearts; lest a hearty laugh shake down some of the musty old cobwebs there. If you want to ruin your sons, let them think that all mirth and social enjoyment must be left on the threshhold without, when they come home at night. When once a home is regarded as on'y a place to eat, drink, and sleep in, the work is begun that ends in gambling houses and reckless degradation. Young people must have fun and relaxation somewhere; if they do not find it at their own hearthstones, it will be sought at other and perhaps less profitable places. Therefore let the fire burn brightly at night, and make the homestead delightful with all those little arts that parents so perfectly understand. Don't repress the buoyant spirit of your children. Half an hour of merriment, round the lamp and firelight of a home, blots out the remembrance of many a care and annoyance during the day; and the best safeguard they can take with them into the world is the unseen influence of a bright little domestic sanctum."

THE new railroad from Logansport to Union City, Ind., 92 miles in length, has only four curves on the entire line. It forms the connecting link in a new through route from Chicago to the Atlantic cities.

OFFICIAL REPORT OF PATENTS AND CLAIMS

Issued by the United States Patent Office,

FOR THE WEEK ENDING JANUARY 21, 1868.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

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In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

☞ *Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to Inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.*

73,427.—ARTIFICIAL LEATHER BELTING.—Stephen M. Allen Woburn, Mass.

I claim, 1st, A new artificial leather belting and banding for driving machinery, made by combining tanned and untanned scraps of skins or hides, after preparation, with vegetable fiber, pulped and run off into sheets, substantially in the manner and for the purposes herein set forth.

2d, As a new article of manufacture, belting and banding for driving machinery, made by combining tanned and untanned animal fiber with vegetable fiber, and by the further combination of bullock's blood or fibrine, the same being manufactured substantially as and for the purposes above described.

73,428.—MORTISING MACHINE.—Cornelius Baggerman, and John Green, St. Louis, Mo.

We claim the combination of the sliding chisel arbors, C C', the sliding holders, E, the cam rods, d, the connecting rods, d1, the cam wheel, D, and the cams, E, constructed and operating substantially as described.

73,429.—MANUFACTURE OF PAPER PULP.—Hippolyte Emile Bailliére, Hoboken, N. J., assignor to American Fiber Company.

I claim a fiber for the manufacture of paper, etc., produced from disintegrated bamboo, substantially as described.

73,430.—WATER METER.—Phinehas Ball, Worcester, Mass.

I claim, 1st, The hollow piston P, in combination with the valve, bar, or rod, T, arranged to slide within said piston, substantially as and for the purposes set forth.

2d, The spring, S S, or other equivalent dvice, compressed by the power acting upon the piston within the cylinder, so that when they reach the central line of equipoise, they react and release the valve, substantially as set forth.

3d, The combination of the springs and valve, bar, or rod, with the valve and gearing, or racks for actuating the same, under such an arrangement that the compression of said springs shall take place partially or wholly during the time the valve remains at rest, substantially as set forth.

4th The arrangement of the adjusting rod, t, within the valve, bar, or rod, T, whereby the length of the stroke of the piston is readily adjusted, substantially as set forth.

5th, The combination of the angular valve V, and ports formed in the cylinder case as described, of the piston, valve rod, springs, and gearing, for actuating said valve, substantially as and for the purposes set forth.

73,431.—SCREW-CUTTING TOOL.—Edgar B. Beach, West Meriden, Conn.

I claim the cutter, A, provided with the flange, B, attached to one side of a shank, substantially in the manner herein set forth.

72,432.—REIN SNAP.—Wm. H. Benham, New Haven, Conn.

I claim, 1st, The spring snap described, having a lever or arm, C, actuated by a spring, E, and liberated by pulling on the rein, adapted to serve in the manner and for the purpose herein set forth.

2d, In connection with the above, the employment of one or more fixed hooks, B1 B2, arranged relatively to the casing, B, arm, C, spring, E, and the locking piece, D, substantially in the manner and for the purpose herein set forth.

3d, In combination with the driving rein or its equivalent, the employment of the spring snap, substantially of the character herein represented, and adapted to be liberated by the movement of the rein or its equivalent, substantially in the manner and for the purpose set forth herein.

73,433.—BRICK-DRYING APPARATUS.—John K. Caldwell, Allegheny city, Pa.

I claim, 1st, The arrangement of a coil of pipe, i, over the fire space of the furnace of a drying house or oven, substantially as and for the purposes hereinbefore set forth.

2d, A furnace, so constructed with double walls, as to have a chamber, m, such chamber being furnished with registers, n, or other equivalent device for admitting air, and opening, by any suitable aperiures, into the drying house or oven, substantially as and for the purposes hereinbefore set forth.

3d, The ventilators, g, so arranged, relative to the hot air chamber, m, and coil or coils of pipe, i, as to secure a current or draught of air therefrom through the drying house or oven, substanntially as and for the purposes hereinbefore set forth.

73,434.—COMPOUND FOR PAVEMENTS.—J. C. Campbell, and M. V. Campbell, Syracuse, N. Y.

We claim the within compound of gravel, coal ashes, ground charcoal, ground plaster, cast iron fillings or borings, and coal tar, as and for the purpose set forth.

73,435.—CORK PULL.—Seth E. Clapp, Cambridge, assignor to himself and George P. Clapp, Boston, Mass.

I claim the combination of the spear, B B', with the sleeve, C, and the grappling prongs, B H' H'', substantially as described, and for the purpose set forth.

73,436.—GRATE BAR FOR FURNACES.—George H. Clarke, Brooklyn, assignor to the Salamander Grate Bar Company, New York city.

I claim the arrangement of the locking rod, B, and recess, C, in combination with the interlocking bar, A, the whole constructed and operating as set forth and specified.

73,437.—MANUFACTURE OF HOES.—William T. Clement, Northampton, Mass.

I claim the within-described method of manufacturing hoes, consisting in the production of wrought iron eyes, B B', and previously prepared blades, A A', and in welding them together in the manner substantially as herein set forth.

73,438.—CARRIAGE PERCH.—William H. Cooper, and George Gregory (assignors to Lawrence Bradley and Pardee), New Haven, Conn.

We claim the attachment of the perch, D, to the body forward of the wheel house, in the manner substantially as herein set forth.

73,439.—DEVICE FOR LEAKY BOILER TUBES.—Robert Avis Copeland, Baltimore, Md.

I claim the flange, A, screw bolt, C, and expanding nut, B, constructed and arranged substantially as herein set forth.

73,440.—CORSET SPRING.—Thomas B. De Forest, and Thomas S. Gilbert, Birmingham, Conn.

We claim the herein-described corset steel, consisting of two or more wires or steels, united and secured in position by the clasps, in the manner specified, as an article of manufacture.

73,441.—DITCHING AND GRADING MACHINE.—F. H De Tray, Odin, Ill.

I claim, 1st, The ditcher or plow, Bb, in combination with the inclined way or dirt slide, B', as described, and for the purpose set forth.

2d, The conveyer, C, in combination with the ditcher, Bb, and slide, B', as and for the purpose set forth and described.

3d, The stand, c3, wheel, c4, and the out hangers, c3, when combined and arranged in an adjustable manner, so as to regulate the vertical hight of the out end of the pieces, c2, as described, and for the purpose set forth.

73,442.—TREE-FEEDING TUBE.—John C. Fish, Barnstable, Mass.

I claim a tree-feeding tube, having a construction substantially as set forth.

73,443.—LAMP.—Samuel W. Fowler, Brooklyn, N. Y.

I claim the construction of the top of the burner, with its collar or flange, C, circular groove, E, perforations, G, around its lower side, and grooves, D D, on each side, when used in combination with the flange, J, of the chimney, H, as herein described, and for the purposes set forth.

73,444.—RUNNING GEAR FOR VEHICLES.—Daniel D. Gitt, Arendtsville, Pa.

I claim, 1st, Interposing a joint between the spring and the body or axle of a vehicle, either at the front or rear end thereof, said joint being so constructed as will allow of one of the axles to vibrate vertically and independently of the body or bed of the vehicle, substantially as described.

2d, Connecting the coupling bar or reach of a vehicle at one end, by means of a swivel joint, so as to prevent said reach from being twisted or strained by the motions of the axles, substantially as described.

3d, The combination of a joint pin, f, placed between one of the axles and the body of a vehicle, with a reach, which is connected at one end by a swivel joint, substantially as described.

4th, The application of anti-friction rollers, c c, to the sliders, b b', substantially as described.

5th, The sectional head block, E, constructed with a recess in it for receiving a head and neck, which is formed on one end of the reach, substantially as described.

6th, The construction of plates, F and G, substantially as described, so as to form with a pin, f, a loose pivotal connection between the axle and body of a vehicle.

7th, The bearing, h, rising from slider, b,, and adapted to serve the purpose described

73,445.—WASHING MACHINE.—Francis M. Harris, Winnamac, Ind.

I claim, 1st, The combination in a washing machine such as described, with the stationary washboard, of the swinging boards, and spring bands of vulcanized rubber applied to the journals of said swinging boards, in the manner and for the purposes shown and specified.

2d, The combination, with the stationary wash board, swinging board, and springs for inducing the pressure of the latter, of the wash tub, with its peculiarly shaped bottom, arranged with relation to the said washboards, substantially as herein shown and set forth.

73,446.—WELL TUBE.—W. T. Horner, Buffalo, N. Y.

I claim the combination of the outer tube, B, provided with the cross bar, D, with the inner tube, C, provided with the slots, c c, and recesses, d d, at the bottom thereof, constructed and arranged in the manner and for the purposes set forth.

73,447.—RIFLING ORDNANCE.—B. B. Hotchkiss, N. Y. city.

I claim the relieving grooves, C, for the purpose herein set forth.

73,448.—SPRING PEN RACK.—James M. Keep, New York city. Antedated July 22, 1867.

I claim, 1st, A spring pen rack, when the springs are made of rubber, gutta percha, or of any of their compounds, or of sheet metal, the same being of narrow strips or sheets, and of one or more pieces, when bent, curved, and operating substantially as herein described.

2d, The method of attaching the springs of pen racks to their bed pieces, substantially as herein described.

73,449.—CALCULATING MACHINE.—Levi Keiler, Catawissa, Pa. Antedated January 6, 1868

I claim the two disks, C and D, graduated screw shaft, B, and guide bar, E, when arranged, combined, and operated as herein described and for the purposes set forth.

73,450.—STUFFING BOX FOR VALVE STEMS, &C.—Calvin Kline, Brooklyn, N. Y., assignor to himself and R. L. Peabody, New York City.

I claim the collar, C', on the rotating or partially rotating stem, c, arranged as represented relatively to the casing, A, spring, D, and cap, E, so as to allow of lubrication, all as and for the purposes herein set forth

73,451.—COATING HEEL AND TOE IRONS FOR BOOTS AND SHOES.—Henry O. Lothrop, (assignor to himself, Crawford Pierce and Joseph R. Pierce,) Milford, Mass.

I claim, as a new article of manufacture, a heel or toe iron, coated with tin or other anti-corrosive metal, substantially as and for the purposes herein shown and set forth.

73,452.—HARVESTER RAKE.—William G. Merrell, Auburn, N. Y., assignor to himself and Cyrenus Wheeler, Jr.

I claim, 1st, in combination with the hollow column supporting the revolving and stationary hubs, the jointed shaft D, that passes up through it, and drives the reel, as and for the purpose described.

2d, Also, in combination with the reel, and a rake that moves and operates in conjunction therewith, a clutching mechanism, and a cam ledge that operates substantially as and for the purpose described.

3d, Also, in combination with a reel whose axis of rotation is parallel to the cutting apparatus, adjustable vertically in relation thereto, and is supported by one end only, a rake so arranged as to revolve around the support of the reel, and be thrown into and out of action by a mechanism operating substantially as described.

4th, Also, a support for the rake and reel, so arranged that it may be moved about the driving gear axis, for the purpose of adjusting the rake to the different inclinations of the platform, substantially as described.

73,453.—SAUSAGE STUFFER.—Purches Miles, (assignor to Theodore Mace,) New York City.

I claim the swinging double piston, the one part sliding on the other, in combination with the hopper, contracted as and for the purposes set forth

Also, the elliptical grooves or ribs, I, in combination with the hopper and sliding and swinging piston, as and for the purposes set forth.

73,454.—PISTON ROD PACKING.—William Hartley Miller, Philadelphia, Pa.

I claim the above described packing tube, tubes, layers, or cord, or their equivalent, substantially as shown, as a new article of manufacture.

73,455.—ARGAND LAMP FOR BURNING PETROLEUM.—A. K. Murray and A. B. Howland, Titusville, Pa.

We claim, 1st, the employment of the partition or flange, n, or its equivalent, arranged with relation to the air passages, e and l, substantially as and for the purposes set forth.

2d, The arrangement and combination of the disk, m, perforated casing, k, and partition or flange, n, with the annular wick tubes, substantially as and for the purposes set forth.

3d, The general arrangement and combination of the flange, n, and air passages, e and l, with the annular wick tubes, substantially as and for the purposes set forth.

73,456.—STEAM ENGINE PISTON.—Alexander Nadow, Springfield, Mass.

I claim the valve, g, when used in combination with the piston, B, and ports, k k', substantially as described.

73,457.—HORSE RAKE.—Oziel Nivison, Hector, N. Y.

I claim, 1st, the foot stirrup, S, arranged in connection with the spring, G, so that the operator can thereby aid the spring in unloading the rake, as described.

2d, The hinge plates, P, connecting the staple bar, C, and rake head, B, and provided with a series of holes in combination with the hinged rods, L, so that the weight of the head thereon aids in unloading the rake, as set forth.

3d The combination of the spring, G, rod, E, provided with the foot stirrup, S, circular piece, D, hinge plates, P, pressure bar, C, and head, B, arranged and operating substantially as and for the purposes set forth.

73,458.—APPARATUS FOR PREVENTING THE CURCULIO FROM ASCENDING FRUIT TREES.—William H. Noble, Bridgeport, Conn.

I claim the arrangement of a hammer, operating automatically, in such relative position to trees or vines that the blow of the hammer may communicate a jar thereto, substantially as and for the purpose herein set forth.

73,459.—LUBRICATING BEARINGS FOR MACHINERY.—Leverett H. Olmsted, Stamford, Conn.

I claim the lubricator receptacle, C, provided with an opening or openings, said openings being closed with leather, or any other substance that will produce the intended effect, for the purpose set forth.

73,460.—HAY RAKE AND LOADER.—Caleb Plaisted, Kenockee, Mich.

I claim the standards, P P, in connection with rods, C' and S, and with the pulleys, I I and J J.

73,461.—METHOD OF MAKING BARRELS.—Louis Raymond, Rockland, Del.

I claim a keg or cask made of a series of wooden rings, put together with a glued break joint, substantially in the manner and for the purpose set forth.

73,462.—SHOEMAKER'S TRIMMING KNIFE.—John Reist, Philadelphia, Pa

I claim the slotted guard, D, fastened by screw, E, to handle, B, substantially as and for the purpose above described.

73,463.—SEED SOWER.—E. D. Reynolds and O. B. Reynolds, North Bridgewater Mass.

We claim, 1st, A seed sower, having the colter hinged in such manner that it may be elevated, and secured in elevated position, substantially as and for the purpose set forth.

2d, Also, bracing the colter, when made with the above provision, by the brace or latch bar, o, and its locking device or mechanism, substantially as shown and described.

3d, Also, applying the hopper or seed box to the tilting board, substantially as shown and described.

73,464.—BAIT OR MEAT CUTTER.—Nathan Richardson, Gloucester, Mass.

I claim the removable blocks or heads, c c, containing the stationary cutters, and attached to or forming a part of the framing, in combination with the adjustable strips, e, placed between the blocks or heads, c c, and the framing, as and for the purpose described.

73,465.—HEAD BLOCK FOR SAW MILL.—Charles Roberts, Lake Village, N. H.

I claim the combination of the tubular shaft or shafts, K, with the other shaft or shafts, I L, and the lever, M, with its pawls, or their equivalent, constructed and operating substantially as and for the purpose herein specified.

73,466.—MATTRESS.—George Schott, New York city.

I claim a mattress in which the space between the upper and under side of the ticking or case is divided up into boxes or cells by strips of cloth or similar material attached at their edges to such ticking or case, substantially as and for the purposes specified.

73,467.—IRON ROLL.—Samuel J. Seely, New York city, assignor to J. M. Brown, Brooklyn, N. Y. Antedated January 2, 1868

I claim a roll for rolling iron having a solid wrought iron arbor and a sectional cast-iron surface, when constructed substantially in the manner described for the purpose set forth.

73,468.—LADDER.—Abraham Simmerman, Glassboro, and Jacob S. Simmerman, Millville, N. J.

We claim the sections, A B H K, in combination with hooks, g g h h, arms, m l, and legs, e f, all arranged to form a perfect self-bracing ladder, substantially in the manner described.

73,469.—FANNING MILL.—A. W. Smith, Dudleyville, Ala.

I claim the feeding roller, c1, with its projections in combination with the pins, c3, slide board, c4, and hopper, C, when arranged as described.

73,470.—LET-OFF FOR LOOMS.—T. S. Smith, Boston, Mass.

I claim, 1st, The double-arm clutch constructed, arranged and operating substantially as described when the grasp of the clutch is loosened by the pull or tension of the yarn, substantially as set forth.

2d, The lever, D g, in combination with the clutch, when arranged and operating substantially as described.

3d, The combination of lever, clutch, and spring, substantially as and for the purposes described.

4th, The combination of lever, wedge block, clutch, and spring, substantially as and for the purposes described.

5th, The combination of whip roll, wedge block and cross-arm clutch, substantially as and for the purposes described.

73,471.—WAGON BOLSTER.—Charles Stebbins, Owego, N. Y.

I claim the application of two or more rubber springs to the bolsters of a buggy, lumber wagon, cart, or any vehicle drawn or moved by cattle or horses, in the manner and for the purpose above described.

73,472.—STEREOSCOPE.—John W. Storrs, Birmingham, Conn.

I claim, 1st, The rolls, P1 P2, and the connected scroll, Q, tinted substantially in the manner and arranged to operate in combination with stereoscopic views, substantially as and for the purpose herein specified.

2d, Arranging the scroll, Q, to traverse diagonally so as to carry the tinted scroll nearer the picture at the top than at the bottom while the rolls, P1 P2, are equally near the picture, substantially as shown in Fig. 4, for the purpose herein set forth.

3d, The vertical rollers, G1 G2, carrying a series of transparent pictures joined as specified in combination with a stereoscope and arranged to operate the connected scroll, H, substantially in the manner and for the purposes herein set forth.

4th, Mounting the rollers, G1 G2, and connected scroll, H, in frames, I3, adapted to be used in a stereoscope, substantially in the manner and for the purpose herein set forth.

5th, Removing and exchanging the rolls, G1 G2, and the connected scroll, H, without disturbing the gearing, substantially as and for the purpose herein set forth.

73,473.—OILED FABRIC.—George Streat, New York city.

I claim the oiled fabric specified made in the manner set forth, as a new article of manufacture.

73,474.—TONGUE FOR HAY LOADING MACHINES.—Eli Sweet, Whitney's Point, N. Y., assignor, by two deeds, to T. W. Vincent, Eber Sweet and Benjamin J. Jones.

I claim, 1st, The sliding bar, B, in combination with the tongue, A, draft bar, c, and spring catch, C, when arranged to operate substantially as and for the purpose set forth.

2d, The slotted plate, a, guard plate, c', and spring catch, C, combined in relation with each other and with the sliding rod, B, and tongue, A, substantially as and for the purpose specified.

73,475.—ANIMAL TRAP.—N. S. Thompson, Germantown, O.

I claim the combination of the weighted doors, E E', pendant, F, spring catches, g s, pulley and cord, m o, trigger, j, and ledges, c c, arranged in relation to box, A, guides, C D, and the open trigger box, g h, in the manner and for the purpose described.

73,476.—EXPANDING FELLIES AND TIGHTENING SPOKES.—Alban N. Towne, Chicago, Ill.

I claim the combination of the revolving socket having a recess to receive the spoke and a screw chased on its external surface, and the nut with lugs for retaining it in place inserted into the inner face of the felly and having an internal screw to receive the screw in the socket, the parts being arranged to operate substantially as and for the purpose set forth.

73,477.—COAL BOX STOVE.—A. N. Towne, Chicago, Ill.

I claim the arrangement of the stove, C, flanged hearth plate, B, and stationary fuel box, A, said parts being respectively constructed and the whole arranged for use substantially as and for the purpose set forth.

73,478.—CIGAR HOLDER.—W. K. Vanderslice, Jr., San Francisco, Cal.

I claim, 1st, A cigar holder having the perforated pointed tube, b, entering the center and lying in the longitudinal axis of the cigar and mouth piece together with the supporting ring, c, and wires, d d, substantially as and for the purpose described.

2d, The adjustable point, e, substantially as and for the purpose set forth.

73,479.—CHURN.—D T Ward, Cardington, Ohio.

I claim, 1st, The adjustable annular ring, F, when composed of the ring, F, made either in one piece or in sections and the wings, G G, with concave surfaces, b b, the whole being used in the manner and for the purpose herein specified.

2d, The use of the dasher, C, constructed as shown in combination with the annular ring, F, in the manner and for the purpose herein specified.

3d, The peculiar arrangement and combination of the uprights, K K, bottom, P, and hoop, Q, for the purpose of holding the churn in position, in the manner herein set forth.

4th, The peculiar arrangement and combination of the churn, A, annular ring, F, dasher, C, pulley, H, belt, I, and driving pulley, N, with crank, O, thereon, the several parts being arranged as and for the purpose herein specified.

73,480.—GANG PLOW.—Seth Way, La Porte, Ind.

I claim, 1st, The mode of supporting the weight by the tongue, I, and of elevating and lowering the plows, D D, by the axle, B, lever, G, windlass, F, and catch, J, respectively, constructed and arranged substantially as set forth.

2d, The combination of the axle, B, lever, G, windlass, F, tongue, I, and equalization double tree, H, respectively, constructed and arranged substantially as set forth.

73,481.—LANTERN.—Hiram Wentworth and V. B. Clark, Ripon, Wis.

We claim, 1st, The spring, F, as applied to lantern bottoms.

2d, The bracket, G, and manner of attaching it opposite to the spring, F.

3d, The arrangement of the spring, F, so as to be operated both above and below the flange, J, at L and K.

4th, The guard, E.

5th, The flange, C, on oil pot, B.

6th, The projection, D, at the top of the oil pot, B.

7th, The arrangement of the different parts, substantially as described and for the purposes specified.

73,482.—DEVICE FOR PULLING HOP POLES.—James R. Woodworth, Nunda, N. Y.

I claim the jaws, B B, fulcrum, F, joint, G, rods, E E, in combination with the handle or lever, A, constructed substantially in the manner herein shown and described.

73,483.—BOOT CRIMP.—Henry Wright, Saco, assignor to James R. Clark, Biddeford, Me.

I claim, 1st, The combination and arrangement of the screw bolt, S, the straining bar, D, the screw, H', and the incline bar, B, all made substantially as and for the purposes set forth.

2d, The combination of the dove-tail, M, substantially as described and for the purpose set forth.

3d, The flexible metallic connection, E', in combination with the lower straining bar, E.

73,484.—CHOCK FOR WHALE BOATS.—Mayhew Adams, Chilmark, Mass.

I claim the construction and use of the chocks consisting of the parts one and two, operating substantially as and for the purpose specified.

73,485.—WINNOWING MILL.—Sanford Adams, Boston, Mass.

I claim, 1st, The fluted rolls, H, for either the hopper, A, or shoe, J, to vibrate upon, substantially as described and for the purpose set forth.

2d, The shaft, L, and spring, O, arranged substantially as described to give an additional motion to the pivoted end of the shoe, J, substantially as and for the purposes set forth.

3d, The slats, e e e, fastened on to the sides, S S, both swinging from the pivots, f, substantially as and for the purpose set forth.

4th, The combination of the hopper, A, slide, I, and screw, t, as and for the purpose set forth.

73,486.—ROASTED COFFEE.—John Arbuckle, Jr., Allegheny City, Pa.

I claim coating roasted coffee with any glutinous or gelatinous matter for the purpose of retaining the aroma of the coffee and also act as a clarifying agent, as herein described and set forth.

73,487.—ELECTRIC CABLE.—Jean Lucien Arman, Bordeaux, France.

I claim an electric cable having a core, A, of fibrous strands, surrounded by insulated wires, B, and fibrous strands, D, and inclosed in an outer covering of strands, E, of buoyant material when the said strands and wires are twisted and arranged in respect to each other, as set forth.

73,488.—LAMP.—Lewis J. Atwood (assignor to himself and Holmes, Booth and Haydens), Waterbury, Conn.

I claim, 1st, The helical expansive interior chimney clamp, m, applied substantially as and for the purposes specified.

2d, The closed cap, b l, in combination with the removable air distributer, e, and tapering wick tube guide, g, as and for the purposes set forth.

3d, Supporting the chimney upon the burner by the joint action of the draft plate, h, and the vertical springs or scallops around the edge of the air distributer, e, substantially as set forth.

4th, The removable air distributer, e, and tapering guide, g, in combination with the draft plate, h, substantially as and for the purposes specified.

73,489.—STEAM ENGINE.—Henry Bailey, New York city, assignor to I. L. Homer, H. F. Pease and W. R. Pease.

I claim the combination with the cylinder, B, and head, D, for inclosed operation within them of the piston, pitman and crank as described of the interposed slide, H, with its rocking joint piece or block, I, all for action together, essentially as herein set forth.

73,490.—TWEER IRON.—Lyman M. Bailey (assignor to himself and Joseph P. Long), Landgrove, Vt.

I claim the combination of the chamber, A, perforated cap plate, C, solid valve, D, and sliding door, F, all constructed as set forth.

73,491.—BOLT LATCH.—Henry Baker (assignor to himself and Christian G. Herr), Lancaster, Pa.

I claim the arrangement and combination of a shutter bolt with its open slot, b, and recess for the pin, c, with its handle, I, and horizontal and vertical bevelled latch and lock catch, G G', with or without the lock lever, K, all arranged and operated in the manner and for the purpose specified.

2d, Also, in combination with the foregoing arrangement, the latch lever, M, with its neck, m, and rocker, L, when applied in the manner and for the purpose shown and set forth.

73,492.—MODE OF HANGING CARRIAGE BODIES.—George A. Blair and A. L. Gladding, Johnsonburg, N. Y.

We claim suspending the circular lever frames, G G', on the two pulley bearings, n n, arranged with relation to the seat, B, and body, A, of the carriage by means of the elastic strap, I, substantially as and for the purposes set forth.

73,493.—WOOD-BENDING MACHINE.—I. W. Bowers, Boston, Mass.

I claim the portions, D D, pivoted together in combination with the former, C, operating substantially as set forth.

73,494.—BREECH-LOADING FIRE-ARM.—Frances E Boyd and P. Shelton Tyler, Boston, Mass.

We claim, 1st, The plate or washer, e, formed as described and attached to the spindle, c, in combination with the raised or cam-shaped surface of the bearing plate, d, as set forth.

2d, Also the combination of the clamps, g g, and the curved and cam projections of the face plate with the bearing plate, d, and plate or disk, e, constructed and operating substantially as and for the purpose set forth.

73,495.—LAMP.—Ovette Boynton, Hinesburg, Vt.

I claim the burner, constructed and arranged substantially as set forth and described, that is to say, with its water chamber interposed between the flame and lamp provided with oil and water feeding ducts and a well tube, through which the wick descends to the oil.

73,496.—WOOD-BENDING MACHINE.—D. F. Breed, Valparaiso, Ind.

I claim, 1st, The slotted plate, P, in combination with the rod, m, and drum, D, operating substantially as and for the purpose set forth.

2d, The adjustable guides, 4, rods, W, levers, Z, bed plate, 2, bands, H and I, arranged to guide the stuff to be bent and to prevent a lateral motion, constructed and operating substantially as and for the purposes described.

73,497.—SPRING ATTACHMENT FOR VEHICLES.—Elphalet C. Brooks, San Francisco, Cal.

I claim the combination of the shield, A, bolts, F and G, with the perch, D, axle, E, in combination with the spring, C, and thorough brace, B, substantially as shown for the purposes specified.

73,498.—COMBINED KNOB LATCH AND LOCK.—Conrad Brown, Goshen, N. Y.

I claim, 1st, The upright pieces, D D1, provided with vertical slots, b b1 b2, and slanting cross slots, i i1 i2, substantially as and for the purposes specified.

2d, The combination of the catch, d e, with the notches, c c1 c2, in the door bolt, C, substantially as and for the purposes described.

3d, The combination of the falling tumblers, E E1 E2, uprights, D 1, and key, J, with the catch, d e, and door bolt, C, provided with notches, c c1 c2, for the purpose of changing the locking device, substantially as described.

73,499.—CHAIR SEAT SUPPORTER.—George Butterfield and A. G. Treadwell, Boston, Mass. Antedated January 11, 1868.

We claim the slats, b b, to be used substantially as herein described and for the purpose specified.

73,500.—HOP PRESS POWER.—Newel Carpenter, White Creek, Wis.

I claim the lever, D, provided with the lugs, e, in combination with the bar, E, having the grooves, h, in its sides and the notches, g, on its edges with the pawls, k, all arranged for joint operation substantially as described.

73,501.—HARVESTER.—William D. Carpenter (assignor to himself and J. Stackpole), South Berwick, Me.

I claim, 1st, The reciprocating slide intermediate between the driving gear and the reciprocating sickle bar arranged to operate in reverse direction to said sickle bar, for the purpose and substantially as described.

2d, The tubular pinion and crank wheel, H H', mounted on a stationary stud or pin on standard, E, in combination with its driving gear, arranged and operated as described.

3d, The bevel wheel, D, bevel pinion, E, shaft, F, spur wheel, G, crank and pinion wheel, H H', pitmen, I I k, slide, J, and lever, K, all arranged and operated as described and for the purpose set forth.

73,502.—FORGE HEARTH.—Robert W. Clark, Pittsburg, Pa.

I claim the use of a single fire-clay brick or tile in blacksmiths' forges, substantially as described, as a new article of manufacture.

73,503.—CHURN.—George Clayton and Collis B. Allen, Willoughby, Ohio.

We claim the special construction of the triangular frame, A, standard, D, as arranged in combination with the churn, H, when operated in the manner as and for the purpose set forth.

73,504.—PLOW.—Wm. S. Colwell, Pittsburg, Pa.

I claim a plow provided with a mold board, having the surface convex, in the manner and for the purpose herein described and set forth.

73,505.—STAVE MACHINE.—Wm. S. Colwell, Pittsburg, assignor to James M. Hempsill, Allegheny City, Pa.

I claim the hollow wedge, constructed as herein described, and used in connection with the knives, C and D, and set screws, f and e, in the manner and for the purpose herein set forth.

73,506.—HYDROCARBON BURNER.—Frederic Cook, N. Y. city.

I claim, 1st, The introduction and distribution, by centrifugal force, of liquid hydrocarbons into furnaces as fuel, substantially as shown and described.

2d, The introduction and distribution of water, in combination with liquid hydrocarbons, into furnaces by centrifugal force, substantially as shown and described.

3d, Also the revolving distributer, D, with its head, F, constructed, arranged, and operating as and for the purpose set forth.

73,507.—MACHINE FOR MAKING AND DIPPING MATCHES.—James F. Cranston (assignor to himself and S. W. Porter), Springfield, Mass.

I claim, 1s, The arrangement of the cutters, C and B, belts, F and G, and dipping pans, X and Y, having the melting cups, P and P, operated in connection with each other by the horizontal shaft, O, substantially as and for the purpose described.

2d, The device for the purpose of transferring the match stems from the cutters, C and B, to the belts, F and G, consisting of the springs, t and t', and guides, s and s', constructed and arranged as described.

73,508.—CURD BREAKER.—Palmyra Crary, Lowville, N. Y.

I claim the implement so constructed and described as herein set forth.

73,509.—CAR BRAKE.—Wm. G. Creamer, Brooklyn, N. Y.

I claim, 1st, The jointed pawl, D, in combination with the arm on the brake shaft, I, and the ratchet on the drum, K, substantially as described and for the purposes set forth.

2d, In combination with the drum and jointed pawl, as above claimed, the ratchet wheel, A, and pawl, B, the wheel being fixed on the drum, as described and for the purpose set forth.

73,510.—CAR SEAT.—Wm. G. Creamer, Brooklyn, N. Y.

I claim the combination with, and attachment to, the seats or chairs of railroad cars, of an arm rest and protector, substantially as described and for the purposes mentioned.

73,511.—JEWELING WATCHES.—A. C. Crosby, Piqua, Ohio.

I claim the adjustable tapering spindle, B, the spring arm, D, with or without the curves, a, in combination with the hub or sleeve, A, for the purpose and in the manner set forth.

73,512.—MANUFACTURE OF CARPETS AND OTHER ARTICLES FROM JUTE, FLAX, ETC.—Thomas Crossley, Bridgeport, Conn. Antedated July 22, 1867.

I claim treating fabrics composed wholly or partly of jute, flax, cotton, or other suitable vegetable fiber, substantially in the manner herein set forth, so as to prepare the same for dyeing or printing, and the manufacture of carpets or other articles for which such fabrics may be applicable.

Also, the manufacture produced thereby.

73,513.—APPARATUS FOR DISCOVERING THE FISSURES IN THE SIDES OF WELLS.—John D. Dale, Rochester, N. Y.

I claim, 1st, The combination with the head, of and adjusting gage, E, for adapting the device to the diameter of the bore, as specified.

2d, The combination with the head of an indicator F, as described, and for the purpose set forth.

73,514.—PROCESS FOR MULTIPLYING COPIES FROM MANUSCRIPT.—Abel Claude Felix Niepce de St. Victor, Paris, France, assignor to P. A. G. Niepce de St. Victor and M. L. J. Lavater.

I claim, 1st, The process of taking copies from manuscripts by submitting the copies, on issuing from the copying press, to the action of ammonia, substantially as herein described.

2d, The treatment of manuscript copies with either alkaline or acid vapors to develop the writing, according to the constituents of the ink, substantially as herein described.

3d, The impregnating of the copying paper with sugar or other adhesive matter, substantially as and for the purpose herein set forth.

73,515.—HORSE HAY FORK.—H. E. Dewey, Aurora, Ill.

I claim in combination with a screw fork, A, operating substantially as described, the spool, D E F, and sheaves, C C, arranged with the cord, R, substantially as and for the purposes specified.

73,516.—CROSS-CUT SAW.—Thomas S. Disston (assignor to Henry Disston), Philadelphia, Pa.

I claim a bolt, D, with a slotted head, f, in combination with a handle, B, slotted for the reception of one end of a saw blade, and having screws, b, or other equivalent bearings, for the end of the said blade, when the latter has openings, d e, adapted for the reception of the head and end of the bolt, all substantially as described.

73,517.—RACK FOR TOWEL.—Elisha E. Everitt (assignor to himself and H. F. Hover), Philadelphia, Pa.

I claim a rack or holder to the side pieces of which are secured coils, a, of wire, adapted for the reception of the ends of rods extending between the side pieces, all substantially as described.

73,518.—CHAIN MACHINE.—Luke Fitzpatrick and Jacob Schinneller, Temperanceville, Pa.

We claim, 1st, The combination of the nut, B, with the mandrel, A, constructed, arranged, and operating substantially as herein described and for the purpose set forth.

2d, Also the spring set, D, and guide, e, when used in combination with the cutter, C, constructed, arranged and operating substantially as herein described and for the purpose set forth.

73,519.—MACHINE FOR COLLECTING AND CONDENSING METALLIC VAPOR.—Ferdinand Formhals, San Francisco, Cal.

I claim, 1st, The construction of the cagniardelle blower principally of wood.

2d, Also the combination of the cagniardelle with the furnace, in combination with tanks, substantially as set forth and shown and for the purposes specified.

73,520.—SAWING MACHINE.—John Fry, Brookfield, Ill.

I claim providing the frame of a portable sawing machine with an arm or prolongation, so constructed and arranged that a sawhorse can readily be attached to or detached from the same, as and for the purposes specified.

73,521.—MANUFACTURE OF ILLUMINATING GAS.—Robert M. Fryer and Andrew B. Fryer (assignors to National Gas Light Co.), New York city.

We claim, 1st, The process above described for manufacturing illuminating gas, which consists in distilling the coal at a low heat, and converting the distillate and condensable products into gas, in separate benches or retorts, substantially as described.

2d, The process of converting the volatile products or fluids, given off from the first bench of retorts, into gas, by subjecting the distilled products to the different temperatures required to convert the same into gas, substantially as set forth in the foregoing specification.

3d, The construction and use of the automatic seal valves, which are employed for the same purpose, and instead of the ordinary hydraulic main of gas works, substantially as above set forth.

4th, The manner of distributing the distilled products or fluids given off from the first bench of retorts, equally to the several gas producing retorts, by means of the several traps and connections, substantially as above set forth.

5th, The manner of separating the gas generated in the second bench of retorts from such fluids as escape conversion into gas in these retorts, and the method of passing the gas thus generated into pipes leading to the gas holder, while the fluids are conveyed directly into the third bench of retorts, where they are subjected to a higher heat, necessary to convert the same into gas.

6th, The combination of the whole gas generating apparatus, as described in the foregoing specification, and for the purpose therein named; and this we claim whether the constructed apparatus be precisely in the form described by us, or otherwise, if it produces substantially the same results.

73,522.—BRICK MACHINE.—R. M. Gano, Allegheny City, Pa. Antedated Jan. 17, 1868.

I claim the pressure roller, C, arranged to operate in combination with the rotating table, provided with a series of molds for forming bricks, substantially as described.

73,523.—CIDER MILL.—Lewis Gebhart, Orangeville, Ohio.

I claim the cider mill consisting of the toothed cylinder, B, strainer, F, endless aprons, O Q, pan, G, spring, L, adjustable roller, H, and roller, I all constructed and arranged to operate in the manner as and for the purpose set forth.

73,524.—DRESSING MILLSTONES.—Sam'l Golay, L'Asse-Mill, near Noyon, Switzerland.

I claim, 1st, A cutting tool armed with a diamond or diamonds, or other hard stones, and so constructed and operating that while it is caused to traverse, it will cut or chip a furrow or groove in a millstone by a succession of blows, as set forth.

2d, The disks, l and l', hung to a spindle, J, and having sockets, p, of different sizes, in which the cutting stones are held when the disks are brought together, as described.

3d, The cutting tool, k, constructed substantially as specified, in combination with the mechanism herein described, or any equivalent to the same, for imparting to the said tool a rotary, longitudinal, or lateral motion, as and for the purpose herein set forth.

4th, The adjustable frame, A, guided by the central spindle, P, and carrying the adjustable plates, c', in combination with the pivoted frame, B.

5th, The reversible guide bar, C, so secured to the frame, B, by bolts, f, that it may be inclined, for the purpose specified.

73,525.—HOE AND GARDEN RAKE COMBINED.—R. H. Gordon, Sr., Brooklyn, Ohio.

I claim a combined hoe and rake constructed with flukes, B, enlarged or widened at the point, a', and provided with the shanks, E, in the manner as and for the purpose specified.

73,526.—STEEL TRAP.—C. P. Goss and Adrian Rais, Waterbury, Conn.

We claim constructing a steel trap with a compound spring or springs and base plate of one piece of sheet steel, substantially as herein described.

73,527.—RAT TRAP.—John C. Guerrant and Benton J. Field, Leaksville, N. C.

We claim, 1st, The combination of the spring, D2, lever, E, connections, f g A', and movable platform, B, with the movable wing, B', connections, b d i, and stop pin, i', all arranged and operating substantially as and for the purpose herein specified.

2d, The combination with the above of the rod, H, stop, h, and spring, h', arranged and operating in the manner and for the purpose set forth.

73,528.—PIPE AND ROD CUTTER.—D. Frank Hartford (assignor to himself and Edmund Tarbell), Boston, Mass.

I claim, 1st, The cutter holder, C, combined with the feed screw, F, and the adjusting screw, O, made substantially as described and for the purpose set forth.

2d, The cutter holder, C, and knife, D, combined with the supporting bolster, E, made substantially as described and for the purpose set forth.

73,529.—RAILROAD RAIL FASTENING.—Nicholas Heading, Cincinnati, Ohio.

I claim, 1st, In the described combination with a sole-plate and keying-device, the reversible guide bar, C, connecting the notches, C C, in the rail ends, substantially as and for the purpose set forth.

2d, The sole-plate, H, constructed with the upturned corners or lugs, i i' i'' and i''', for the purpose above explained.

73,530.—BUGGY TAP.—Wm. S. Johnson, Henderson, Ky.

I claim a buggy tap, E, whose screw threaded orifice, e, is prolonged to its outer end, and provided with a temporary screw, F, adapted to operate as set forth.

73,531.—ROOFING COMPOUND.—John A. Jones (assignor to himself and A. F. Mears), Baltimore, Md.

I claim the within named ingredients, used together, substantially in the proportions and for the purpose set forth.

73,532.—COMBINED RULE AND SQUARE.—W. O. Jones, Portland, Me.

I claim making the joint in the manner described, so that the rule can be used as a square, and this in combination with the graduated scale, so that it can be used as a bevel.

73,533.—MANUFACTURE OF HINGE HOOKS.—Charles Kaulbeck (assignor to himself and Watson W. Roberts), Boston, Mass.

I claim the mode, substantially as described, of manufacturing shutter or blind hinge hooks.

73,534.—GAS COCK.—Peter Keller, New York city.

I claim, 1st, A gas cock, which when opened forms a space, d, and an annular channel, e, substantially as and for the purpose described.

2d, The arrangement and combination of the pipe, B, with a perforated tip, adjustable shell, C, and bulb, A, substantially as and for the purpose set forth.

73,535.—BOTTOM FOR COAL HOD.—E. W. Kimball, Hudson, N. Y.

I claim a cast iron bottom for coal scuttles, or hods, when the same is cast with a lower rim or base, C, having a hand recess, B, and is also provided with suitable means of attachment to the body of the scuttle or hod, substantially as described.

73,536.—CIRCULAR-SAW MILL.—J. L. Knowlton, Philadelphia, Pa.

I claim, 1st, The combination and arrangement of the carriage, M, and yokes, N and R, or their equivalents, the latter bearing the circular saw, S, when the parts are so constructed and arranged that the yoke, R, rests upon the yoke, N, and the latter is pivoted to the carriage, so that the saw can be moved to and from the log, or inclined in any direction, the carriage being at liberty to move back and forth as the inclination of the saw may require, and without the aid of any mechanical arrangements, substantially in the manner and for the purpose specified.

2d, The combination of the wedge roller, P, with the yoke, R, and constructed with lateral movement in such a manner as to allow angular movement of the saw mandrel without disturbing its relative position with the log.

73,537.—WATER METER.—Wm. Livingston, New York city.

I claim, 1st, The construction of a water or fluid meter, consisting of a measuring vessel or cylinder, enclosed in an outer casing or jacket, the intervening space or spaces forming the water ways to and from the measuring cylinder.

2d, The combination of a piston with jointed plates or bars, or other proper flexible material, that will extend and close up with the motions of the piston, and give positive action to the valves at either end of the stroke.

3d, The combination of a piston and intermediate flexible attachments with the valves, either slide valves or other valves, by means of the rod, F, and its inclined plane, S, working the valve rod, E, or by means of a bell crank or other lever, taking motion from the piston at certain points of the stroke, and transferring the same to the valves, substantially as described.

73,538.—LAMP.—E. A. Locke and Wm. N. Weeden, Boston, Mass.

We claim a sectional lamp cone, made to open and close, as and for the purpose substantially as set forth.

Also, a removable chimney supporting ring or base, holding the parts of the cone together, substantially as described.

73,539.—APPARATUS FOR DISTILLING SPIRITUOUS LIQUORS.—Orazio Lugo (assignor to John F. Collins), New York city.

I claim, 1st, Introducing into a distilling apparatus a current of alkalinetted air, substantially in the manner described and set forth.

2d, One or more receivers or analyzers between the still and condenser, having enclosed rotating and stationary fans, for the purpose described and set forth.

3d, Producing, in connection with or continuation of the process of distilling alcohol, ethers during the same operation, substantially as described and set forth.

73,540.—PROCESS FOR PRODUCING OXYGEN AND CHLORINE.—Jules Theodore Anatole Mallet (assignor to Jean Marie Onesime Tamin), Paris, France.

I claim the process for producing, conjointly or separately, oxygen and chlorine gas, substantially as herein described.

73,541.—MACHINE FOR BLOCKING AND STRETCHING HATS.—Geo. A. Mandeville and Wm. E. Pine, Newark, N. J.

We claim, 1st, A forming block, combined with a system of radially adjustable, brim-supporting arms, constructed and operating substantially as described.

2d, A circular series of radially-sliding, brim-supporting arms, to enter the body of the hat, and adjustable in fixed positions to and from a center, substantially as shown and described.

3d, The adjustable ring, 4, sliding in the inclined slots, to vary the positions of and hold securely the radial, brim-supporting arms in the desired fixed position, either to or from a center.

4th, The combination with a radially mortised plate of a circular system of radial, brim supporting arms, arranged to receive the hat block within the circle they describe.

5th, The radial arms of the system of brim supporting arms, constructed with their outer surfaces tapering gradually downward from the top of the sectional band plate, as and for the purpose described.

6th, The combination of the ring, 4, its supporting frame, and an adjustable lever, for operating it and holding the brim supporting arms positively and firmly in the position to which they may be adjusted.

7th, The combination of a perforated hat-forming block with a grooved, perforated, or skeleton supporting plate, for the purpose set forth.

8th, The arrangement of a series of clamping fingers with the series of stretching arms, and with their supporting frame, whereby is provided the means for the adjustment of the clamping fingers, independent of the means for the adjustment of the stretching arms, substantially as described.

9th, The combination of grooved cam plate, F, whether with or without its rim or handle, with its system of radial stretching arms, substantially as and for the purpose set forth.

10th, The arrangement, in a hat blocking machine, of lever 18 with the adjustable stop 23, to limit the upward movement of the hat block, for the purpose set forth.

11th, The combination of a set of radial stretching arms with a set of slides, the inner surfaces of such slides forming the banding rim, substantially as described.

12th, The combination of the loose, adjustable ring, J, with the outer system of stretching arms, for the purpose of graduating the amount of stretch to be given to the brim of the hat body, substantially as described.

13th, The loops or guards upon the radial stretching arms, to sustain the ring, J, and serving therewith to form slots, or guides, to insure the positive expansion of the system of stretching arms by the action of the ring, when raised.

14th, The combination, with the stretcher carrying sliding frame, of the counterbalancing weights, substantially as shown and described.

15th, The combination of an outer system of rising and falling stretching arms, with an inner system of radially sliding, brim supporting arms, which have no rising or falling motion.

16th, The combination in the same machine, and for joint action, of a system of radially adjusting, brim supporting arms, a system of stretching arms and a rising, hat forming block, the same operating substantially as described.

73,542.—HAY AND COTTON PRESS.—Louisa J. Maxey, Troy, Ind., administratrix of the estate of Edward G. Maxey, deceased, and Wm. R. Mason, Lewisport, Ky.

We claim, 1st, The combination of the gearing wheels, c d e f g g', with the double reciprocating rack and compressing beam, F, constructed and arranged substantially as and for the purposes herein described.

2d, The pitmen, i i', in combination with the outer head blocks, b b', and the doors, k' k', and their self-acting apparatus for chocking the head blocks, and releasing them when the doors are opened to take the bale out, constructed and arranged substantially as and for the purposes herein described.

3d, The relieving slides, p p', in combination with the packing compartments, C C, arranged substantially as and for the purpose herein described.

73,543.—MEANS FOR STUFFING CHAIRS.—Wm. E. Michael (assignor to himself and Abram Setley), New Holland, Pa.

I claim the combination, with the slats, E, of cross strips, D and B, screws, C, and rounded cover, when constructed and applied substantially in the manner shown, for the purpose specified.

73,544.—HAY ELEVATOR.—Abil Mott (assignor to himself and Warren Kenyon), Scott, N. Y.

I claim the frames, A and H, with their cords and pulleys, the frame, F, and pin, G, constructed and used substantially as and for the purpose set forth.

73,545.—TREATING CAOUTCHOUC AND OTHER GUMS.—J. B. Newbrough and E. Fagan, New York city.

We claim the within described new manufacture of substance, consisting of caoutchouc, or equivalent gum, incorporated with iodine, and bromine (after treating the said iodine and bromine with turpentine, or equivalent oil, as described), and subjected to heat.

73,546.—INSTEP STRETCHER.—C. C. Pease, Jamestown, assignor to himself, Giles Milks, and S. B. Brimstool, Kennedy, N. Y.

I claim, 1st, The slide, slot and screw, 2, as herein described, for raising and lowering the instep block of a last, as and for the purpose specified.

2d, Connecting the slide, slot and screw to a last, when arranged so as to be used and operated for the purpose described.

73,547.—COMBINED CULTIVATOR AND HARROW.—Chas. Rich and Oscar L. Neisler, Poughkeepsie, N. Y.

We claim, 1st, The adjustable bars, K' K', when arranged on the sides of the hill, and when provided with handles, j j, connected at their upper ends so that the teeth can be accommodated to irregularities in the hill, or can be connected for broadcast harrowing or tilling, substantially as herein shown and described.

2d, The device for connecting the harrow frame, C, with the axle, A, and driver's seat, I, consisting of the bars, E and F, on the axle, of the links, G, levers, H and J, and connecting rods, h and i, all made and operating substantially as and for the purpose herein shown and described.

3d, The above, in combination with the notched bar, M, when made as and for the purpose described.

4th, Securing the draught bars, N, to the rear of the harrow holders, K, substantially as and for the purpose herein shown and described.

5th, The hollow cultivator tooth, P, when arranged so that it can be fitted to and easily removed from a harrow tooth, L, substantially as and for the purpose herein shown and described.

73,548.—SEED SOWER.—A. Rowe, W. H. Mitchell and E. B. Hamill, Macomb, Ill.

We claim, 1st, The fluted or ribbed, concave disk, D, made of a single plate struck up with the ribs, k, in the form and manner substantially as shown and described.

2d, The oblong curved opening, I, for the passage of the grain from the hopper to the disk, as set forth.

3d, In combination with the opening, I, the oscillating slide valve, f, for regulating the delivery of the grain at different points of the disk, as described.

4th, The rotating arm, p, mounted on the shaft, F, and arranged to revolve within the hopper, E, as shown and described.

73,549.—CARTRIDGE BOX.—P. F. Schneider, Hartford, Conn., assignor to himself, W. H. D. Callender, and B. C. English.

I claim, 1st, The spring lever, G, provided with spring lug, a, operating the ratchet, D, of the cartridge chamber in its forward motion, and returning to its original position, sliding over the ratchet in the manner described, substantially as specified.

2d, The plate or lid, J, provided with slot, I, through which play the handle, B, of the spring lever, G, having spring lug, a, operating the ratchet wheel of the cartridge chamber, allowing the ejection of but one cartridge at a time, and admitting the operation of said ratchet wheel continually from the same point, and the lever to return to its proper position, ready for its next operation, substantially in the manner represented and described.

73,550.—PLOW.—Geo. K. Smith and Joseph Strasser, Allegheny City, Pa.

We claim, 1st, The combination of the graduate, C, with the beam, D, constructed, arranged and operating as herein described, and for the purpose set forth.

2d, The combination of the movable cap, B, with the beam, D, and graduate, C, constructed, arranged and operating as herein described and for the purpose set forth.

73,551.—RAILWAY SWITCH.—Joseph B. Spurgin and Thomas A. Kirk, Kansas City, Mo.

We claim, 1st, The combination and arrangement of the two main tracks, A and B, one or more oblique or inclined tracks, D, and one or more switch tracks, C, with each other, substantially in the manner shown and described, and for the purpose set forth.

2d, The pieces, G and H, one or both constructed substantially as described, in combination with the rails of two tracks, at the point where the said tracks meet and unite to form one track, substantially as herein shown and described, and for the purpose set forth.

73,552.—MEDICAL COMPOUND.—James T. Stewart, Peoria, Ill., assignor to Samuel R. Whitlow, Rochester, Ill.

I claim an improved medical compound, prepared of the ingredients and in the proportions and manner substantially as herein set forth and described.

73,553.—COMPOSITION FOR FUEL.—Washington Stickney and Nathan B. Chase, Lockport, N. Y.

We claim the improved composition for fuel, prepared of the material and substantially in the manner herein set forth.

73,554.—BOOT CRIMP.—John Tipton and J. Carl, Malaga, Ohio, assignors to John Tipton.

We claim, 1st, The combination of the plates, A A, with the two right and left screws, r r', and the spur wheels, g g, substantially as and for the purpose specified.

2d, The combination and arrangement of the plates, A A, with the arms, e e, brace, a' a', joints, l and arms, C C, substantially as and for the purpose specified.

3d, The bar, M, when constructed with slotted ends, a ratchet surface on its upper side, and a central female screw, substantially as and for the purposes set forth.

4th, The combination of the plates, A A, with the arms, C C, bar, M, screw rod, R, and board, B, substantially as and for the purposes specified.

5th, The combination of the plate, O, board, B, jaws, o o o, and screw rod, R, when the parts are constructed and applied together, substantially in the manner and for the purposes specified.

73,555.—TAMPING AND BLASTING MACHINE FOR SPLITTING WOOD.—Elisha W. Walton, Drytown, assignor to Joseph H. Atkinson, San Francisco, Cal.

I claim, 1st, the construction of the barrel with a charge cavity and screw, with cross head, handles, nipple and hammer, substantially as described, and for the purposes set forth.

5d, The screw cleaner, for the purposes set forth.

73,556.—CHURN.—Samuel J. Whipple (assignor to himself and Joseph H. Atkinson), Orville, Cal.

I claim a metallic or wooden churn, in which all the parts described and represented are arranged in the manner set forth.

73,557.—HAND HOLE JOINTS FOR BOILERS.—Gilbert White, Harlem, N. Y., assignor to himself and Gustavus Pierrez, New York city.

I claim the packing, C, of the face, a, and the cover, A, in combination with the plate, D, all constructed and arranged substantially as shown and described.

73,558.—STONE AND STUMP EXTRACTOR.—Moses Wieand and George Gorr, Emaus, Pa.

We claim the portable power, consisting of the mechanism arranged substantially as described, and provided with the chain, f, having the stationary hook, p, and the sliding hook, p', all mounted on the frame, constructed as set forth.

73,559.—SPRING HOLDER.—Daniel Witt, Hubbardston, Mass assignor to Dexter Howe, New York city.

I claim the spring, A, in combination with the screw bolts, C, sockets, B and nuts, b b, substantially as described, for the purpose specified.

73,560.—DITCHING MACHINE.—E. Worth and C. A. Davis, Oswego, Ill.

We claim, 1st, The knives, L, arranged to operate substantially as and to the purpose set forth.

2d, The point, F, jointed to the shoe, E, in combination with the cutter bar K, screw, J, and standards, I I, arranged to regulate the depth of the machine in the ground, substantially as set forth.

3d, The combination of the horizontal shears, D, inclined flanges, C, with cutter bars, K' K', knives, L, and mold board, B, substantially as set forth.

73,561.—WRENCH.—Hugh S. Wrightson (assignor to M. M. Welby and C. H. Slicer), Baltimore, Md.

I claim, 1st, a wrench, with its adjustable jaw constructed and applied to its handle and stationary jaw, as described, when its ratchets or teeth are located as and operated in combination with groove, b, and tongue, d, in the manner and for the purpose specified.

Also, button, E, in combination with groove, b, and tongue, d, for holding the removable jaw to its seat, as herein described.

73,562.—SASH FASTENING.—C. M. Amsden, Wooster, Ohio.

I claim the spring bolt, b, in the side of the sash, B, provided with the knee, working in the slot, f, of the sash, and operated by means of the slotted lever, C or H, pivoted to the sash, B, constructed and arranged as described for the purpose specified.

73,563.—FASTENER FOR STAIR RODS.—Wm. R. Anderson, New York city. Antedated Jan. 8, 1868.

I claim the combination of the stationary framework, A, movable arm, B, and hook, h, substantially in the manner and for the purpose set forth.

73,564.—PLOW GAGE WHEEL.—Philo D. Beckwith, Dowagiac, Mich.

I claim, 1st, The axle or skein, B, cast upon the wheel, A, as and for the purpose set forth.

2d, The shank, C, with a hub cast upon its lower end, and used in combination with the wheel, A, and its axle, B, substantially as herein set forth.

73,565.—PROCESS FOR SEASONING AND PRESERVING WOOD.—Sigismund Beer, New York city.

I claim seasoning, preserving, and purifying wood, by extracting its perishable matters, without injuring the wood substance, and associating there with a durable and antiseptic substance, which makes it harder, water-proof indifferent to atmospheric changes, and less combustible, by the process above described, in which borax, or some other borate or boracic acid, or a like compound, is employed, substantially as and for the purpose specified.

73,566.—COFFER DAM.—Edwin Bell, St. Paul, Minn.

I claim, 1st, In combination with a floating coffer dam, constructed substantially as described, the flexible bag, sack, or pipe, F, for packing the same, and excluding the water.

2d, Also, the use of the apron, of rubber cloth, canvas or other flexible material, made water-proof, for packing the joints between the tiers of planks forming the inner walls of the cam, substantially as described.

73,567.—CONSTRUCTION OF HANDLES FOR METAL TEA AND COFFEEPOTS.—Wm. Bellamy, Newark, N. J.

I claim a tubular metal handle, filled with plaster-of-paris, for metal tea and coffeepots, substantially as and for the purpose set forth.

73,568.—CULINARY VESSEL.—W. H. Bennett, New York city.

I claim the combination of the vessel, D, divided into various compartments by the vertical partitions, c, each compartment having its own tap, the perforated receptacle, B, leaving the space between its sides and the outer casing, C, open, and widest at the bottom, and the hot-water vessel, A, all arranged as described for the purpose specified.

73,569.—VIOLIN.—Bainbridge Bishop, New Russia, N. Y.

I claim, 1st, The supplementary bridge, J, to the extended finger board, D substantially as and for the purpose specified.

73,570.—MODE OF CUTTING CHANNELS IN BOOTS AND SHOES.
L. R. Blake, Boston, Mass.
I claim the combination of leading and following knives, for the purpose of forming different-sized grooves in channels, when the leading knife is constructed with such a breadth of back as will cover the cutting edge of the following knife, substantially as described.
Also, the formation of the channel, substantially as shown and described.

73,571.—MANUFACTURE OF LOCKING RINGS FOR CLOSING FRUIT JARS.—L. R. Boyd, New York city.
I claim the above described improved method of manufacturing screw rings for fruit jars and other analogous articles, substantially as and for the purposes set forth.

73,572.—PAPER FILE.—Solomon Brock, Brooklyn, N. Y.
I claim, 1st, The employment of threaded needles, arranged stationary in the file, and operating with a paper flap, for the purpose of passing a thread in the letters or papers, with the operation of filing the same in the file, so that the letters or papers may thereby be secured when removed from the file, substantially as herein shown and described.
2d, The combination and arrangement of the file case or frame, A, with the side, B, and needles, E E, the flap, D, and springs, F F, and notches, H H, operating together substantially as and for the purpose herein shown.

73,573.—MACHINE FOR SUPPORTING TIN CANS WHEN BEING SOLDERED.—Almond Brooks, Columbus, Ind.
I claim the combination of the adjustable frame pieces, A, with inclined faces and grooves, A', the spider, B, tubular shaft, C, internal rod, D, plate, E, elastic bands, F, and pawl, G, constructed and arranged to operate substantially in the manner and for the purpose set forth.

73,574.—TWEER IRON.—Jairus Brown, Portland, Mich.
I claim the construction and arrangement of the cylinder, A, the head or cap, B, provided with more or less openings, C D E F and G, the rod, H, the false cap, I provided with appropriate openings, J, the crank, K, the lever, L, the cylinder, M, the false bottom, N, and the door, O, when constructed and operating substantially as and for the purposes set forth.

73,575.—AXLETREE.—Chas. E. Buck, Racine, Wis.
I claim the rod, C, applied to the straight axle, A, its ends passing through the under sides of the thimble skeins, B, securing them in place, and its center held in position by means of the brackets, a, the rod, C, being tightened by means of the nuts, D, as herein shown and described.

73,576.—CONCRETE BRICK PRESS.—T. J. Burke, Chicago, Ill.
I claim the cam wheel, R, in combination with lever, J, follower, D, slides, X X, lever, N S, and box, B B, arranged to operate in the manner as herein set forth.

73,577.—SAND PUMP FOR OIL WELLS.—John F. Carll, Brooklyn, N. Y.
I claim, 1st, A sand pump provided with valves, D J, and their connecting agencies, arranged in such manner that the valves will be operated automatically, and the pump filled with sand or debris under the static pressure of the water within the well or hole, substantially as herein shown and described.
2d, The valve stem, G, with the tube, H, yoke, I, oblique slot, e, pin, g, and the slots, f f, all arranged to operate in connection with the valve, J, substantially as and for the purpose specified.
3d, The safety valve, F, arranged in relation to the valves, D J, applied to the cylinder of a sand pump to operate in the manner substantially as and for the purpose set forth.

73,578.—STEAM GOVERNOR.—William L. Collamore, Warren, R. I.
I claim the combination of the supplemental weights, H, and lever, B, with a governor, substantially as herein specified.

73,579.—RECTIFIER AND CONDENSER FOR ALCOHOLIC SPIRITS.—J. F. Collins, New York city.
I claim the construction and use of a rectifier for alcoholic or other spirituous vapors, in the manner and form substantially as described and set forth, and
Also, the construction and use of a condenser or worm, in the manner and form and for the purposes substantially as described and set forth.

73,580.—SCISSORS.—Ransom Cook, Saratoga Springs, N. Y.
I claim as a new article of manufacture, scissors constructed and arranged substantially as herein described.

73,581.—NECKYOKE.—E. Covert and J. C. Covert, Farmer Village, N. Y.
We claim the metallic clasp, B, connecting the leather, C, to the neckyoke, A, substantially as and for the purpose set forth.

73,582.—BUTTER WORKER.—Washington Cunningham, Oxford, N. Y.
I claim, 1st, The spring roller, C, as herein set forth, which allows the compresser, A, to rise and fall, for the purpose herein set forth.
2d, Extending the side rail, E, for the purpose of preventing the carriage, F, from falling, as herein set forth.

73,583.—CHURN DASHER.—Morgan O. Davis, Warrensburg, N. Y.
I claim a dasher composed of the shaft, F, and dasher boards, a, and key, K, substantially as shown and described, and for the purpose set forth.

73,584.—CLOTHES WRINGER.—William S. Douglas, Richmond, Vt.
I claim, 1st, Regulating the pressure of the wringing rollers, d and d', by means of the levers, D and F, rod, E, and spring, e, when the same are combined and arranged substantially as described.
2d, In combination with the above, the tilting and drain boards, H and I, when the same are constructed and arranged substantially as described.

73,585.—APPARATUS FOR MANUFACTURING SHEET LEAD AND LEAD PIPE.—Andrew Dow, Brooklyn, N. Y.
I claim, 1st, The combination of the water water cylinder block, B, posts C, piston, D, cross head, E, having central bolt, F, bearing head, b, cylindrical ram, I, and annular block, G, all constructed as described, for the purpose specified.
2d, The combination of the water cylinder block, B, tube, L, vessel, K, having core, C, and annular block, G, constructed as described, for the purpose specified.

73,586.—WINDOW SASH.—A. K. Eddowes, Philadelphia, Pa.
I claim, 1st, The hollow or solid cylindrical flexible packing, D or D1, and grooved clamp or molding, D2, in combination with the rabetted frame, A, for securing the glass in said frame, essentially as shown and described.
2d, The arrangement, within the rabbet, a, of a strip or bearing, b, made of a soft and pliable material, such as gum or cork, for the standing edge of the glass to rest upon, essentially as specified.

73,587.—NAIL EXTRACTOR.—Jacob Edson, Boston, Mass.
I claim the combination of the levers, A and B, the wheel, C, and the adjustable teeth, e and l, the whole being constructed, applied, and arranged substantially in manner and so as to operate as and for the purpose or purposes set forth.

73,588.—SHOE SHAVE.—Marius M. Elliott, New England Village, Mass.
I claim a shave for boots and shoes, having its blade hung in the guard for adjustment, substantially as described.

73,589.—BOOTS AND SHOES.—Martin R. Ethridge, Locke's Mills, Me.
I claim, 1st, The new arrangement of the upper, A, and the cushion cover, B, with the wooden sole, D, and the leather sole, E, placed underneath the said wooden sole, the upper, A, and cover, B, under such arrangement, being carried around the edges of the wooden sole, and being sewed to the sole, E, as specified.
2d, And, in combination with the wooden sole, cushion cover, upper, and metallic sole, arranged as described, the finishing welt, G, applied between the upper and the metallic sole, as set forth.

73,590.—PROCESS OF RECUTTING FILES.—Albert I. Ferguson, Sharon, Pa.
I claim the combination of the within-described ingredients, when used for recutting files, substantially in the manner herein specified.

73,591.—SAUSAGE FILLER.—Martin Feuerstein, Williamsburg, N. Y.
I claim, 1st, The piston rod, i, when pivoted to the end of the bent ratchet bar, g, with which bar the piston rod is arranged, and moves parallel, substantially as herein shown and described.
2d, A machine for filling sausages, consisting of the upright cylinder, A, piston, E, piston rod, i, pivoted to the reciprocating bar, g, and of the tube, a, provided to receive and hold the removable tube, c, all made and operating substantially as herein shown and described.

73,592.—BELLOWS FOR MUSICAL INSTRUMENTS.—Oliver Follett, Pittsfield, Mass.
I claim the application of subsidiary weights or springs to the bellows of musical instruments, whereby the performer can regulate the pressure of wind by means of pedals or stops, substantially as herein specified.

73,593.—HARROW, CULTIVATOR, AND PLANTER COMBINED.—J. G. S. Garwood, Vermillion, Ill.
I claim, 1st, The combination, in one machine, of the harrow, A B, plow standards, G I, plows, H J seed box, C, dropping cylinder, D, axle, E, and wheels, F, substantially as herein shown and described and for the purpose set forth.
2d, In combination with the above, the curved spring-plate or apron, N, seed box, C, and dropping cylinder, D, substantially as herein shown and described and for the purpose specified.
3d, The combination of the slide, K, lever, L, and hook, M, with each other and with the seed box, C, and dropping cylinder, D, substantially as herein shown and described, and for the purpose set forth.

73,594.—APPARATUS FOR FILLING SIPHON BOTTLES.—Wm. Gee, New York city.
I claim, 1st, The telescopic bracket, C, adjustable substantially as described when applied to an apparatus for filling siphon bottles, for the purpose specified.
2d, The foot, G, applied to a sliding rod, D, and arranged to operate in connection with the bracket, C, and the parts thereto attached, substantially as and for the purpose specified.
3d, The adjustable notched collar, j, on the part, a, of the bracket, C, in combination with the pin, h, of the arm, g, of the guard, H, all arranged substantially as and for the purpose specified.

73,595.—STEAM GENERATOR.—H. Gerner, New York city.
I claim a steam boiler, having a conical flue, F, situated in a conical shell, E, which is surrounded by cylindrical shells, A D, substantially as herein set forth.
Also, the combination of the conical flue, F, with the conical shell, E, and with the grate, G, substantially as and for the purposes described.

73,596.—ICE CREAM FREEZER.—Charles Gooch, Cincinnati, Ohio.
I claim the internal spur wheel, K, in combination with the wheels, L and M, substanatially as herein described, for the purpose of securing an opposite motion to the agitator and the can.

73,597.—VEGETABLE CUTTER.—George P. Hachenberg, Coxsackie, N. Y.
I claim the combination of the stationary vessel, A, revolving toothed ring D, having flange, F, under the lower edge of the vessel, A, slotted revolving disk, G, fitted by slots, a, upon the lugs, b, of the toothed ring, cutters, I, adjusting screws, K, sockets, U, fixed bar, M, in the vessel, A, follower, N, and gear wheel, Q, all operating as described for the purpose specified.

73,598.—ROLLING MACHINE.—George Hastings, Jr., Wheeling, W. Va.
I claim, 1st, The rollers, C D and E, and the riders, carriages, and boxes, F G and H, with the supporting rods, J J, combined and arranged substantially as shown and described for the purposes set forth.
2d, The collars, N, grooves, O, and clutch coupling, M, in combination with the rollers, C D E, sides, and carriages, and boxes, F G H, and supporting rods, J, as herein described, for the purpose specified.
3d, In three high rolls, connecting the middle and upper rolls, so that they shall move up and down together, substantially as shown and described.

73,599.—LAMP.—Hiram W. Hayden, Waterbury, Conn.
I claim a perforated chamber, h, and deflector, g, fitted to slide vertically upon the wick tub, in combination with the chimney holder, sustained by arms to the burner cap, substantially as and for the purposes set forth.

73,600.—LAMP.—Hiram W. Hayden, Waterbury, Conn.
I claim, 1st, A chimney holder, connected permanently to the burner shell, and provided with a short deflector, in combination with a stationary wick-tube, and arranged as set forth, so that access is given below the chimney holder for trimming the wick, as set forth.
2d, Also, a sliding perforated cup, having a bottom with a slot for the wick tube, and applied between the burner shell and chimney holder, substantially as set forth.
3d, Also, the perforated cup, k, stud, e, deflector, g, and chimney holder, f, in combination with the burner and wick tube, h, substantially as and for the purposes set forth.
4th, Also, a friction spring in combination with the perforated cup, k, for sustaining the same at any point to which it may be moved, as set forth.

73,601.—WASHING MACHINE.—Henry Helm, Pittsburgh, Pa.
I claim, 1st, The elastic rings, e, upon the grooved wheels, r, of the rollers, H, attached, by the elastic strips, a, to the central elastic ring, e', upon the shaft, D, all constructed and operating as described for the purpose specified.
2d, The combination of the rollers, r, washer, W, strips, f, box, T, divided into three compartments by the vertical partitions, u, crank wheel, W, rods, C, treadle, t, pivoted seat, S, as herein described, for the purpose specified.
3d, The combination of the elastic rings, e e', and elastic strips, a, with the rollers, H, shaft, D, and vibrating washer, W, as herein described, for the purpose specified.

73,602.—STEAM ENGINE GLOBE VALVE.—H. H. Hendrick, Dayton, Ohio.
I claim as a new article of manufacture, a disk valve, B, formed of chilled or case-hardened iron, in the manner described, and loosely attached to the stem, substantially as shown and specified.

73,603.—ARTICLES MADE OF MOLDED WOOD.—Samuel B. Henry, Bridgeport, Conn.
I claim a block or strip of molded wood, the fibers of which have been displaced by the action of dies applied to the end grain, as described, and the pores of which are filled with rubber, or its equivalent, applied in solution.

73,604.—LATHING MACHINE.—Thomas Hill, New Centerville, Wis.
I claim, 1st, The stand, A, in combination with the sliding or adjustable frame, B, when used in connection with bars, G, in which laths are clamped or secured, and all arranged in the manner substantially as and for the purpose set forth.
2d, The sliding or adjustable frame, C, connected with the lever frame, Gx, by the racks and pinions, D E, when said parts are used in connection with the frame, B, and the bars, G, provided with the slides, l, and arranged to operate in the manner substantially as and for the purpose specified.
3d, The slides, l, and springs, m, placed on the rods, j, within the bars, G, and arranged to operate in connection with the frame, C, substantially as and for the purpose set forth.
4th, The rods, o o, arranged with the notch, r, frame, C, springs, g, and the plates, a and t, to operate in connection with the slides, l, of bars, G, substantially in the manner as and for the purpose set forth.
5th, The clamps, l, applied to the bar, J, in combination with the bars, G, and the slides, l, which hold the laths, all arranged substantially as and for the purpose specified.

73,605.—GRAIN SEPARATOR.—Orsamus Holmes, New Lenox-ill.
I claim the bars, S, pivoted near their centers, U, to the frame of the machine supporting the straw shoe, B, their lower ends pivoted to the grain shoe, T, whose outer end is supported by the pivoted bars, V, all arranged as described whereby the movements of the straw shoe, B, and the grain shoe, T, are simultaneous, as herein set forth for the purpose specified.

73,606.—PLOW.—W. T. Howell, Alfred, N. Y.
I claim the attaching of the share, E, to its standard, D, by means of the band, F, fitted on the cylindrical part b, of the standard, the pin, cx, on which the band rests and the brace rod, Fx, fitting in the recess oo depression, c, in the top of the share, all arranged substantially as shown and described.

73,607.—PLOW.—David W. Hughes, Quincy, Ill.
I claim, 1st, The placing of the plows at the outer sides of the wheels, B B, substantially in the manner as and for the purpose set forth.
2d, Having the plows or shares, I J, placed in reverse obliqne positions for the purpose of dispensing with a land side to avoid friction and draft and to keep the implement in line with the of draft, as set forth.

73,608.—STEAM GENERATING APPARATUS FOR HEATING BUILDINGS.—Benjamin Irving, New York city.
I claim, 1st, The combination and arrangement of the dampers, N and S, made and operating substantially as hereinbefore set forth.
2d, Also, in combination with the coils of pipe, and dampers, N and S, the perpetual reservoir of water, E, made and operating substantially as hereinbefore set forth.
3d, Also the combination and arrrngement of the nozzle, H, with funnel, I, substantially as hereinbefore set forth and for the purpoees described.

73,609.—CLOTHES PIN.—David D. Jones, Scranton, Pa.
I claim the pins, A and B, pivoted together at one end and provided with the collar, C, and spring, D, the several parts being constructed and used as and for the purpose specified.

73,610.—CONCRETE BUILDING BLOCK PRESS.—Orlan L. Jordan, Dowagiac, Mich.
I claim the combination of the frame, A, with box, B, bars, G F, lever, E, follower, D, bars, I I, and lever, H, the whole being constructed, arranged and operating in the manner substantially as and for the purposes set forth.

73,611.—FENCE.—DANIEL Kaufman, Boiling Springs, Pa.
I claim, 1st, The fence posts, A, when supported above the ground by means of the metallic shoes, D, pivoted to the lower ends of the inclined braces, C, as herein described for the purposes specified.
2d, The posts, A, formed of two parts slotted for the reception of the rails, B, the ends of the rails of one panel fitting against the ends of the rails of the opposite panel in the center of said posts in combination with the braces, C, horizontal pieces, e1 e2, and metallic supporting shoes, D, as herein described for the purpose specified.

73,612.—CURTAIN FIXTURE.—C. F. Knauer, Pittsburg, Pa.
I claim, 1st, The pulley bearing, B, with its aperture or flanges, i, slots, c, arranged and constructed substantially as described and for the purpose set forth
2d, The cord pulley, D, provided with teeth, e, on its periphery and journals, J, when arranged and operated in combination with the cord, E, substantially as described and set forth.

73,613.—OX YOKE.—Joseph Langenbach, Dorchester, Iowa.
I claim, 1st, The padded bows, B, made in two parts and pivoted within slots in the stock, A, when provided with a series of holes, d, in the tenons, a, all constructed, arranged and operating substantially as and for the purpose described.
2d, Providing the stock and the upper ends of the bows or either with a series of set holes substantially as described so as to make the yoke adjustable for larger and smaller animals, as set forth.

73,614.—TRUSSES AND ABDOMINAL SUPPORTER.—Jules Lecocq, New York city.
I claim forming trusses, abdominal supporters, etc., of wire, A, bent into the form required and covered with rubber tubing, B, substantially as herein shown and described and for the purpose set forth.

73,615.—MACHINE FOR SAWING HOOPS.—Abraham Lutz, Orangeville, Ill. Antedated January 17, 1868.
I claim the construction and arrangement of the inclined fixed bearing, E, having the pin, e, and concave head, e', spring, F, provided with the horizontal roller, G, and bent spring, H, with concave arm, b, as herein shown and described for the purpose specified.

73,616.—MACHINE FOR MOLDING PEAT.—James B. Lyons, New Haven, Conn., assignor to Lyons Peat Coal and Machine Company, New York city.
I claim, 1st, Delivering the peat in rolls or bars on the drying racks, for the purposes set forth.
2d, The revolving marker, E, with its blades, e e e e, as arranged in combination with the delivering mechanism and drying racks, substantially as herein described for the purpose described.

73,617.—MARINE FOUNDATION.—Edward Manico, London, Great Britrin, assignor to John P. Manico, New Orleans, La. Patented in England October 23, 1867.
I claim the combination of parts and articles herein described when the same are used for obtaining foundations for marine and other structures requiring them.

73,618.—COMBINED POTATO PLANTER, HOE AND POTATO DIGGER.—Francis B. Marden, Bangor, Me.
I claim, 1st, The mode of operating the shaker, F, by an eccentric, b, and pitman, f, so arranged and connected with the hanging irons, j j, that by raising or lowering the handles to any given point, it does not prevent the free and easy working of the shaker, F.
2d, The digging point, G, shaker, F, finger reel, E, comb, P, with the eccentric, b, pinion, a, and driving wheel, C, in combination with the journal boxes, h h, having projecting axles, i i, for attaching the draft irons, j j, when constructed and arranged substantially as and for the purposes herein set forth.

73,619.—HARVESTER RAKE.—Jas. S. Marsh, Lewisburg, Pa.
I claim, 1st, The combination, substantially as described, of a main frame supported upon two wheels, and a laterally projecting platform and cutting apparatus, so hinged to the main frame that the cutting apparatus shall be in advance of the main axle, with a series of combined rake and reel arms, all revolving on a vertical axis, or one nearly so, on a support mounted on the platform, near its inner front corner, for the purposes set forth.
2d, The combination, substantially as described, with a two-wheeled front-cut harvester, of a series of combined rake and reel arms having a vertical axis, or one nearly so, on a standard or suppors, mounted on a hinged platform, near its inner front corner, the arms being independently hinged, and having a rising and falling movement independent of their axis of rotation, for the purpose set forth.
3d, The combination, substantially as described, with a two wheeled front-cut harvester, of the main frame between the wheels, the intermediate hinged coupling arms F1 G, the cutting apparatus, and platform, and a series of rake and reel arms pivoted to a crown wheel or central hub revolving on a vertical axis, and driven by an extensible connection from the main axle for the purposes set forth.
4th, The combination, substantially as described, of two driving wheels, a frame arranged between the wheels, and projecting beyond their periphery at either end, a laterally projecting cutting apparatus, and platform pivoted to said frame by hinged connections, both in front and rear on the wheels, the cutting apparatus being in advance of the main axle, and a combined rake and wheel, revolving on a vertical axis near the inner front corner of the platform, and always revolving outside of the wheels, for the purposes set forth.
5th, The combination, substantially as described, in a two-wheeled front-cut hinged-bar machine, of a combined rake and reel, mounted on the inner front corner of a platform, suspended from the main frame by flexible connections attached to the coupling arms, and with the lifting devices attached to the rear end of the tongue, for the purposes set forth.
6th, Attaching each of the rake or reel arms to their pivoted shanks by means of a slot and set screw, or bolt, so that these arms can be adjusted and set to work at different hights above the platform, to suit different hights of grain, substantially as described.
7th, The combination, substantially as described, with a combined rake and reel, mounted on the inner or gearing side of a grain platform, of the divider, D1, and inwardly inclined removable deflecting board, D3, for the purposes set forth.
8th, The combination, substantially as described, with a revolving rake and reel mounted on a hinged platform, of an adjustable inner grain guard, E, attached both to the shoe and to the inner curved guard, D1, for the purposes set forth.
9th, The combination, substantially as described, with a two-wheeled front-cut machine, having a revolving rake and reel mounted upon a hinged platform, of a lateral hinged curved brace or coupling arm, or its equivalent, attached to the inner side of the platform and main frame, in rear of the wheels, and suspended from the main frame by a chain or other flexible connection, for the purposes set forth.
10th, The folding joints, g g, or their equivalents, as a means of communicating motion to rake or reel arms, which are so supported as to move in harmony with a hinged platform, substantially as described.

73,620.—BUCKLE.—C. W. Martin, Mount Pleasant, Iowa.
I claim, 1st, The buckle constructed as described, whereby the trace is passed under the end bar, F, of the part, B, and over the covex side of the plate, H, under the notched bar, F, over the tongue, M, and beneath the bar K, as and for the purpose specified.
2d, The buckle constructed as described, consisting of the S-shaped frame, B, having the loop, G, and concavo-convex plate, H, and provided with the lugs, D, to which the curved frame, C, is pivoted, said frame having the cross bars, K L, and tongue, M, fitting into the notch, N, of the end bar, F, of the part, B, as herein shown and described.

73,621.—LUBRICATING CAR WHEELS.—Wm. W. Martin, Allegheny City, Pa.
I claim the reservoir, A, provided with projection, O, furnished with an opening, 3, for communicating between the reservoir, A, chamber, n, and opening, B, for the axle, the whole being constructed, arranged, and operating substantially as herein described and for the purpose set forth.

73,622.—BED BOTTOM.—Nathan Maxey, Plymouth, Ind.
I claim the slats, C C, provided with loops, D D, and collars, G G, and connected to the side rails and end rails by the springs, I I and a a, and staples, H and e, substantially as and for the purpose set forth.

73,623.—HARVESTER RAKE.—J. B. McCormick, St. Louis, Mo.
I claim, 1st, operating the pivoted rake head, H, by means of the fixed cam G, into the groove, t, of which the outer end or the rake arm, F, is fitted, in connection with the rods, j k, and the bent lever, I, all arranged to operate in the manner substantially as and for the purpose set forth.
2d, The hinged table, M, operated through the medium of the eccentric N, from the driving wheel, B, substantially as set forth.
3d, The combination of the rake, H, and hinged table, M, constructed and arranged for joint operation in the manner substantially as and for the purpose specified.

73,624.—GATE LATCH.—C. E. Merrifield, Indianapolis, Ind.
I claim, 1st, The catch, G, formed by a series of parallel flanges, in combination with a horizontally swinging latch, F, substantially as described.
2d, The combination and arrangement of the shank, C, arm, D, bell-crank formed lever, E, and latch, F, substantially as set forth.

73,625.—ANIMAL TRAP.—John H. Miller, Vernon, Ind.
I claim an animal trap constructed with a case, A, subdivided into compartments with the openings closed by doors, C C' K and L, which are actuated by means of the platforms, G and H, trigger, F, shaft, D, and arms, E and I, arranged to operate substantially as set forth.

73,626.—HARROW.—Nicholas B. Miller, Orion, Mich.
I claim the frame, A, teeth, D D, bars, B B, with wheels, C C, and wheel, E, when constructed, combined, and arranged as and for the purposes specified.

73,627.—PAINT COMPOUND.—John D. Mills, Dayton, O.
I claim the composition of the above-named ingredients as a paint, and to be applied as I apply them, by grinding, bolting, oiling, and painter's brush.

73,628.—FLOUR SCOOP AND SIFTER.—Rufus S. Mitchell, Elizabeth, Ind.
I claim a flour scoop, consisting of the sides, A, having shoulders, a, lip, D, sieve, B, wooden back, C, beater, E, and spring, F, all constructed, arranged, and operating as and for the purpose set forth.

73,629.—CORN HARVESTER.—H. Molby, Davisburg, Mich.
I claim, 1st, In combination with the frame, A, provided with the rack, D, and cords, d d, and standards, a a, the hinged frame, C, rotary cutter, cord, s, and lever, T, arranged in the manner and for the purposes set forth.
2d, The revolving platform, K, with its bars, L L and R, for supporting the cornstalks, and operating as and for the purpose specified.
3d, The arrangement of the cutter wheel, O, with the revolving platform, K, and the reels, P and q, substantially as and for the purpose specified.

73,630.—CULINARY APPARATUS.—T. W. Moore, N. Y. city.
I claim, 1st, Providing the inner side of the channel, a, at the joints with holes or recesses, substantially as and for the purpose herein shown and described.
2d, The inclined channels, c, when arranged within the vessels, B and G, along their walls, for conducting the condensed steam back to the boiler, substantially as herein shown and described.
3d, The steam-way, D, when arranged as described, so as to convey the steam from the boiler into the upper vessels, B C, and to reconduct the condensed steam to the boiler, as set forth, the steam-way being either attached to the upper vessel, B C, or to the boiler, or both, as described.
4th, The perforated pipe, D, when arranged as set forth, in combination with the recessed or perforated flange of the channel, a, and with the inclined channel or channels, c, all made and operating substantially as and for the purpose herein shown and described.
5th, Making the bottoms of the vessels, B and C, inclined to one or more sides, so as to guide the liquids to a certain desired point or points, as set forth.
6th, The vessels, B C, having inclined bottoms, and provided with pipes, E, and steam pipes, D, in combination with a vessel, F, as and for the purpose described.
7th, The vessels, A B C, when provided with perforated channels, a, and steam pipes, D, and when otherwise made as described, in combination with the channal or channels, c, pipe or pipes, E, and vessel or vessels, F, all made and operating substantially as herein shown and described.

73,631.—MODE OF CONVERTING RECIPROCAL INTO ROTARY MOTION.—Duncan Morrison, Portland, Me.
I claim the weighted swinging arm, a, swinging on the pivot, b, and the two pawls, c d, one above and the other below the pivot, b, and operating upon the gears, e f, alternately, so as to impart to the shaft, g, a continuous revolving motion, as described, together with the standard, x, catch, w, rod and pulley, u t, all arranged and operating for the purposes set forth.

73,632.—TOP PROP FOR CARRIAGE.—John F. Mullen, New York city.
I claim the screw, f, constructed and applied substantially as and for the purpose described.

73,633.—BUCKLE.—Heimann Neumann, New York city.
I claim the arrangement of a notch or recess in the side bar, G, of a buckle frame, substantially as and for the purpose described.

73,634.—STEAM GENERATOR.—Augustus W. Newell, Bradford, Pa.
I claim the construction of an adjustable fire-box, as hereinbefore described, provided with suitable fastenings, C C, steam pipes, D, with expansion joints, E, and proper water pipes, F, arranged substantially as and for the purposes described.

73,635.—ARCADE RAILROAD.—Samuel B. B. Nowlan, New York city.
I claim the arcade road and railroad, constructed and arranged as described, consisting of the roadways, A B and C, the upper roadway supported by iron columns, D, and having gas and water tubes, a, and the second by masonry, through which the sewers, c d, and pneumatic dispatch, K, pass said roads provided with open spaces, F, for the admission of light, and having the stairways, E, substantially as herein shown and described, for the purpose specified.

73,636.—TIN-WARE SEAMING MACHINE.—H. J. Noyes, Ashtabula, Ohio.
I claim, 1st, The adjustable rotating-gage pressure-head, E, with the spring, F, and support, E'', constructed and operating substantially as specified.
2d, The inclined rotating pressure-head, B, when constructed substantially as shown, and operating on the seam of the ware in the manner stated.
3d, The rotating seaming-head, A, and slotted bearing, C', constructed and operating as described, in combination with the said pressure-head, B, and adjustable-gage pressure-head, E, as and for the purpose specified.

73,637.—DRY HOUSE FOR FRUIT, ETC.—L. A. Oellig, Martinsburg, Pa.
I claim a circular dry house, made in sections, of sheet iron, or other suitable material, with drawers, furnace, pipes, and slides, aranged substantially as described.

73,638.—MACHINE FOR FINISHING THE EDGE OF BOOT AND SHOE SOLES.—Charles W. Palmer, Lynn, Mass.
I claim, for the purpose of finishing the edges of detached soles, the machine constructed and operating substantially as described.

73,639.—AIR WHISTLE.—C. H. Parshall, Detroit, Mich.
I claim the combination of the pump, B, the air chamber, C, the cylinder, E, plunger, K, and whistle or horn, A, constructed and arranged to operate substantially as set forth.

73,640.—APPARATUS FOR TREATING CANE JUICE WITH SULPHUROUS ACID.—John E. Pattison, Thibodeaux, La.
I claim, 1st, A stationary cylinder, A, in combination with revolving troughs, E, one or more, or their equivalents, said troughs being contained within said cylinder, and employed to raise and drop the juice in order to bring it under the effective action of sulphurous acid, substantially as described.
2d, The projection or partition, F, arranged and employed in the manner and for the purpose set forth.
3d, The provision in the troughs, E, of the partitions, e', substantially as and for the purpose set forth.

73,641.—HARVESTER.—Henry W. Pell, Rome, N. Y.
I claim, 1st, The segmental strap or guide way, D, mounted on the tongue, A, in combination with the lever, G, substantially as set forth.
2d, The lever, G, in combination with the draught chain, I, connected to the frame, B, substantially as and for the purposes specified.

3d, Mounting the whiffletree bolt in line with the tongue, or nearly so, upon the center of a lever fulcrumed at one end, and at the other connected by a draught chain to the frame of the machine, substantially as described.

73,642.—HARVESTER.—Henry W. Pell, Rome, N. Y.

I claim, 1st, The longitudinal bar, C, connected at each end to the tongue, by swinging arms, B B', and carrying a stud or bolt, D, on which the doubletree and draught clevis are mounted, substantially as and for the purposes set forth.

2d, One or more pairs of swinging arms, B, supporting the draught clevis and whiffletree bolt, vertically and laterally, and permitting their free play longitudinally beneath the tongue.

73,643.—BARRELS AND CASKS FOR CONTAINING OILS, ETC.—Antonio Pelletier, Washington, D. C.

I claim, 1st, The composition, consisting of silicate of soda and red lead united, as a coating for oil barrels and similar vessels, as described.

2d, Also, as a new article of manufacture, an oil barrel or similar vessel, when coated with the composition herein described.

73,644.—GARDEN PLOW.—David Petticrew, Westville, Ohio.

I claim a garden plow, constructed with a single shovel, A, standard, B, handles, E, beam, C, and wheel, G, said parts being respectively constructed and arranged substantially as set forth.

73,645.—CONCRETE ROOFING.—Samuel B. Pierce, and Pembroke Pierce, Homer, N. Y.

We claim the mixture of the above-named ingredients, when used substantially as and for the purpose specified.

73,646.—CHRONOMETER ESCAPEMENT.—Albert H. Potter, Williamsburgh, N. Y.

I claim the pallets, B and B', rigidly attached to the arbor, K, in combination with the obtusely pointed toothed escape wheel, A A A, lever, C, fork, L, pin, Q, roller, R, and pallet, D, all constructed, arranged, and operating substantially as herein described and specified.

73,647.—MACHINE FOR CUTTING DYE WOOD.—Onsville E. Pray, Portsmouth, N. H.

I claim the drum, B, constructed as described, its radial arm, c, provided with chambers, d, in their outer ends for the reception of the adjustable cutters, C, and the periphery of said wheel, provided with transverse slots, dx, as herein described for the purpose specified.

73,648.—TOOL.—Andrew J. Prescott, Catawissa, Pa.

I claim, 1st, The cutter shaft, B, provided with the cutting projection, a, pivoted in a slot in the mandrel, through an elongated hole, and adjusted in one direction by means of the pivot screw, 2, substantially as herein set forth, for the purpose specified.

2d, The feed-nut, D, provided with a flaring mouth, in combination with the stop screw, I, mandrel, A, and the cutter shaft, B, constructed substantially as and used for the purpose set forth.

73,649.—CORN PLANTER.—William Rayhill, Pana, Ill.

I claim the bars, D D, wheel, C, with its cams, slide, F, and seed slides, G G, of the hoppers, arranged and used with the frames, A A', standard, J, bar, K, and lever, I, substantially as and for the purpose set forth.

73,650.—HORSE HAY FORK.—Elias Rhodes, Sr., Clyde, Ohio.

I claim the cross piece, or head, H, in combination with the bolt or slide, I, lever, J, spring, K, rod, D, and shaft, A, all constructed, combined, and arranged to operate in the manner set forth.

73,651.—HAMES FASTENER.—William A. Robinson, Grand Rapids, Mich.

I claim the combination of the grooved and ratchet bars, A and F, with the spring, d, and loose loop, E, said loose loop operating in connection with the shoulders, b and C, substantially as and for the purposes set forth.

73,652.—CANDLESTICK OR HOLDER.—S. J. Rockwood, Elsah, Ill.

I claim the conical or tapering-shaped socket or tube, D, for holding a candle, substantially as and for the purpose described.

73,653.—PULLEY AND BLOCK.—Samuel Roebuck, and John Roebuck, New York city.

We claim the block, A, when combined with the rollers, C and B, of which the latter is provided with concentric and eccentric grooves, substantially as and for the purpose herein shown and described.

73,654.—ROTARY BLOWER.—P. H. Roots, and F. M. Roots, Connersville, Ind.

We claim, 1st, The packing strips, g g, arranged substantially as herein shown and described, upon the interior surface of the case of a rotary blower, pump or engine, to render the same tight.

2d, The abutments, A B or A' B', in combination with an inclosing case, rendered tight by means of packing strips, substantially as and for the purpose set forth.

73,655.—SAFETY POCKET.—Abbott Q. Ross, Cleves, Ohio.

I claim the within-described pocket safe, composed of the arms, A A, provided with the slide, C, lock catch, d, teeth, e e, and blade, f, the whole combined and arranged as herein set forth.

73,656.—SUB AQUEOUS TUBE.—Thomas F. Rowland, Greenpoint, N. Y.

I claim the application to the exterior of a sub aqueous iron tube of blocks composed of cement, tile, or other suitable material, secured to the tube by tongues, and grooves, and bolts, in the manner substantially as herein shown and described.

73,657.—LIFTING JACK.—Elias Shopbell, Ashland, Ohio.

I claim the standard, A, provided with a tenon, a, and pivoted at A' to the lever B, the rack, C, passing through a slot in the lever, and pivoted at b to the standard, when arranged and combined as herein described, for the purpose set forth.

73,658.—ICE CREAM FREEZER.—F. G. Siemers, Winona, Minn.

I claim, 1st, An ice cream freezer, provided with vertically moving, concave scrapers, arranged to operate substantially as described and for the purpose set forth.

2d, The combination of the rotating case, B, and vertically moving concave scrapers, L, when constructed and arranged to operate substantially as described.

3d, The rotating case, B, provided with the socket, O, and the locking stud, d, constructed and arranged to operate as set forth.

73,659.—CHURN.—Isaac J. Siler, Arcanum, Ohio.

I claim the spiral arms, F, and their arrangement with reference to the two shafts, C C, forming a churn dasher, substantially as and for the purpose specified.

73,660.—BILLIARD TABLE CLOTH.—Darius Skidmore, Seneca Falls, N. Y.

I claim a new manufacture of billiard table cloth, consisting of cotton, linen, or other cloth, coated on the surface in the manner of preparing oil cloth, but with dead colors, substantially as and for the purpose described.

73,661.—HINGE.—John Sowle, Boston, Mass.

I claim slitting or dividing the pin or spindle, a, made of tempered steel or other metal, so that it will produce the required degree of friction within the hinge, substantially as and for the purpose set forth.

73,662.—FIRE GRATE.—Henry Speeler, Trenton, N. J.—Antedated Dec. 21, 1867.

I claim the within described grate bar, A, provided with the tube, B, bent as described, the upper portion of said bar and tube being perforated as specified, and used substantially as and for the purpose set forth.

73,663.—LAMP.—Charles F. Spencer, Rochester, N. Y.

I claim, 1st, So arranging and combining the parts of the burner that the chimney is located below the level of the spur wheel shaft, and in close contact with the lamp body, and made to enclose the said shaft, as herein set forth.

Also, the combination with the chimney of any suitable gear that will impart motion to the wick by simply turning the chimney, as herein set forth.

Also, the arrangement of the revolving cap, C, serving both as the support for the chimney and as the gear or actuating the wick, as herein set forth.

73,664.—LAMP.—Stephen Spoor, Phelps, N. Y.

I claim a shade, E, within the chimney, A, arranged and operating substantially as and for the purposes herein set forth.

73,665.—PUDDLING FURNACE.—Wm. Stevenson, Allegheny City, Pa.

I claim in combination with a puddling furnace, the heater, G, arranged substantially as and for the purposes described.

73,666.—LOCKING KNOB LATCH.—H. C. Storrs, N. York city.

I claim the combination of the locking bar, b, pivoted to the latch bolt, with the bolt, F, and latch bolt, B, substantially as shown and described.

73,667.—WASHING MACHINE.—B. F. Stover, Ladoga, Ind.

I claim the arms, I and J, and rods, a and b, and uprights, K, combined substantially as shown, with the roller, H, and bottom surfaces, F and G, all as set forth.

73,668.—WHEEL TIGHTENER.—Enoch Swain, Lewistown, Pa.

I claim the combination of the circumferential grooved tire, s, with the screws, C D, and spoke, constructed as described, for the purposes set forth.

73,669.—RULING MACHINE.—J. F. Tapley, Springfield, Mass.

I claim the combination with the drum, B, of two sets of adjustable cams, c c, etc., one set at one end of the drum operating the pen board, or bar, and the other set the stop gate, substantially as shown.

73,670.—ADJUSTABLE SPIRIT LEVEL.—Wm. J, Tate. New Haven, Conn.

I claim, 1st, The adjustable spirit level, consisting of the box, B, provided with the perforated projections, a, through which the screw bolts, b, surrounded by the springs, d, pass, and the adjusting nuts, c, working in the recesses of the case, A, as herein described, for the purpose specified.

2d, The combination of the adjusting nuts, c, and springs, d, with the perforated flanges, a, of the box, D, and the screw bolts, b, as herein described, for the purpose specified.

73,671.—DRAWER TRUSS.—Zalmon Taylor. New York city.

I claim the strap, C, or its equivalent (when the pad is arranged therein substantially as and for the purpose set forth), whether the same is elastic or non-elastic.

73,672.—GAGE COCK FOR BOILERS.—Wm. G. Thomas, Centralia, Pa.

I claim the combination of the screw, E, with the valves, D and H, and parts, B and C, substantially as shown and described.

73,673.—KNIFE CLEANER.—Ira F. Thompson, Providence, R. I.

I claim, 1st, The knife cleaner formed of the rubbers, f introduced within the box, a, and provided with the pins or screws, g, as and for the purposes set forth.

2d, Also the elastic septum, c, fitted as specified, in combination with the said rubbers, f, box, a, and pins or screws, g, as and for the purposes specified.

73,674.—PAPER CUTTER.—Theo. R. Timby, Saratoga, N. Y.

I claim, 1st, The paper cutter so constructed that when the knife is thrust out its cutting edge will form an acute angle with the edge of the case.

2d, The slot, F, adapted and employed to guide the paper to the edge of the knife, substantially as set forth.

73,675.—HOOF EXPANDER.—John Tipton, Malaga, Ohio.

I claim the instrument above described, when constructed substantially as and for the purpose specified.

73,676.—FEEDING APPARATUS FOR FLOCKING MACHINES.—Henry Turner, New York city.

I claim, 1st, The automatic feeding apparatus for flocking machines, consisting of the box, A, provided with stirrers or agitators, m, in combination with the apron, E, when the same is provided with cups, f f, and in combination with the plungers, J and K, and hopper, F, all made and operating substantially as herein shown and described.

2d, The plungers, J K, when made of different lengths, and when attached to cranks that project from the rock shaft at different angles, substantially as and for the purpose herein shown and described.

73,677.—CORKSCREW.—George Twigg, Birmingham, England.

I claim, 1st, The handle, c, in combination with the shank, a, swivel, f, and nut, d, as shown in fig. 1, substantially as described, for the purpose specified.

2d, The handle, c, in combination with the set screw, i, and groove, k, as shown in fig. 6, substantially as described, for the purpose specified.

3d, The handle, c', in combination with the screw, a, pin, l, and clutch piece, m, as shown in fig. 8, substantially as described, for the purpose specified.

4th, The rubber ring or band, v', fig. 3, in combination with any bell or barrel, b, fig. 1, substantially as shown and described and for purposes set forth.

4th, The split barrel, w, fig. 14, in combination with the ring or ferrule, r, substantially as shown and described and for the purposes set forth.

73,678.—BUCKET FOR DREDGING MACHINES.—Thos. Walsh and Augustin Walsh, New York city.

We claim the arrangement of the jointed levers, c, shaft, b, guide rods, h, shaft, d, chain, e, and buckets, a a', when the shaft, d, is adapted to be drawn down to the shaft, b, by the chain, e, for opening the buckets, the guide rods h, passing through the shaft, d, as herein shown and described.

73,679.—RAILROAD RAIL CLAMP OR CHAIR.—John E. Watkins, Smithfield, Ky.

I claim, 1st, The combination of the flanged clamp, C, brace key, K, and tightening key, F, when secured in position upon the rails by means of the spikes passing through the flange, C1, the key, K, and the base plate, C, upon the outside of the rail, and by the wedge-shaped spikes, A, passing through the flange, C3, key, F, and base plate, C2, upon the inside of the rail, as herein shown and described for the purpose specified.

2d, The combination of the flanged or dovetailed clamp, C, brace key, K, tightening key F, and wedge-shaped spikes A, with each other, substantially as herein shown and described and for the purpose set forth.

73,680.—FASTENING METALLIC COLLARS TO BOTTLES.—Edward Wattis, Jr., Philadelphia, Pa.

I claim, 1st, Fastening the collars to the necks of bottles by spinning or expanding the metal beneath the projecting lips or flanges of bottles when the necks are not grooved, or by spinning the same into a groove or grooves in the neck, substantially as described.

2d, Preventing the metallic collars of bottles from turning round by forming one or more flat sides on the lips or flanges, and fitting the collars thereto, substantially as described.

73,681.—CAR COUPLING.—William Weiler, Washington, N. J.

I claim the catch, f, and lever, h, arranged on one of the bumpers of a railway car, for supporting and releasing the link, substantially as set forth.

73,682.—HYDRO-CARBON BURNER.—James Haley White, San Francisco, Cal.

I claim, 1st, The combined use of the products of decomposed steam and wet or ordinary steam, each being introduced separately, and in such proportions as may be required, into a gas holder or mixer, for the more perfect combustion of the vapor of hydro-carbon oils, substantially as described.

2d, The superheating and decomposing apparatus, consisting of the cylinders, J J', and I, and the gas or supply tube within the mixer or holder, D, substantially as described.

3d, The horizontal cylinders or mixers, D D, having openings or burners entirely around their circumference, on the under side as well as the others, which causes them to be more effectually heated, and also prevents their filling or being clogged by a residuum.

4th, The combination and arrangement of the interior perforated tubes or pipes, F g, and d, with the exterior cylinders, or mixers, D D, substantially in the manner and for the purposes set forth.

5th, In combination with the above claimed apparatus, the perforated air tube, L, for supplying hot air to render the combustion of the vapor and gases issuing from the mixers more perfect.

73,683.—COTTON PRESS.—Paul Williams, Winona, Miss.

I claim, 1st, Combining the lever beams, A, with the screw, H, follower, J, and thrust beam, M, to form a cotton press, substantially as shown and described.

2d, The partially revolving tap, I, combined with its recess, m, and the screw, H, and lever beam, A, of a cotton press, substantially as shown and described, and for the purpose specified.

73,684.—WAGON FOR UNLOADING COAL.—J. H. Wood, Trenton, N. J.

I claim, 1st, The attachment of a funnel shaped or incline mouth, D, of any material, to the rear or side of a cart or wagon, as herein described, and for the purpose set forth.

Also, the valve or gate, E, at the end of the mouth, D, or in the chute or tube, G, when combined, as herein described, and for the purpose set forth.

Also, the hinged or sliding chutes or tubes, H, when attached to an open mouth, or to the end or side of a cart or wagon, for the purpose herein set forth.

73,685.—PLOW.—Alexander Wright, Allegheny City, Pa.

I claim a plow, constructed, arranged and operating substantially as herein described, and for the purpose set forth.

73,686.—WAGON CLIP.—George S. Zeigenfuss, Doylestown, Pa. Antedated Jan. 16, 1868.

I claim the segmental head, d, having a screw, e, which passes diagonally through the curved projection, a, on the end of the thill iron, A, for the purpose of securing the looped thill iron, B, all constructed and used as specified.

REISSUES.

2,847.—HAND STAMP.—E. D. Chamberlain, Westfield, N. J., and Charles H. Brown, New York city, assignees of D. H. Chamberlain.

We claim, 1st, The combination, with a die in a hand stamp, of type wheels of different diameters, substantially as and for the purpose specified.

2d, The die holder, F, constructed and combined with the lever end, c', substantially as and for the purpose shown and described.

3d, Making the type wheels, a b c, of different diameter, rotating upon separate and distinct axes, a' b' c', substantially as and for the purpose shown and described.

4th, The combination of the inking ribbon with the type wheels, substantially as herein described, so as to present a double fold of the ribbon under the type wheels, all as set forth.

PENDING APPLICATIONS FOR REISSUES.

Application has been made to the Commissioner of Patents for the Reissue of the following Patents, with new claims as subjoined. Parties who desire to oppose the grant of any of these reissues should immediately address MUNN & Co., *37 Park Row, N. Y.*

58,268.—GATE FASTENING.—Richmond A. Leeds, Stamford, Conn. Dated Sept. 25th, 1866. Application for reissue received and filed Jan. 8th, 1868.

I claim, 1st, The arrangement of a catch for gates, composed of one or more vertically moving plates or bolts, horizontally across the face of the front stile of the gate, when used in combination with a lug or projecting piece secured to the fence post, substantially as and for the purpose herein specified.

2d, A latch for gates consisting of two eccentrically hung bolts or plates, D, provided with handles or arms, E, and arranged within an enclosing case, F, in combination with a lug or projecting piece, H, substantially as herein specified.

36,673.—STUMP EXTRACTOR.—Samuel B. Smith, E. J. Genet, and Samuel M. Longley, New York city, and Andrew C. Getty, Hudson, N. Y., assignees of Solomon W. Ruggles, Fitchburg, Mass. Dated Oct. 14th, 1862. Application for reissue received and filed, Jan. 8th, 1868.

What is claimed as the invention of Solomon W. Ruggles, is the combined use therein of power, multiplying toothed wheels, wrapping connected differential drums, or pulleys, and a sheave block, or blocks, substantially in the manner and for the respective purposes herein set forth.

25,823.—LIGHTNING ROD.—William Hall, Dubuque, Iowa. Dated Oct. 13th, 1859. Application for reissue received and filed Jan. 11th, 1868.

I claim as an article of manufacture a cylindrical lightning rod made of sheet copper in sections, when the sheet is made to extend beyond a single cylinder, leaving the edges open or unsoldered, when the same is constructed substantially as and for the purposes set forth.

55,581.—QUARTZ CRUSHER.—John Mabbs, Isle Royal Mines, Houghton, Mich. Dated July 24th, 1866. Application for reissue received and filed Jan. 11th, 1868.

I claim, 1st, The revolving feed table, J, in combination with a quartz crusher or pulverizer, whether connected by a sleeve to the main shaft, or revolved on a separate shaft, substantially as described.

2d, The plow or scraper, L, in combination with the feed table, J, when attached to the axle of the muller or fixed stationary, substantially as described.

3d, The tank, O, in combination with the plow, L, feed table, J, and mullers, F, constructed and operating substantially as and for the purpose described.

65,680.—CEMENT FOR FIXING DOOR KNOBS, ETC.—Patrick Kennedy, New York city. Dated June 11th, 1867. Application for reissue received and filed, Jan. 11th, 1868.

I claim the application of a cement which is composed of sand and alum, with or without the addition of copperas, for fastening door or furniture knob-tops to their metal or other shanks, as set forth.

72,209.—LAMP BURNER.—W. H. Love, R. H. Childs, and W. H. Childs (assignees by mesne assignments of John C. Love), Philadelphia, Pa. Dated Dec. 17th, 1867. Application for reissue received and filed, Jan. 15th, 1868.

We claim as the invention of the said J. C. Love, and desire to secure by Letters Patent,

1st, A flat slotted plate, d, arranged above the dome, B, of a lamp burner as and for the purpose described.

2d, The plate, d, with its flange, i, and opening, n, in combination with the casing, A, of a lamp burner, when the edges of the said casing are parallel to the upper edges of the wick tube, as set forth.

3d, A burner having a ledge, t, for the support of the chimney, when the said ledge is level with or above the top of the wick tube, for the purpose specified.

☞ NOTE.—*The above claims for Reissue are now pending before the Patent Office and will not be officially passed upon until the expiration of 30 days from the date of filing the application. All persons who desire to oppose the grant of any of these claims should make immediate application.* MUNN & CO., *Solicitors of Patents, 37 Park Row, N. Y.*

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The remaining ten miles will be finished as soon as the weather permits the road-bed to be sufficiently packed to receive the rails. The work continues to be pushed forward in the rock cuttings on the western slope with unabated energy, and a much larger force will be employed during the current year than ever before. The prospect that the whole

GRAND LINE TO THE PACIFIC

WILL BE COMPLETED IN 1870,

was never better.

The means provided for the construction of this Great National Work are ample. The United States grants its Six Per Cent Bonds at the rate of from $16,000 to $48,000 per mile, for which it takes a *second lien* as security, and receives payment to a large if not to the full extent of its claim in services. These Bonds are issued as each twenty mile section is finished, and after it has been examined by United States Commissioners and pronounced to be in all respects a first-class road, thoroughly supplied with depots, repair shops, stations, and all the necessary rolling stock and other equipments.

The United States also makes a donation of 12,800 acres of land to the mile, which will be a source of large revenue to the Company. Much of this land in the Platte Valley is among the most fertile in the world, and other large portions are covered with heavy pine forests and abound in coal of the best quality.

The Company is also authorized to issue its own First Mortgage Bonds to an amount equal to the issue of the Government and no more. Hon. E. D. Morgan and Hon. Oakes Ames are Trustees for the Bondholders, and deliver the Bonds to the Company only as the work progresses, so that they always represent an actual and productive value.

The authorized capital of the Company is One Hundred Million Dollars, of which over five millions have been paid in upon the work already done.

EARNINGS OF THE COMPANY.

At present, the profits of the Company are derived only from its local traffic, but this is already much more than sufficient to pay the interest on all the Bonds the Company can issue, if not another mile were built. It is not doubted that when the road is completed the through traffic of the only line connecting the Atlantic and Pacific States will be large beyond precedent, and, as there will be no competition, it can always be done at profitable rates.

It will be noticed that the Union Pacific Railroad is, in fact, a *Government Work*, built under the supervision of Government officers, and, to a large extent, with Government money, and that its bonds are issued under Government direction. It is believed that no similar security is so carefully guarded, and certainly no other is based upon a larger or more valuable property. As the Company's

FIRST MORTGAGE BONDS

are offered for the present at **90 CENTS ON THE DOLLAR**, they are the cheapest security in the market, being more than 15 per cent lower than U. S. Stocks. They pay

SIX PER CENT IN GOLD,

or over **NINE PER CENT** upon the investment, and have thirty years to run before maturity. Subscriptions will be received in New York at the Company's Office, No. 20 Nassau street, and by

CONTINENTAL NATIONAL BANK, No. 7 Nassau st.,
CLARK, DODGE & CO., Bankers, No. 51 Wall st.
JOHN J. CISCO & SON, Bankers, No. 33 Wall st.,

and by the Company's advertised Agents throughout the United States. Remittances should be made in drafts or other funds par in New York, and the bonds will be sent free of charge by return express. Parties subscribing through local agents will look to them for their safe delivery.

A New Pamphlet and Map, showing the Progress of the Work, Resources for Construction, and Value of Bonds, may be obtained at the Company's Offices, or of its advertised Agents, or will be sent free on application.

JOHN J. CISCO, Treasurer.

New York, Jan. 8th, 1868. 5 tf

UNRIVALLED PORTABLE FRENCH Burr Stone Mills of all sizes for grinding various kinds of grain, Coffee, Spices, Plaster, and Paint. Address 4 4* S. N. FRENTISS & CO., 249 West 28th st., N. Y.

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STEAM ENGINES and BOILERS, Steam Pumps, Engine Lathes, Planers, Shaping Machines, Brass Finisher's Tools, and Machinists' Tools of all kinds. Also, Grist Mills, Cotton Gins, Saw Mills, Wheel and Hub Machines, Shingle Machines, and Wood Working Machinery of all kinds at JOHN F. C. RIDER'S, 47 Dey st., New York. Manufactory at South Newmarket, N. H. 1 16

ASHCROFT'S LOW WATER DETECTor will insure your Boiler against explosion. JOHN ASHCROFT, 50 John st., New York. 1 7*

PATENT SHINGLE, STAVE, AND Barrel Machinery, Comprising Shingle Mills, Heading Mills, Stave Cutters, Stave Jointers, Shingle and Heading Jointers, Heading Rounders and Planers, Equalizing and Cut-off Saws. Send for Illustrated List. FULLER & FORD, 5 tf] and 284 Madison street, Chicago, Ill

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SCHLENKER'S PATENT BOLT CUTting Machine.—The Best in Market.—Two Sizes, cutting bolts from ⅜ to 3 inches. Up to 2½ inches, once passing over the iron is sufficient for cutting a perfect thread, either V, square, or wood screw. Heads to fit the ordinary lathe or other bolt cutting machines, furnished to order. Also, nut taps furnished to order. Send for circular. Address R. L. HOWARD, Buffalo, N. Y. 1 6*

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BARREL MACHINERY.—Greenwood's Patent Stave and Heading Machinery, for Tight and Slack Work. Geddis's Patent Barrel Heaters. G. L. Benton's Patent Convex Emery Wheels, for Gumming and Sharpening Saws. JOHN GREENWOOD, Rochester Barrel Machine Works Rochester, N. Y. 1 11*tf

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PORTABLE STEAM ENGINES, COMbining the maximum of efficiency, durability, and economy with the minimum of weight and price. They are widely and favorably known, more than 800 being in use. All warranted satisfactory or no sale. Descriptive circulars sent on application. Address J. C. HOADLEY & CO., Lawrence, Mass.

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THE

HARRISON BOILER

HAS ABSOLUTE SAFETY FROM

Destructive Explosion.

CERTIFICATES:

Fairhaven, Vt., June 8th, 1867.

Joseph Harrison, Jr.,

Dear Sir:—We received your inquiries, asking how we liked your Boiler, etc. In reply, will say that we are much pleased with it, and as far as our experience goes, we believe it is all you recommend, and think we make a saving of at least one-third of the fuel over our old boiler, while it does our work much better. As to its safety, we made a good test some three months ago. The fireman went off duty, leaving the water low, and the next man came on late, seeing the water low and steam also down, he thought he would get steam up first and then put on the pump; but seeing the steam did not come up, we looked into the furnace and saw it was at a white heat. As it was very hot we let it cool off and then put on the pump, but the water leaked out as fast as it came in. We then screwed up the nuts on the bolts, and found the boiler as good as ever. It has been at work ever since, and works just as well as it did when first put in. Respectfully yours. T. & W. MILLER.

Peru, Ill., June. 25, 1867.

Joseph Harrison, Jr., Esq.,

Dear Sir:—Your favor of the 20th ult., asking my opinion of the 50 H. P. Boiler I bought of you, came safely to hand.

Allow me to say that I am very much pleased with the Boiler. I (who never saw a boiler set) superintended its erection, and a young, smart fellow, not 21 years of age, coupled it to the engine, and it has now its complement of water, and does not leak a drop. We had 70 lbs. of steam in 30 minutes, and the furnace had no fire in it for two weeks.

Allow me also to express my great admiration of the excellence of the workmanship in your Boiler and Fittings, and the very reasonable prices at which they are furnished. Yours truly. JAMES BARTON.

Portland, Me., July 19, 1867.

Joseph Harrison, Jr., Esq.,

Dear Sir:—After several months' constant use of the Harrison Boiler, it gives us great pleasure to state that we consider its good qualities cannot be equalled by any other Boiler we have ever seen.

From some severe tests, both before and after setting in operation, we are confident as to its entire safety from explosion, and we can cordially endorse all claims as to its facility for generating steam, and also the readiness with which it can be cleaned inside and out.

In economy of fuel it exceeds our most sanguine expectations, and we could make some statements thereto that might appear incredible where we were not known. We therefore prefer, and should take pleasure in exhibiting to parties interested a practical illustration of its superiority in this and other respects. Yours truly,

LEATHE & GORE,
Manufacturers of Steam Refined Soaps.

Camden, N. J., Dec. 20, 1867.

Mr. Joseph Harrison, Jr.,

Dear Sir:—In reply to yours, under date of Dec. 20, 1867, regarding the Harrison Boiler, we would say that, having used one for a year, we feel justified in saying that, for economy of fuel, safety, quick generation of steam, and other general advantages, with far less liability to become out of order, obtained by the use of the Harrison Boiler, we consider it a very profitable investment.

Very respectfully yours,
GARRISON, GILLINGHAM & CO.

Lebanon Furnace, Dec. 21, 1867.

Mr. Joseph Harrison, Jr.,

Dear Sir:—It gives me great pleasure to state that the boiler you furnished me for my repair shop has given me entire satisfaction. I can raise steam in a shorter time than in any boiler I have ever used. It has not leaked a drop since it was put up, and has not cost a cent for repairs. I feel that it is a very safe boiler, as I do not see how a dangerous explosion can take place. I believe it to be an economical boiler, though I have made no experiments with it as to the amount of coal consumed in work done. Yours truly,

G. DAWSON COLEMAN.

Office of Nashua Lock Company,
Nashua, N. H., Dec. 23, 1867.

Joseph Harrison, Jr.,

Dear Sir:—We have had one of your Harrison Boilers in our establishment since March last, and can say that for safety, nothing can surpass it; as you know, one section was dropped into the hold of the vessel, in shipping it, which has caused two of the Balls to break, both times when our steam was at 80 lbs., and no damage done. As to the economy of the Boiler, we cannot say too much in its favor, and as to its generating of steam, nothing, we think, was ever made to surpass it. Our boiler is 50-horse. we use 22 of it for our engine, and from the top of the boiler a 1¼ pipe starts, and goes through 1800 feet of same size pipe into a Japan Oven, and the steam passing continually through it, and it never lacks for steam. We cannot speak too highly of all its merits. Yours truly,

F. O. MUNROE, Sup't N. L. Co.

New Britain, Conn., Dec. 24, 1867.

Jos. Harrison, Jr., Esq.,

Dear Sir:—Your letter was duly received; in reply will say we are very much pleased with the boiler we had of you last summer. We find it to be all you claim for it. We are convinced of its entire safety; and as for economy, we want no better proof than our engineer asking us for an increase of his wages, as he said he only used about one half of the fuel required for the other kind of boilers, to keep up the same amount of steam. We know of no other boiler by which steam can be got up as quickly with as little attention, and what we now know of the Harrison Boiler, we should prefer it to any other we have ever seen. Very respectfully yours,

JUDD & BLAKESLEE.

Office of Van Brunt & Co., Manufacturers of Agricultural Implements, Horicon, Wis., Dec. 25, 1867.

Jos. Harrison, Jr.,

Dear Sir:—Yours of the 20th inst., making inquiries as to the working of the Harrison Boiler, had of you, we have to say, that we have been well pleased with its power to generate steam, exceeding any other boiler we have ever used in economy of fuel and facilities of getting up steam. Yours, respectfully,

VAN BRUNT & CO.

Black Diamond Steel Works, Park, Brother & Co.,
Pittsburgh, Dec. 26, 1867.

Joseph Harrison, Jr.,

Dear Sir:—For some five months we have used your Boilers over two of our heating furnaces, using the steam from them to operate one of our three-ton hammers. The boilers will make more steam than we require, and consequently we have our heating furnaces provided with spare or additional stacks, so arranged that when the heat from the furnaces gives us more steam than wanted, we close the dampers of the furnaces on the rear stacks, and open those belonging to the forward stacks, thus preventing the waste heat from the furnaces from passing under and along the boilers. We believe your boilers are less liable to accidents than any other kind of steam generator now in use, and we would not substitute any other description of steam boiler in place of them, for the following reasons, viz:—We believe them to be the safest, most economical and durable boilers now offered to the public. Since the first day we fired up our heating furnaces, over which we have your boilers placed, we have not experienced the least trouble, and do not expect to have any trouble in the future. We therefore cheerfully recommend your boilers to the public. Respectfully yours,

PARK, BROTHER, & CO.

Almonte, C. W., Dec. 26, 1867.

Joseph Harrison, Jr.,

Dear Sir:—In reply to yours of the 20th, it gives us great pleasure to be able to bear testimony in favor of your Boiler on all points on which you ask our opinion—safety, economy in fuel, and general merit. We have now two of 75 horse-power each, and are very much pleased, indeed, that we did not put in tubulars, as we had at first intended. In reply to a letter of inquiry from another Canadian firm, we wrote this morning:—"A most comfortable thing it is to be able to stand in front of a boiler and have no feeling of danger." Such is our experience, and we have no hesitation in recommending your Boiler to all in want of steam power. Yours truly,

B. & W. ROSAMOND & CO.,
Manufacturers of Woolens.

Alexandria, Va., Dec. 27, 1867.

J. Harrison, Jr., Esq.,

Sir:—We have had your Boiler in use about eight mos., and find that in economy of fuel, safety, and superior finish, it is all that was promised, and we are entirely satisfied with it. Very respectfully yours, etc.

J. G. VERPLANCK & CO.

Philadelphia, Dec. 27, 1867.

Mr. Joseph Harrison, Jr.,

Dear Sir:—In answer to yours of 20th instant, it gives us pleasure to state we are well satisfied with our Harrison Boiler deeming it economical in fuel, easily managed, and have confidence in its exemption from destructive explosion. During the year it has been in use, our works have not been delayed one hour, nor have we discovered the least imperfection, either from leakage or any other cause. Having taken the precaution to secure sufficient capacity, we have ample steam and considerable to spare, burning a slow, moderate fire, with the steam damper (set at 45 lbs.,) closed most of the time.

Very respectfully, your friends,
HANCK, GRIFFITH & CO.

Galena Foundery, Galena, Ill., Jan. 6, 1868.

Joseph Harrison, Jr., Esq.,

Dear Sir:—It is with pleasure that I bear testimony to the merits of the Harrison Boiler. I have had your Boiler in use about one year, and it has given entire satisfaction. It has had the most severe tests, which would have ruined any ordinary boiler. It is very economical, and takes very little fuel to raise steam. We have raised steam to 40 lbs. in eight minutes, on Monday morning when the water was cold. In thirty years' experience with boilers in England and America, I have not found one to compare with the Harrison Boiler for safety and economy.

Yours truly. JOHN WESTWICK.

Phœnix Steam Mills,
Philadelphia, Jan. 10, 1868.

Jos. Harrison, Jr., Esq.,

Dear Sir:—I am in receipt of your favor asking my opinion of the Harrison Boilers, put up in the place of the boilers that exploded with me in January last, and which have been in constant use ever since. I find that they save me at least 25 per cent in fuel, are less liable to leak, and I consider them entirely safe, and prefer them in every respect to the old-fashioned boiler.

Yours, very respectfully,
JAMES M. PATTON,
Brown street Wharf.

☞ Apply to J. B. HYDE, Agent,
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THE HARRISON BOILER WORKS,
6 1 os] Gray's Ferry Road, Philadelphia, Pa.

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On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

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1868.

Scientific American.

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Vol. XVIII.—No. 7. [NEW SERIES.]

NEW YORK, FEBRUARY 15, 1868.

$3 per Annum [IN ADVANCE.]

Improvement in Bakers' Rotary Ovens.

Fig. 1 of the engravings is a front elevation and Fig. 2 a vertical section of an oven for baking bread, crackers, pastry, and other articles, patented through the Scientific American Patent Agency, Dec. 24, 1867. The hearth, A, Fig. 2, is of two parts; one, the base or foundation, being a cog wheel supported in the center by a suitable pivot, B, and on the circumference by small rollers or wheels, C, traversing a circular track. The other portion of the hearth is the floor of tiles, or other suitable materials, laid on the arms and rim of the wheel. The courses, which are laid, as seen in the engraving, Fig. 2, on radial lines, are jointed so that the hearth is perfectly tight. The under side of the tiles is corrugated, so that the wheel arms will offer no impediment to the free circulation of the heat.

The crown and sides of the oven are of sheet iron, having four bars of iron running crossways, to which are attached four small wheels, so that the hearth may be turned while the crown remains stationary. The hearth is rotated by means of a crank and pinion, D. The oven stands on a foundation of brick with double walls, the spaces, E, being filled with sand. Between the oven proper and the inner brick wall is a space for the heated air entirely surrounding the oven. Outside of this and between the two walls is another space, F, which is a space for cold air. Its connection with the external atmosphere is seen in the two openings in the sides of the flaring jambs of the recessed door, G, Fig. 1. In the same figure the apertures, H, with sliding doors are for removing ashes, etc., that may have lodged under the hearth. I is the damper of the chimney, seen also in Fig. 2. J is a small boiler set over the furnace, K, for generating steam, which, by the pipe, L—both figures—may be discharged into the oven as needed, for moistening the bread. The boiler has a faucet by which hot water, so frequently required in a bakery, may be obtained. The doorway, G, is closed by inner and outer sliding doors, as seen by the dotted lines. M is the handle of a pin which may be pushed in or pulled out to unite or disconnect the oven side and the hearth, so that the latter may be turned and the former remain stationary when the oven is to be filled, which is always done by commencing at the center of the hearth in front of the door. The cold air space is intended for retaining and regulating the heat of the inner hot air space. It will be seen that this outer covering of cold air prevents the radiation and escape of the heat. The oven may be revolved by power and kept moving continuously, or it may be turned occasionally by hand to equalize the heat as may be desired. Practical bakers will readily see its advantages. It can be adapted for heating by means of petroleum or other hydro-carbons.

For further information address J. A. Kinkele, 751 First avenue, New York city.

Fig. 1.

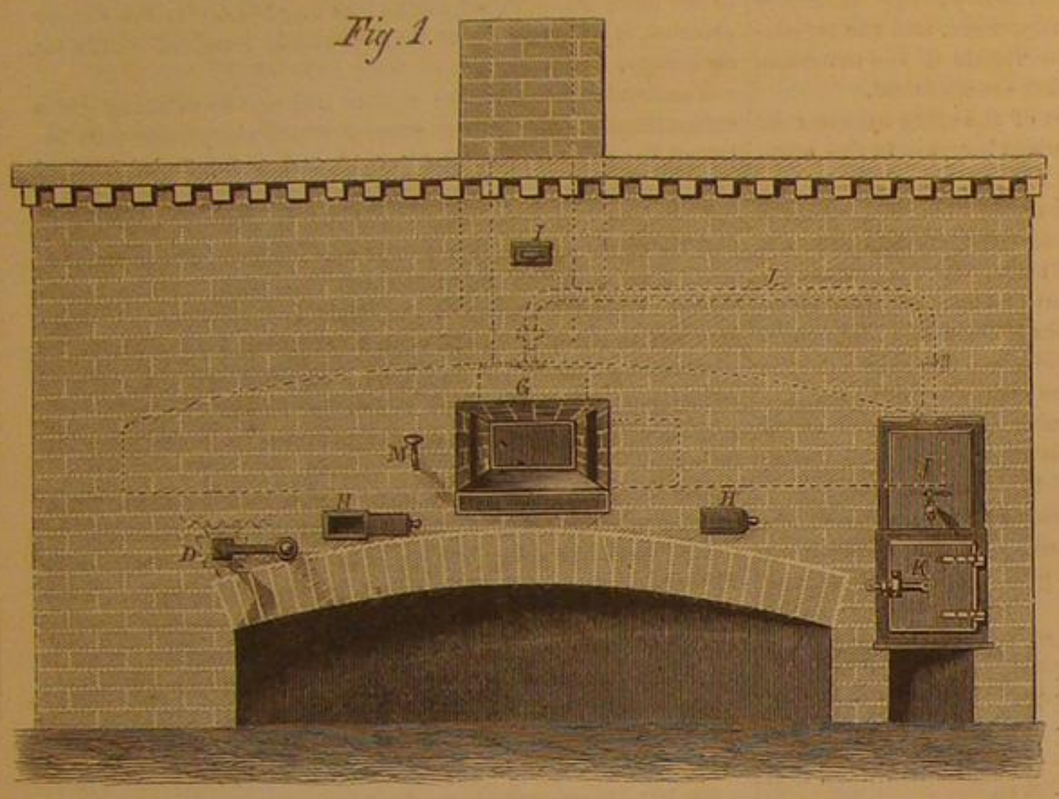
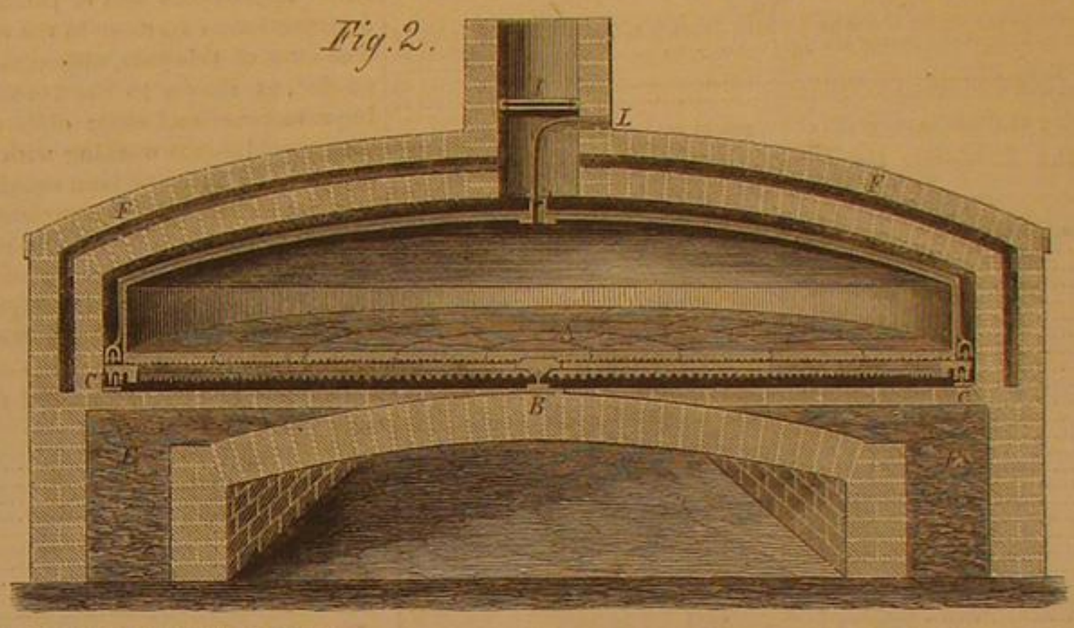


Fig. 2.



KINKELE'S PATENT REVOLVING OVEN.

Improvement in Street Car Signals.

Even the citizen of New York, or of any other large place where much of the travel depends on street cars, finds some difficulty in designating an approaching car, either by the colored lantern shown at night, or the letters and figures presented by day. The latter are either on the dasher, hid by the horses, or on the side of the car, not to be seen until the car is abreast the waiting passenger, or has passed him. The distinction of different colored lanterns is difficult to learn and not easy to understand. These annoyances to the habitué become serious troubles to the stranger. To obviate these difficulties is the object of the simple device illustrated in the engravings, and it is not only a convenience to the public, but an advantage pecuniarily to the railroad companies.

Fig. 1 is a perspective view of a car with this attachment and Fig. 2 a view of the lantern. The lantern is secured to the roof of the car by a metallic flange conforming to the shape of the roof, and placed on the left hand side of the car. The curved flange for ordinary cars is seen in Fig. 2 at A. All below that flange is inside the car. This portion comprises the light and reflector, which illuminate the interior of the car brightly, being about eight by sixteen inches, much larger than the lights ordinarily used; and the signal portion projecting above the roof of the car, fully as large. The lower portion—that below the roof flange—is hinged to allow removing and cleaning the lamp and reflector. This portion is of glass in a proper frame, and the front and rear sides of the upper portion are externally of sheet metal, painted black or some dark color, inside of which are plates of ground glass. The roof of the lantern is also of metal with passages for the escape of the gases of combustion. Through the metallic sides are cut the letters or figures, having a border painted light, as seen distinctly in Fig. 2, and serving to make them marked during daylight. In the night the light, passing through the ground glass, will throw the characters out fully as clear and bold.

This lantern and signal is cheaply made, and can be easily attached to any car, whether new or old. It is evident that the perforated or lettered plates can be removed at will and others substituted, so that a car may be transferred from one route to another, as desired. The utility as well as the elegance of this arrangement should attract the attention of our street railway managers, as the light necessary for the signal subserves also the purpose of illumination to the interior of the car.

Patented through the Scientific American Patent Agency Dec. 17, 1867, by L. V. Badger, whom address for further information at Chicago, Ill.

Fig 1

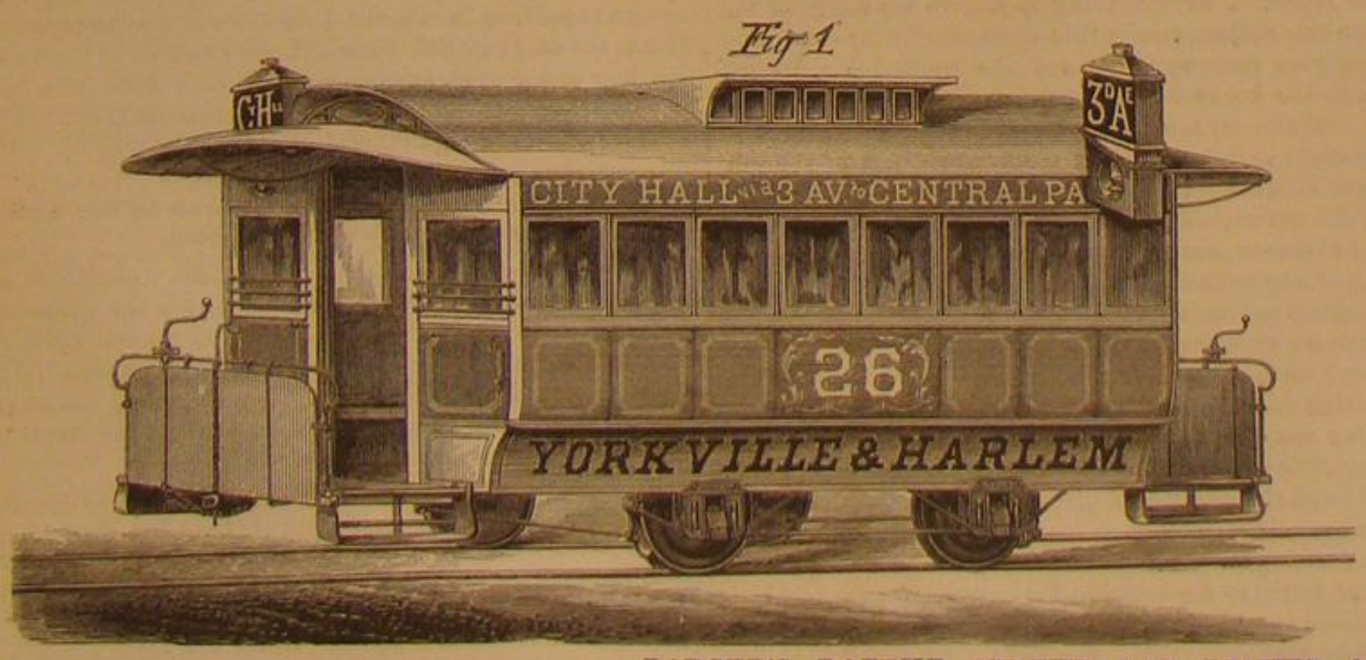


Fig. 2



BADGER'S PATENT STREET CAR LIGHTS AND SIGNALS.

TEST FOR FIXED AND VOLATILE OILS.—Several years ago M. Rousseau, of France, discovered that olive oil, the feeblest conductor of electricity, when mixed with one hundredth of its volume of oil of poppies, increased the number of vibrations of a magnetic needle in a given time, when the same was made to form parts of an electric current. Mr. Warner, an English experimenter, has enlarged the field thus opened, and shows that difference of resistance will show the purity of oils. He gives a table of resistances of volatile and fixed oils, and as turpentine and alcohol are the principal adulterants of volatile oils, and as the former has an immense resistance and that of the latter is enormously lower than any of them, the variation in the deflector compared with that given in the tables will detect, and show the extent of adulteration

PATENT OFFICE REPORT.

UNITED STATES PATENT OFFICE, January, 1868.

I have the honor to submit the following report of the business of this office during the year 1867.

The receipts and expenditures of the office for the year, and the condition of the patent fund at its close, are shown by the following statements:

No. 1.

Number of applications for patents during the year	21,276
Number of patents issued, including reissues and designs	13,015
Number of caveats filed during the year	3,597
Number of applications for extension of patents	106
Number of patents extended	93
Number of patents expired	1,005
Of the patents granted there were to	12,651
Citizens of the United States	191
Subjects of Great Britain	80
Subjects of French Empire	93
Subjects of other foreign governments	

No. 2.

Statement of money received during the year, namely:		
On applications for patents, reissues, appeals, etc.	$597,005 75	
For copies and for recording assignments	49,576 17	
Total		$646,581 92

No. 3.

Statement of expenditures from the patent fund:		
For salaries (including the extra 20 per cent)	$156,546 50	
Contingent expenses—miscellaneous	$269,813 85	
Permanent improvements in the model room, library, draftmen's room, and examiner's rooms	46,301 98	397,114 83
Temporary clerks (including the extra 20 per cent)		155,339 91
Withdrawals		200 00
Refunding money paid by mistake		1,085 80
Judges in appeal cases		261 25
To this add the following items not heretofore paid from the patent fund, viz:		
For illustrations for report	$16,819 60	
For expenses of copyrights	1,895 43	18,715 03
Total		$639,263 32

No. 4.

Amount to the credit of the patent fund January 1, 1867	$264,125 88
Amount of receipts during the year	646,581 92
Total	$910,707 80
From which deduct for expenditures	639,263 32
Leaving a balance to the credit of the patent fund, Jan. 1, 1868, of	$271,444 48

TABLE *Exhibiting the Business of the Office for Thirty-one Years Ending December* 31, 1867.

Years.	Applications filed.	Caveats filed.	Patents issued.	Cash received.	Cash expended.
1837	....	....	435	$29,389 08	$33,506 98
1838	....	....	520	42,133 54	37,402 10
1839	....	....	425	37,260 00	34,543 51
1840	765	228	473	38,056 51	39 920 67
1841	847	312	495	40,413 01	52,666 87
1842	764	391	517	36 505 68	31,241 48
1843	819	315	551	35,315 81	30,766 96
1844	1,045	380	502	42,509 26	30,244 73
1845	1,246	452	502	51,076 14	39,395 65
1846	1,272	448	619	50,264 16	46,158 71
1847	1,531	553	572	68,111 19	41 878 35
1848	1,628	607	660	67,576 69	58,995 84
1849	1,855	595	1,070	80,752 78	77,716 44
1850	2,193	692	995	86,927 05	80,100 95
1851	2 258	769	869	95,738 61	86,916 93
1852	2,630	996	1,020	112,056 34	95,916 91
1853	2,673	901	958	121,527 45	132,869 83
1854	3,324	868	1,902	163,789 84	167,146 32
1855	4,435	926	2,024	216,459 35	179,540 33
1856	4,960	1,024	2,502	192,588 02	199 930 02
1857	4,771	1,010	2,910	196,132 01	214,582 09
1858	5,364	943	3,710	200,716 16	193,193 74
1859	6,225	1,097	4,538	245,942 15	210,278 41
1860	7,633	1,084	4,819	256,332 59	252,820 80
1861	4 643	700	3,340	187,354 44	221,491 91
1862	5,038	824	3 521	215,754 99	183,810 39
1863	6 014	787	4,170	195,593 29	189,414 14
1864	6,972	1,063	5,020	240,919 98	229,868 00
1865	10,664	1,937	6,616	348,791 84	274,199 34
1866	15,269	2,723	9,450	495 665 88	361,724 28
1867	21,276	3,597	13,015	646,581 92	639,263 32

Valuable reports of sections have been received from the officers in charge relating to the subjects coming under their cognizance; their accompanying exhibits show that in each department the number of applications has increased and the character of the inventions proves that the inventive faculty is still alive and usefully employed. The reports, however, generally agree in stating that, with some exceptions, the improvements are mainly in detail, perfecting and adapting what may be considered substantially as existing contrivances and processes.

Changes in the classification and in the alignment of cases having been lately made, a tabular account of the rate of increase of work in the different classes cannot be given satisfactorily.

The purpose of the change, so far as it affects subjects, has been to secure more homogeneity in the classes and to allot more systematically the floating cases whose distribution has previously been rather arbitrary than consistent. Another incentive to reorganization in this particular has been the increase in the number of examiners and assistants, which is now one fourth larger than at the date of my last annual report.

The new classification is nearly completed and will shortly be printed. The number of classes has risen from twenty-two to thirty-six, a number of subjects being now recognized individually which were formerly merged with others, under a more generic title. Among these are builders' hardware, felting, illumination, paper, and sewing machines, to each of which subjects so much attention has been directed by inventors that a division became a necessity to secure a proper apportionment of work among the corps of examiners.

The American system, as it may fairly be called, has proved itself to be well adapted to carry out the purpose of the law and the clause in the Constitution under which, in the interest of science and the useful arts, Congress has power to secure to inventors, for limited times, the exclusive right to their discoveries. The office has now a corps of experts to whom applications for patents are assigned for examination, who are intimately acquainted with the details of their respective classes, and whose judgment is worth to an inventor, in an average case, many times the cost of making the application for a patent.

It is believed that the value of the system, great as it is admitted to be, is not adequately understood, and to some, the thorough acquaintance of an examiner with his class is simply regarded as a positive obstacle in the way of obtaining a patent. Such an apprehension cannot be felt by one who truly values the system, as, for instance, by a *bona fide* inventor who has unwittingly followed in a path previously traveled by another; to him, although disappointed, the the truth had far better come in this way than after expense has been incurred in operating under a patent whose worthlessness is only made apparent when the invention proves itself valuable and provokes litigation.

The student is well aware that the English practice of granting patents was originally a system of monopoly, extending to such things as tanning, the sale of salt in a given district, the importation of certain articles, and similar exclusive powers, which proved vexatious exactions to the public.

The act of Parliament to discourage monopolies, passed some two centuries since, recites the legitimate subjects for such grants, and the wisdom of the conclusion then arrived at has not since been successfully called in question.

The advance made by the American system upon the practice which followed the legislation of the Parliament of King James, consists in giving an intelligent examination to each application, instead of granting a patent as a matter of course; and remitting the patentee to the public and the courts when a few minutes' examination by an expert would have determined to the inventor's satisfaction, though present chagrin, perhaps, that the invention was worthless on the ground of want of novelty or its inherent radical faults.

Viewing the office as a self-sustaining bureau, under the control of the government, the accompanying exhibit is a cause for congratulation to all concerned; the inventors whose genius and industry have supported, and the legislators who have wisely recognized the rights of the inventors and the interests of the public, which are identical.

A glance at the tabular statement of the office business for a series of years shows that the constant increase in the number of applications and of patents has not been attended by a proportionate increase in the expense of the office. This is true even of this year, although over $100,000 has been expended, as shown in the financial statement, for permanent improvements and other objects out of the ordinary course. The machinery is working with less friction and loss, economy and system have been equally studied, and while details may yet be amended to complete the symmetry of the organization, the office is deservedly popular and respected as an American institution, the legitimate exponent of the useful arts whose progress it was designed to promote.

The following table shows the average cost of each examination for a series of years, the calculation being based upon the number of applications and the gross expenditure of the office in each year:

1840	$51 00	1849	$39 75	1859	$33 78
1841	62 18	1850	36 52	1860	33 04
1842	41 05	1851	38 49	1861	47 49
1843	57 55	1852	36 84	1862	36 28
1844	34 6-	1-53	49 71	1863	31 49
1845	31 62	1854	50 28	1864	32 97
1846	36 29	1855	40 48	1865	25 72
1847	27 35	1856	40 31	1866	23 69
1848	36 18	1857	44 35	1867	30 04
		1858	36 01		

The expenditure in 1867, for 20 per cent extra salaries (according to act of Congress), permanent improvements, illustrations for report and copyright expenses (see financial statement No. 3), divided among the applications of the year, renders the average nearly five dollars higher than it would otherwise appear. The increase in the clerical force, both expert and routine, and the multiplication of the office records, drawings and books of reference, has not been accompanied by an adequate extension of room and facilities for work. The urgent pressure in the examiners' department has been somewhat relieved by the assignment of additional rooms, but the employés in other sections are suffering from lack of space wherein to arrange and execute their work. In fact, the public passages and rooms cut off from them are now used to afford accommodation, incomplete as it is, for those employés for whom no rooms can be found.

The librarian again calls my attention to the inadequacy of the room for the proper display and the convenient handling of the books. I have nothing to add to my report of last year on this subject, except that the necessity for more room is every year more apparent, and the limitation more irksome, as the books become more closely crowded, and the space available for their consultation is diminished.

The space and facilities for the arrangement of the caveats are altogether inadequate and unsuitable. It has been my desire to isolate them in a manner consistent with their official character, but want of room has precluded the perfecting of any suitable arrangement therefor.

The great assemblage of drawings of patented and rejected applications occupies much room, but needs more. A very thorough style of improvement in the substitution of sliding and tilting drawers for the ordinary portfolios has made their handling and consultation much more convenient and expeditious. They, however, cannot be kept within the present bounds, and the constant augmentation aggravates the inconvenience.

The drawings now number over 100,000, and are becoming torn and soiled by the constant but legitimate wear to which they are exposed. Photography seems to offer the only means for renewing them. For some time past I have had it in contemplation to have photographic copies of uniform size made from the current issues and the drawings of former patents, so as to furnish to each examiner a copy of all drawings appertaining to his class, enabling him to consult them without going to the draughtman's room, where the space is insufficient for the purpose. This would much facilitate the examination of applications, which becomes a heavier tax annually as the drawings accumulate. A set of the drawings might be bound, and placed in the library for public inspection, and copies furnished to other public institutions which might be disposed to order them. Copies of the drawings might thus be furnished at a reasonable price, and afford a revenue to the office. If this plan were adopted, applications might be filed with but a single drawing, instead of two as is the present practice; and a *fac-simile* of the drawing of record, in most cases, of even size with the face of the patent, might be attached thereto.

It has been my purpose to commence by photographing each week the current issues, and several hundreds of the back issues, so as gradually to accumulate a full copy of the record, and, where a drawing may be lost, to take a photographic view of the model which might stand in its place. The copies thus made would be of even size, and smaller than the average of the originals, which would enable them to be placed in compact form, and greatly to economize the room occupied by them. The printing of the specifications was commenced Nov. 20th, 1866, and the size of the patents reduced from 15x20 to 10x15 inches. The letters patent are thus of a more convenient size for all purposes. A number of copies of each are struck off while the type is set. One copy is attached to the face of the letters patent, of which it forms the "accompanying specification;" one is bound with its fellows, in consecutive order, to form a book of records; two are sent to the Commissioner of English patents as a slight though utterly inadequate return for the magnificent series of English patents which have been, and continue to be, furnished gratis to us by them as they are issued.

Printed copies are now furnished to all who order them, at one half the former price for the manuscript, and at a profit to the office about equal to the loss on each under the former practice, which was about four cents per hundred words for each copy.

The condensation of the matter incident to printing gives compactness to the record, secures exact correspondence between the original and the record, and a safeguard against change in either.

The time will soon arrive in which it will be prudent to dispose of all models of rejected applications; the amount of room they take can be much better occupied. The model saloon in the west wing of the office is now almost entirely devoted to them, and will soon be required for the display of models of patented inventions. The office will remain in possession of the files and drawings in each rejected case, which will be sufficient for its purpose in preserving the record.

The business of the office is now reported by the examiners of classes as being up to date, so that applications are examined without delay, which is much more satisfactory to all parties than formerly, when it was weeks, and in very many cases months, in arrears. This is in the face of the fact that the business of the office is rapidly increasing, as is shown in the exhibit appended, the number of applications being over three times the number received in 1864.

Necessary Rules of Sleep.

Dr. Winslow wisely says there is no fact more clearly established in the physiology of man than this, that the brain expends its energies and itself during the hours of wakefulness, and that these are recuperated during sleep. If the recuperation does not equal the expenditure, the brain withers—this is insanity. Thus it is that, in early English history, persons who were condemned to death by being prevented from sleeping, always died raving maniacs; thus it is also that those who are starved to death become insane—the brain is not nourished, and they cannot sleep. The practical inferences are three:—1st, Those who think most, who do most brain work, require most sleep. 2d, That time "saved" from necessary sleep is infallibly destructive to mind, body, and estate. Give yourself, your children, your servants—give all that are under you, the fullest amount of sleep they will take, by compelling them to go to bed at some regular hour, and to rise in the morning the moment they awake; and within a fortnight, Nature, with almost the regularity of the rising sun, will unloose the bonds of sleep the moment enough repose has been secured for the wants of the system. This is the only safe and sufficient rule; and as to the question how much sleep any one requires, each must be a rule for himself—great Nature will never fail to write it out to the observer under the regulations just given.

Time of the Earth's Rotation effected by the Accumulation of Meteoric Matter.

In a lecture delivered before the British Association at Dundee, Professor Alexander Herschel makes the following curious observation:—A question which at present agitates the minds of physical astronomers, is to ascertain whether a slight acceleration of the moon's apparent motion can be attributed to an error in calculation, or whether the earth in the course of ages has lost in its speed of rotation. The lunar tables, which exactly represent the moon's apparent motion at the present time, do not absolutely give the hour of an eclipse which happened when the sun was setting at Babylon, some hundred years B. C. The eclipse began, according to the table, when the sun was already below the horizon, and it would be invisible at Babylon. But if the earth's rotation had been a little more rapid in former times than at present, the sun, instead of having set, would have appeared eclipsed before his setting, as was indeed the fact. To account for this change in motion, the friction of the tides has been considered, a slow accumulation of meteorites upon the earth's surface would undoubtedly diminish its speed of rotation. The change of a hundredth part of a second in the length of the day, since the earliest observations, would explain the existing discrepancy.

The Walrus.

A young male walrus has lately been placed in the Zoological Gardens, London. He is probably not more than a year old, and has only partially developed tusks; is eight feet long, and weighs about 350 pounds. He was captured by Captain R. Wells, of the whaler *Arctic*, in lat. 69° N. and long. 64° W., on the 24th of August last. Several hundred of these animals were met on the ice, and were attaked by a

boat's crew. Among those killed was a large female; on towing the body toward the ship a young male was seen diving and swimming around its diseased parent; he was captured by a noose swung over his head and hauled on board. For several days the young captive was kept tied to a ring-bolt on the deck, and refused food altogether. Subsequently he was induced to swallow thin slips of boiled pork, and was thus fed until the vessel reached the Shetland Islands, when a supply of fresh muscles were provided for his use. The stranger excites great interest at the Gardens; the only specimen before seen there was in a moribund state on its arrival and lived but a very short time.

Science Familiarly Illustrated.

HEAT AND COLD.

BY JOHN TYNDALL, ESQ., LL. D., FRS.

Lecture II.

[These lectures, of which there are to be six, are now being delivered at the Royal Institution of Great Britain, our report, with the illustrations, being copied from the London *Chemical News*.]

I want you in the first place to pay attention to what Mr. Cottrell will do here in front of the table. There is a very thick bombshell, for which I am indebted to the great kindness of my friend Professor Abel, of Woolwich. It is now filled with water, and the hole of the bomb is plugged. Mr. Cottrell will now place the bomb in this bucket, which contains a mixture of pounded ice and salt; and I want, if I can, to explode that bomb. Do not feel in the least alarmed about it. The explosion will not be such as to injure any one. I will ask him now to cover the bomb carefully with the freezing mixture of pounded ice and salt, and we will leave it there for half or three quarters of an hour, first putting a blanket over it in order to keep the warm air of this room from acting upon it. And now on the top of this I will put these iron bottles and this leaden bottle, which also all contain water. Having placed them in the freezing mixture we will examine what occurs when the water within these bottles and this bombshell freezes. It will require, no doubt, half an hour or more to produce any action upon the bomb, because it contains a very considerable amount of water. We may possibly obtain an action more rapidly uponthe iron bottles, though they are exceedingly thick. We made a similar experiment with a bombshell in the yard of the Institution, and there it occupied only half an hour to freeze the water and burst the bomb. The result is here in these fragments which are on the table. Look at the thickness of these pieces. I hope the bombshell now in the bucket will be pleasant and courteous and agreeable enough to burst before the lecture is ended but in case it does not burst, these fragments must represent the effect I intended to produce. [At a subsqeuent stage of the lecture the success of the experiment was indicated by the bursting of the bomb. At the conclusion of the lecture the bottles were also found to have been burst by the freezing of the water.]

And now let me recur for a moment to our last lecture. I then attempted something very daring indeed. I dare say many of my elder hearers will have imagined that, in fact, I aimed too high—that I endeavored perhaps to make you understand too much; but I do not think that that was the case. I think it is possible for your minds to see the operations of this thing that we call heat almost—not quite, I think, but almost—as clearly as I see these operations myself, and for this reason I wish, as far as in me lies, to make you see what I see, when I think and talk of this thing that we call heat. It was for that reason that I endeavored to cause you to picture to your minds first of all the motion of the particles produced by striking a piece of lead. You remember I put a piece of lead upon the anvil and struck it forcibly with the hammer, and in that way I produced heat. I then went on from that to what we call combustion; and I asked you to consider this combustion as something almost identical with the action of the hammer upon the lead, that the combustion of bodies is due to the fact that our atmosphere contains what is called oxygen gas—the vital gas—and that when certain bodies are raised in temperature this oxygen hits them with such force as to produce the effects that we call combustion. This, in point of fact, is the theory of combustion. If we remove the oxygen from a place where a body is burning, you will find at once that it can no longer burn. In order to make that evident to you, I have here a candle which I intend to place under what is called the "receiver" of an air pump. Now you have the candle burning within the receiver of the air pump. If I allowed it to continue burning, the oxygen inclosed in that receiver would by and by be exhausted by the burning of the candle, and the flame of the candle would die out as soon as the exhaustion of the oxygen took place. I will hasten that exhaustion by working the pump, and rendering the atmosphere around the candle rare; and you will find that presently the flame will become rather feeble. [The air pump was then set in action]. You see the flame is already beginning to become dim. Now it is very dim. As I work on it becomes still dimmer, but if I let a little oxygen into that receiver I at once restore the brightness of the flame. [Some oxygen was caused to enter the receiver]. Now the flame is brighter than it was before. If I exhaust again you will find that as we take the oxygen away we remove the atoms that are now, as it were, showering down against the combustible matter of that candle. If we take those atoms away you see the flame becomes more and more feeble; and finally if I proceed further I should be able, of course, to entirely extinguish the flame, for when these little oxygen atoms are no longer able to rain down upon that flame, then the flame inevitably goes out. I will re-admit the air before the flame is quite extinguished. [At this moment the candle ceased to burn]. Ah! I am too late, and the flame has gone out. Now, you saw that just before that flame went out it was exceedingly feeble. It was exactly similar to the flame that you obtain at very high elevations upon the earth's surface. Many years ago Dr. Frankland and myself spent a whole night upon the top of Mont Blanc. We slept upon the top, and we there burned a number of composite candles such as we have here, and we also burned a number of them at Chamounix. The air upon the top of the mountain was very rare and very thin, and it was most wonderful to see the effect of this rarefied air upon the flames of the candles. They were exactly like the flame you saw here immediately before it went out. Strange to say, however, the quantity of stearine (the stuff of which these candles were made) consumed above in one hour was exactly equal to that consumed below. There was no sensible difference, in fact, between them, notwithstanding the enormous difference in the characters of the flames. So much for these flames.

We must now say one or two words with regard to the structure of this wonderful and beautiful thing—flame. If you look at the flame of a candle you will observe a particular portion of it to be much more luminous than the rest. At that particular part the flame gives out its greatest light; and if you light two candles, such as I have here, and look at the flame of one of these candles through the flame of the other, you will find that you can, with the greatest ease, see one through the other for a considerable distance upward; but then you come to a very bright portion of the candle flame, and that bright portion almost wholly cuts off the vision of the other candle. Thus, through the part of the most intense brightness the light of the other candle cannot pass. There is something going on which intercepts the light of the other candle. Now, what is this something? This will lead us to a knowledge of the structure of this beautiful flame. The flame here is produced in this way. We have a wick in the center of this column of greasy combustible matter. We ignite the wick. The heat first of all liquefies the greasy matter, and not only liquefies it, but reduces it to a state of vapor, or gas. The candle actually makes its own gas. This vapor comes from the candle straight upward; and being heated and surrounded by the oxygen of the air, this heated vapor is immediately attacked by the oxygen; the atoms of oxygen plunge against the vapor, and what we see as light and heat is the result of this collision. But, let me say a word or two more with regard to flame. I have spoken of the vapor of the greasy matter of the candle. That vapor is composed mainly of two distinct substances. It is called a "hydrocarbon." We have there hydrogen, which is a gas, and we have carbon, which is also, under certain circumstances, a gas. These bodies are united together in the grease of this candle. Now follow me, please; and you will understand the structure of this candle flame immediately. The vapor is attacked by oxygen; but the oxygen loves the hydrogen better than the carbon. It takes the hydrogen first, and liberates little solid particles of carbon in the flame. These carbon particles are the soot which you see sometimes in a smoky flame. You see the smoke here, in point of fact. If the combustion were perfect all that smoke would be burned, and it would be raised to a white heat in the flame. In that particular portion of the flame which gives out the maximum amount of light you have a crowd of these solid carbon particles raised to a white heat by the intense temperature of the flame. And then, finally, these carbon particles also become burned, and the products of combustion pass away into the air as gas. This is the structure of all flames; first of all, an inner core of unburned gas or vapor; and then round about that the oxygen of the air plunging, as it were, against the heated vapor, and forming a kind of luminous shell round about the interior ball.

If, when the carbon particles were heated and liberated from the hydrogen in the manner I have described, oxygen were at once to seize upon them, you could not have this intense luminosity that you find in the candle flame. Here is a lamp, constructed by a particular friend of mine—Professor Bunsen, of Heidelburg—and you see it burns with a very small amount of light. The reason of that is that, by means of these apertures which he has made round about the central tube he mixes the oxygen of the air with the gas before the gas is ignited, and the presence of this oxygen entirely destroys the existence of these carbon particles, to which the light of the flame is mainly due. If I cut off the air the gas alone will come out, and you see then at once that the light greatly increases. In the former case you have the carbon particles halting for a moment in the flame, and raised to a white heat before the oxygen seizes them; and thus you have a far greater amount of light than when you allow the oxygen to get in among them and seize them the moment they are liberated.

The combustion which I have just shown you is of a very vivid kind. There are also slow kinds of combustion going on. For instance, when the oxygen of the air attacks iron, it produces that red iron rust with which you are all very well acquainted. This is just as much a case of combustion as the combustion exhibited in the candle flame. It is a case of slow combustion. When the earlier of the Atlantic cables was made it was surrounded by iron sheathing to protect it; and it was found in one case that the temperature of a great coil of this cable became very high indeed, so high as to imperil the gutta percha and other substances that were employed to insulate the wire. This was found to be due entirely to the slow combustion—to the rusting, or "oxidation," as it is called, because oxygen is concerned in it—of the iron. The iron was slowly burned, and the heat could not get away because the coil was so large, and the consequence was that its temperature became dangerously high. Mr. Siemens has invented an exceedingly beautiful instrument for the purpose of testing cables for this heat. And so in the case of our own bodies there is going on as true a combustion as in the case of the burning candle. We take in food, it is conveyed into the blood, we breathe the oxygen of the air, that oxygen comes into contact with the food in the blood, and the food is there slowly burned, and consequently we are rendered warm. The heat of our bodies is derived entirely from this slow combustion.

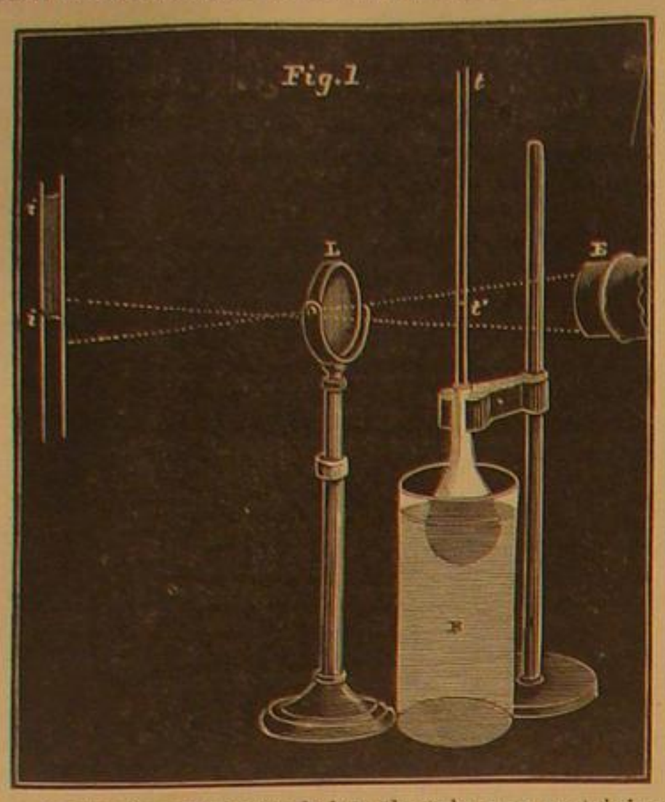
Toward the close of the last lecture I passed on to a consideration of what heat does. The usual result, as I told you, is that bodies are made to expand with heat. I made several experiments in proof of this, one with a very beautiful piece of apparatus made for me by Mr. Becker, by which we multiplied the action more than a thousand fold in order to enable you to see the expansion which occurred when I breathed against a pillar of lead. I now want to make clear to you the wonderful strength of this force with which bodies expand, and the wonderful strength of the force with which they contract. The forces which pull the atoms or molecules of a body together on its cooling are perfectly enormous. I will illustrate this by an experiment which you will understand by reference to this model. I place in a hole at the end of this iron bar a little piece of wood; you see the two ends of this piece of wood rest against these two edges; and if I pull the bar I break the piece of wood. You will observe that it first of all bends and then breaks. Now what I am going to do is this: for this piece of wood I am going to substitute a piece of steel, and then I shall put a red-hot bar of iron across, and screw it on between these two points. It will cool, and the contraction will, I think, be so great as to break the bar of steel in the way in which I have broken this bar of wood. You see the construction of this iron apparatus is much the same as that of the model. [A red-hot bar of iron was screwed to the apparatus as described by the lecturer]. I will hasten the cooling by pouring a little water on the iron bar. [In the course of a few seconds the steel bar snapped]. There it is. The bar of steel is, in point of fact, smashed by the force with which the particles of the iron bar pull each other together when the motion of heat is taken away from them by cooling. That force is, as I have said, perfectly enormous.

Before we pass on to consider the expansion by heat of other bodies beside solid bodies, I should like to explain for the sake of the elder boys (not for the sake of the younger ones, because they will, perhaps, find it a little too difficult for them) the use of one term that is in common use in books that are written on the subject of heat. Suppose you have a piece of lead 3,510 inches in length, and suppose you augment the temperature of that lead one degree, you would find that its length would extend from 3,510 inches to 3,511 inches. That is it would extend $\frac{1}{3511}$ths of its length. This is the fraction of its own length which the lead expands on having its temperature augmented one degree. Now, that fraction is what is called the co-efficient of expansion of the lead. This co-efficient of expansion is much less in many bodies than it is in the case of lead. For iron this co-efficient of expansion is not half what it is for lead. This difference renders it needful for engineers to be very careful not to unite different metals which have different co-efficients of expansion in such a way that on their expansion they would produce distortion and disruption, and, perhaps, fracture. Here, for instance, is a ruler which has one side of brass and one of iron; and when it is heated, in consequence of the brass expanding more than the iron the ruler becomes curved or buckled up. Now, in an architectural structure different metals might be associated in such a way that on a change of temperature the edifice would be endangered in consequence of the metals expanding or contracting in different proportions. That fact is a very important one for architects to remember.

We will now proceed to a consideration of the expansion of liquids by heat. Here is a bottle containing water, another containing alcohol, and a third containing the liquid metal mercury. Here also is a bulb containing mercury. If I lay hold of this bulb the mercury within it expands, and this little column above the bulb is forced upwards. Now I want to show you, if I can, the motion of the mercury when the bulb is heated, and for that purpose I will throw an image of the column upon the screen. Now you have on the screen an inverted image *i'* of the mercury column *i i*, turned upside down by the lens L which you see in front of the lamp E, and I think you will see that when I heat the bulb, the column *i i* will go towards the lower part of the screen, owing to the expansion of the metal. It really goes upward, but it appears to go downward, owing to the image being inverted. I will now place the bulb in hot water, observe the motion which I indicated. I will now take a bulb containing the liquid alcohol, which is much more expansible than mercury. Mr. Cottrell has colored it blue, that you may see it better than you would if it were not colored. The color indicates the column of liquid. At the first moment of the bulb being heated the column of liquid will appear as if it contracted instead of expanded. This apparent contraction is due to the fact that when we first plunge the glass vessel containing the alcohol into warm water that vessel itself expands, and becomes, in fact, of larger capacity, and thus the column of liquid sinks in it. This sinking, however, will immediately disappear, and then the blue liquid will go up in the tube far more rapidly than the mercury rose. I might take other liquids and show you the same effects, but we must now pass on to the question of the expansion of gases.

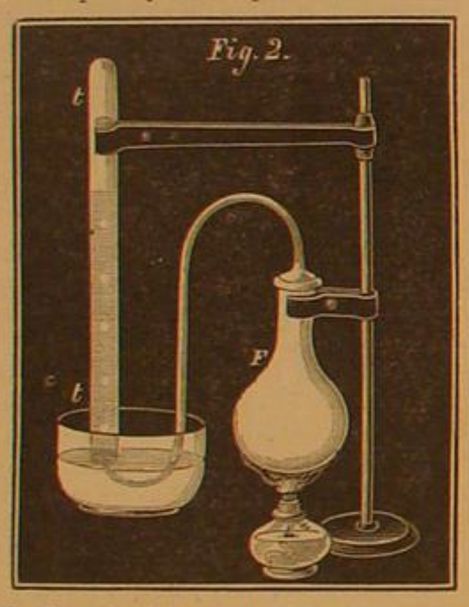
You will understand in a moment that gases are capable of expansion by heat. For instance, I have here (Fig. 2) an empty bottle F, to which is attached a tube; and Mr. Cottrell

is now placing the end of that tube underneath this column of liquid *t t*. The column of liquid is supported by what the elder boys know as the pressure of the atmosphere upon the liquid outside. Now, if I heat this bottle I cause the air in it to expand; it will ascend with force into the tube *t t*, the water will descend, and in that way I think I shall be able to



transfer the air from the bottle into the tube now containing the column of water. Observe now the bubbles of air going up, and pressing down the liquid column. This pressure is due to the expansion by heat of the air in the flask. I might continue this process until nearly the whole of the air of the flask was transferred to the other vessel.

In reference to this subject I might refer to this instrument, which is a thermometer made for the purpose of measuring heat by means of the expansion of air. Here at the top is a bulb filled with air. The liquid column now stands at a certain point. If I put my hand upon it the column descends.



The warmth of my hand is causing the air to expand, and in doing that it drives down the liquid column.

Before proceeding further, I must say one or two words with regard to a term I have just employed. I have used the term "thermometer." That is, *a heat measurer*. I have made use of this bulb of mercury, and the tube attached to it, purely for the purpose of enabling you to understand the common thermometer. If you take this bulb of mercury and plunge it into melting ice, or into water just frozen, at any part of the earth's surface, you will always find that the column of mercury stands at precisely the same hight, so that this temperature of frozen water or melting ice is the same thing all the world over. Here, then, we have, so to say, a standard of temperature. First, suppose that our bulb of mercury is plunged into melting ice: that will give the freezing point of water. Then plunge it into boiling water under the same barometric pressure, and the hight to which the column will rise under such conditions will be the same all the world over; and that point will indicate the boiling point of water.

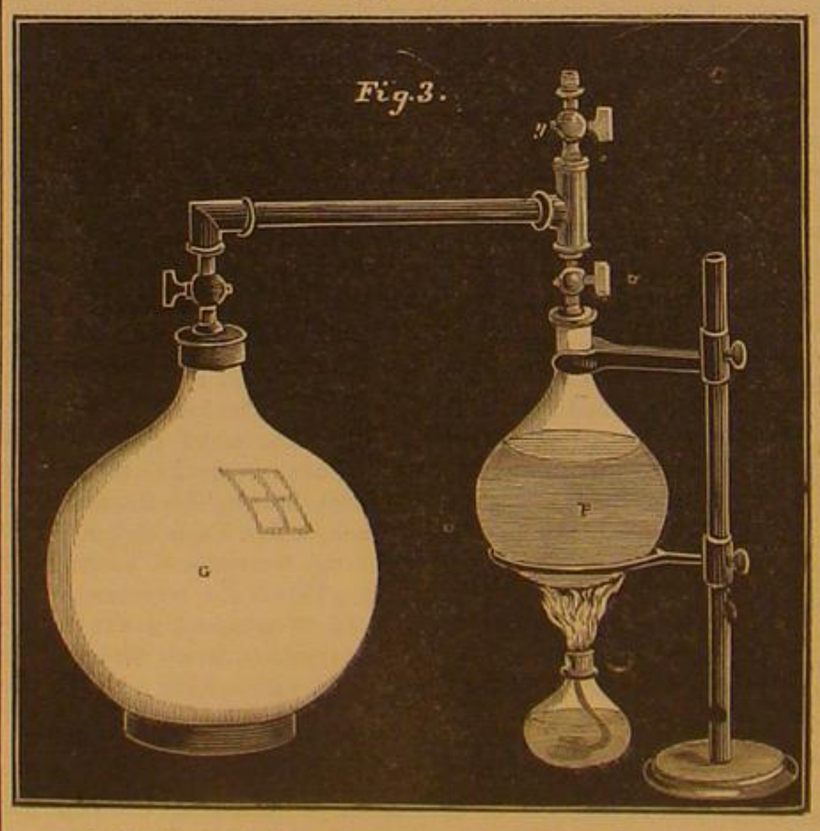
We have three different kinds of thermometers. First of all there is the thermometer of Fahrenheit. In constructing his thermometer Fahrenheit made use of a mixture of ice and salt, and he found that this mixture gave him a far greater cold than that of ice itself. He thought this was the greatest cold possible, and he therefore marked that temperature as the zero of his scale, and began to number his degrees from this zero which represented the temperature of pounded ice and salt. He then went upwards to the freezing point of water, which was 32 degrees above his zero. He then obtained the boiling point of water, and divided the distance between the freezing point and the boiling point of water into 180 equal parts or degrees. The 180 added to the 32 makes Fahrenheit's boiling point 212 degrees above his zero. The second thermometer is one which is in general use among scientific men, and I wish it was employed in all parts of the community. It is known as the Centigrade thermometer. This was invented by Celsius, and is sometimes called Celsius' thermometer. Here we have the distance between the freezing point of water and the boiling point divided into 100 equal parts or degrees. We have a third sort of thermometer which is known as Réaumur's. It is a very awkward one, but it is nevertheless used a great deal in Russia. In this instrument the distance between the boiling and freezing points is divided into only 80 different parts. The degrees in these three different thermometers—Réaumer's, the Centigrade, and Fahrenheit's—are in the respective proportions of 4, 5, and 9. So much then for the terms "degree" and "thermometer" which have been used in these lectures.

Now, if possible, I should like to show you heated air. You cannot detect it by looking at it directly in the atmosphere, but it can be made evident by a device which I intend now to employ. I can show you this heated air rising up in streams from a heated body. Here is a hot spatula. If you look directly at this hot body you can see no emanation whatever from it; but now my assistant will throw a beam of electric light upon this spatula, and we will observe the shadow of it upon the white screen. You now see above the image of the spatula a stream of heated air rising from the hot surface. This effect is quite invisible when you look at the spatula in the ordinary way.

I want now to show you another stream of air. I have here the means of giving you a still greater stream of heated air; and I want to make you acquainted with the celebrated invention of that eminent man, Mongolfier. He conceived the idea of catching these streams of heated air in a bag, and in this way the bag was carried up. From the chimney of this stove we get a stream of heated air. You observe by the effect on the screen how powerfully that stream is rising. I have here a paper balloon, and in this balloon I will catch the column of heated air. If I am successful we shall by-and-by get the balloon filled with the hot air, and then we shall make Mongolfier's celebrated experiment. You see the sides are swelling by this heated air being accumulated inside the balloon. I will now let it go out of our hands, and I venture to say it will sail upwards. There it goes. It has not gone so high as it ought to have gone, but still it will answer for philosophers as an illustration of the balloon of Mongolfier.

It is found that in the case of solids and liquids the expansion is exceedingly irregular. The co-efficient of expansion varies very much. But strange to say—(and I wish I could go into the reason and tell you why)—in the case of really perfect gases it is essentially the same for all. If you take 490 cubic inches of air and heat it one degree it becomes 491 cubic inches, so that the fraction $\frac{1}{490}$th is the co-efficient of expansion of air; and this co-efficient, as I have said, is almost exactly the same for all gaseous bodies whatever.

Now I have to direct your attention to some experiments with regard to the action of heat upon liquids; and with this view I have provided an apparatus (Fig. 3) which I will



now ask Mr. Cottrell, the assistant, to place upon the end of the table. I will now cause the water in this flask, F, to boil, and I want to show you now what is meant by the vapor of water. We will apply heat to the flask, in which is a quantity of water, and after a little time the water will boil and bubble up. I want you to understand accurately the meaning of this bubbling up. What is going on at the present time in that flask of water is this. The water is heated. As the heat becomes more and more intense this shivering, quivering, vibratory motion becomes more and more intense, and then particles of water are jerked away from the upper surface, and carried away into the space here above. After a time the water begins to bubble. Here you have the bubbles of steam rising to the top. Now, the surface of the liquid is in communication with the air. Every square inch of the surface of that flask of water bears a pressure of about 15 lbs. and every little bubble there bears a pressure of several pounds. Why is it that the bubbles are not crushed? Simply because the pressure of the vapor within them is exactly equal to the pressure of the atmosphere without, so that the film of liquid is squeezed between the air on the upper side and the vapor on the lower side. If you lessen the pressure of the vapor within, you will have the bubble crushed by the pressure of the atmosphere. The boiling point of a liquid is precisely that temperature at which the pressure of the vapor of a liquid equals the pressure of the atmosphere. Now, by turning this tap *y*, I have inclosed in the flask some heated water; and you see that at the present time it is quite quiescent. The vapor in the flask is pressing upon the surface of the liquid. But if I take that pressure away, I have no doubt that the water will again boil. How can I do this? I have in connection with this flask of water another globular glass vessel, G, from which the air has been drawn by means of an air-pump. Hence the inside of this globe is a vacuum. Now, if I turn the cock, *c*, which is between the flask and the other vessel, I open a way for the vapor in the flask to go from the surface of the liquid into the vacuum. Observe what occurs. The liquid is relieved of the pressure which was upon it, the water begins to boil, and the flask immediately becomes filled with the vapor of the water. The sides are now quite clouded. We can actually boil that water by cooling it. If the water in the flask were near its boiling-point, and we plunge cold water upon the upper part of the flask, we should condense the vapor above the liquid, and by hus relieving the water of the pressure on it we should cause it to boil. Here I have a tin vessel containing steam, and the air from which has been chased away by the steam. Mr. Cottrell will place it in front of the table. I will withdraw it from the flame, and I will in fact cause the water in it to boil by placing a piece of ice on the top of the vessel, [This was done.] The water is now boiling away, as the boys near at hand can see. Why? Beccause the vapor above the water has been condensed, and when the pressure is then removed from the surface of the liquid, ebullition takes place. If more ice is placed on the top the water will boil still more, but the atmospheric pressure will, perhaps, crush the vessel entirely in. This effect will be due to the reduction of the pressure of the vapor on the inner side of the tin vessel. [The effect anticipated was not produced, but the experiment was repeated at the beginning of the next lecture, and the sides of the tin can were then successfully crushed. The lecturer informed the audience that it had been found that the failure in the present instance was due to an accidental air hole in the side of the tin vessel.]

I have now to pass on to a consideration of the vapor of water. I have here the two gases or substances of which water is composed. I will show you first of all that one of these is a certain gas which is inflammable, and this gas we call hydrogen. Mr. Cottrell is now getting me some hydrogen which has been actually produced by the decomposition (to use a learned term) of water. He will now give me this gas. We hold downwards the mouth of the vessel containing it, as it is excessively light, and would escape if the vessel were held upwards. I will ignite this hydrogen, and you see what occurs. It is an inflammable gas. There it is burning with a flame at the top of the tube. Now the assistant will give me some of the other gas which is a constituent of water, and here we shall find our familiar friend oxygen—that gas which causes bodies to burn so brightly when they are placed in it. I will introduce into the oxygen a small bit of wood with an ember at the end; and what is the consequence? The glowing wood immediately burst into a bright flame. This gas is the other of the substances of which water is composed.

Now I will take the two gases mixed together, instead of having them in separate tubes. I have here a wonderful instrument—a galvanic battery—which enables me to tear asunder the particles of water. Mr. Cottrell will now connect the vessel of water with the battery, and we will let the decomposing gases escape into soap suds. [The mixed gases from the decomposed water were caused to form bubbles with the soap lather. The lecturer then placed a cluster of the bubbles on the palm of his open hand, and exploded them by the application of a light.] How must you figure this act of the combination of hydrogen and oxygen? I suppose you must figure it in this way. You must figure them rushing together with a great clash, and then quivering and recoiling in virtue of their resilience—their elasticity As far as I can follow the thing in my mind the flash is due to the collision between the particles of the oxygen and hydrogen. It is due mainly to the enormous heat produced by the collision; and the heat produced by this collision is so great that for a time the molecules of water produced are so hot that they are preserved in a state of invisible gas. Water is composed of oxygen and hydrogen in the proportion of two atoms of hydrogen to one of oxygen; and two atoms of hydrogen and one of oxygen constitute what is called a "molecule of water." *Molecule* is the term employed to express that combination, and you must remember the term.

I want to show you the difference between vapor and invisible gas. This room is filled with invisible vapor; but here, early in the lecture, I placed this vessel containing something very cold—a freezing mixture; and this frost which you see upon the outside of the vessel is due to the condensation of the aqueous vapor which has come from the gas lights and from the lungs of the persons here present. That vapor has been condensed on the cold surface of the vessel containing the freezing mixture, and then frozen into hoar frost. The fog through which you were kind enough to come on Thursday last to this place was not a true vapor. It consisted of particles of water. Here you see the same thing. The steam which you see rushing from this vessel is not a true vapor. It is due to the vapor cooling and being precipitated. If I allow the steam to pass through this flame it is converted into a true vapor. The steam is now water, now vapor. [Passing the steam jet through the flame, and thus rendering the steam invisible.]

After a time we shall have that vapor cooling and falling into the state of water, and then if we cooled that water still more the particles would bring other forces and powers into play; and those are the forces and powers that I now want to

illustrate before you. I want to exhibit to you the marvelous force of crystallization. When we cool water sufficiently it becomes, as every boy knows, reduced to ice. That ice is one of the most wonderful things on the face of the earth, and in another lecture I shall dissect a piece of ice and show you how wonderful it is. I want to show you something similar to what occurs on your chamber windows when they become frosted during the cold nights and covered with forms as beautiful as vegetable forms. I show you that in this way. If I took this piece of glass and poured a solution of common table salt upon it, and allowed it to remain, the water only would evaporate. The salt would be left behind incrusted on the surface of the glass. You can make the experiment at home with the greatest ease if you drop a little solution of sugar upon glass and allow it to stand. You get the water evaporated and the sugar remains behind. Now I want to do the same with a solution of another substance. First of all I must clean the glass plate perfectly, and this I do with potash; and then I shall put on it a film of a solution of something—not sugar, not salt, but something which will give me crystals more beautiful than either of them. We will take a liquid containing a certain kind of salt in solution, and I will pour this liquid upon the glass plate. I want to evaporate this film of liquid before you, and show you the crystallization of the substance. [An image of the moistened glass plate was projected on the screen. Crystals began to appear in the course of a few seconds, and gradually spread over the surface of the plate.] See how splendidly these crystals form. See them building themselves together in this wonderful way as if they were forming vegetable growths before your eyes. This salt is ferrocyanide of potassium. We will take another plate, and cover it in the same way with a solution of chloride of ammonium. I will warm the plate in order to hasten matters. [This plate was also represented on the screen, and a similar result was obtained as in the last case.] How beautifully these crystals run together. There they are, darting out like spears. This is an experiment which one makes hundreds of times, but still it is sufficient to strike one with wonder. How beautifully the crystals assume their determinate forms.

One minute more. I want to tell that in passing from the liquid to the solid state—in falling together so as to form those beautiful crystals—certain bodies, comparatively few in number, become larger. Water is one of these bodies, and that is the reason why ice floats upon the water. When water freezes it expands with powerful force. The bomb-shell which I placed in the bucket before you was, as you see, burst by the expansion of the water in the act of freezing.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

The Flying Spider.

MESSRS. EDITORS:—For the reason that there are so many things in nature of which we are unable to give a rational solution, I feel reluctant to contradict Father Babez's account of the flying spider, which appeared on page 53, current volume. I have in my mind many times threatened to call the attention of entomologists to the investigation of their habits. I have been a tolerably close observer of them for twice fifteen years, and am strongly inclined to the belief that the Rev. Father has been deceived—that his spidership has practised a "slight of hand performance" on his vision. Spider No. 1, that lit upon the leaf of his book, in all probability, had a line attached to the limb to which he ascended. Spider No. 2, which was "lying on its back with its legs doubled up," was doubtless holding its ball of twine there, which had been used on a former occasion, with one end of his string also attached to some stationary object. It is not at all strange that the thread on neither occasion could be seen; this spider, by a very slight manipulation, with what may be considered as the thumb and finger of its right hand, could lay hold of the cord and take its weight from the table, when it would swing, or seem to float off on his back. Had the Rev. Father passed a rod immediately over it, as it began to move off, it would soon have found itself on its back on *terra firma*.

Among the hundred varieties of spiders, there is but one of the real flying kind, although the "cat spider," that always leaps on its prey, instead of entangling it in his web, will sometime swing off by its thread, and various other kinds will be blown from one tree to another, and weave their gossamer with geometrical precision in mid air between them; yet none of these indulge in balloon voyages.

The flying spider is a pale, light, ashy colored insect, or rather animal, and in this latitude thousands of these little aeronauts may be seen every autumn, vieing with each other in sailing the highest. They seem to be chemists as well as mechanics. They get themselves in a state somewhat like the silkworm before it begins winding its cocoon; nearly all that is inside of their bowels is formed into silken thread, and being thus rendered very light, they wait for a fair day and gentle breeze, when by hundreds and thousands, like birds of passage, they undertake their airy journey. Firstly, they climb upon some shrub, tree, or fence, where they stand awhile with their legs directly under the body, and to all appearance inflating themselves with gas, until the back part of their bodies become semi-pellucid. When fully ready, one does not wait for another, but proceeds to attach its cord to the object on which it is standing, then leaps up and off, fearlessly giving its body to the breeze, gradually rising like a kite until it reaches the end of its string, being generally high up and out of sight. I presume a moderate breeze would carry them a long distance after their thread was broken. I have seen them rise higher than the tallest trees, and disappear in the blue ether, but I have never failed to bring them down down when suddenly cutting their thread as soon as they had made their leap. If, however, they rise twenty or thirty feet before their thread is broken, they are safe, for the breeze will carry them out of harm's way, though they will then rise but slowly. Occasionally, after one has started, another will run up his line with great rapidity some fifteen or twenty feet before throwing itself to the breeze. On the whole, it is both interesting and entertaining to observe their movements.

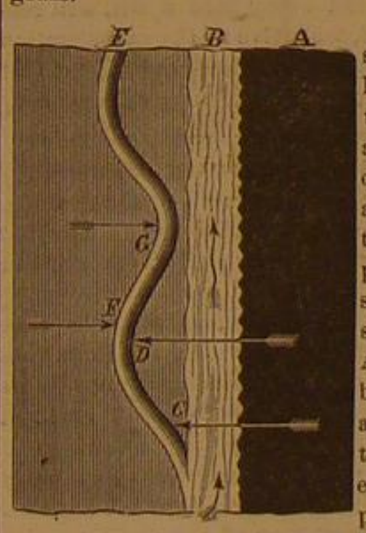
I have written the foregoing with the view of calling the attention of some professional entomologists to the subject.

South Union, Ky. H. L. EADES.

An Attempt to Explain the So-called Heat Shadows.

MESSRS. EDITORS:—In number 3, current volume, of the SCIENTIFIC AMERICAN," Mr. G. A. Shufeldt, Jr., gave as an observation what he called "heat shadows." He asked for an explanation of the phenomenon, and you gave your opinion, doubting that what he observed were shadows. In reading Mr. Shufeldt's observation, I remembered having observed the same phenomenon, but did not investigate the cause of it. I came to the conclusion that the same effect would be produced whenever hot and cold air pass through each other. The sun was shining through a window in the room, the air in the same was heated, the atmosphere outside was cold; I opened the window, and on the window sill and carpet a wavy, vibrating mass of lights and shadows came moving in; no motion was visible in the air, but on the window sill and carpet it was very marked. When the flow of air became stronger, the lights and shadows would move faster; but as soon as I closed the window the phenomenon ceased. This is certainly a proof that the moving lights and shadows were caused by the moving and intermixing of the heated and cold atmosphere.

For close observation, and to determine the cause of those lights and shadows, the above mentioned experiment is not sufficient; the contrast is not great enough, a greater heat than that of a room is necessary to bring out the lights and shadows more prominently. I then had a little stove heated, that came within the rays of the sun; back of it I placed a white sheet of paper, and the same phenomenon was observed, only better defined. The shadow of the stove stood out prominently; the sides of the same were not a straight, but a trembling line, like the teeth of a saw. Next to the stove shadow came a marked stream of light of about half an inch in breadth, trending from the stove, rapidly vibrating and moving upward. From this stream innumerable streams of lights and shadows came winding out, and moved in wavy lines upward, approaching to and receding from the bright, vibrating stream. What produces those lights and shadows? I will endeavor to explain this with the accompanying diagram.



The dark shadow, A, represents that of the stove, the light band or stream, B, next to it, is the extremely heated air, more rarefied, and consequently more transparent and a better medium for transmitting light. The arrows, C, D, pointing outward from the shadow, represent the expansive radiating force of the heat. At C, this force loosens the band or heated layer of air, E, and carries it outward; at D, the force of the heat is lessened and overcome by the pressure of the cold air represented by the arrows, F G, which forces the heated band, E, towards the heated layer, A, until its force is lessened by becoming heated and overcome again by the expansive force of the heat, and the second wave is formed. The vibrating, wavy motion of the heated air continues, and is observable some distance after having passed the sides of the stove, except the light band, A, which does not leave the same. The appearance of the loosened bands or layers of air were either light bands or, as represented in the diagram, had their sides toward the stove shaded; the opposite side was a bright, marked line. The above described phenomenon is no doubt visible, first, by the refraction of light through layers of heated air whose property of transmitting light has been changed from that of the cooler air; secondly, by the wavy, vibrating motion.

The same effect can be observed by pouring water in a porcelain plate and setting it in a wavy motion, the refraction of the light through the different thicknesses of the waves will be seen as lights and shadows on the bottom and sides of the plate. The wavy motion of lights and shadows at the opened window can be explained on the same principles.

Philadelphia, Pa. AUGUST WILHELM.

Another correspondent on the same subject says:

The vibrations of air under certain circumstances are distinctly visible to the human eye, and air thus vibrating casts a visible shadow. A metallic surface and artificial heat is not essential to the production of these visible vibrations. The warm rays of the sun often cause a visible motion of the air nigh the earth's surface. By a peculiar optical illusion, the moving air often appears at rest while objects seen through that medium are apparently vibrating. But not always. When heated air is ascending from the earth's surface, laden perhaps with misty exhalations, but performing its irregular motions with medium rapidity, its vibrations are not extended to the object seen through that heated air, but the air itself is visibly in motion. Heated air rising from a register, or common stove, is distinctly visible when a person stands so that the column of rising air is between him and a window. Occasionally, when this heated air was making its tremulous motions with unusual rapidity, I have witnessed upon a neighboring window the same optical illusion that I have seen in the fields and on the seacoast. The moving air seemed at rest while the window appeared tremulous with motion. This occurs, however, only when there is intense heat in the stove and the remaining portion of air in the room is cold. I have often stood in halls and churches with a perpendicular piece of pipe between me and a neighboring window, and watched the vibrations of the air. These vibrations had all the irregular, wavy, tremulous appearance which characterizes a rising volume of steam. They extended to the distance of about three feet each side of the pipe, the motion becoming less and less apparent, and the volume less dense, as it extended further from the pipe.

A kerosene lamp with a tube from one and a half to two inches in diameter across the top, in a room nine feet high, will cast a circle of light about twelve inches in diameter, upon the ceiling. This circle of light is bordered by a dark circle, which is the shadow of the upper edge of the tube. Within, but next to the dark circle or shadow, is a circle of light in which no tremulous motion is visible, while in and around the center of this circle of light is a shadow, dimly defined, but rapid and tremulous in its motions. This shadow has no connection with the shadow of the tube. The tube, the circle of cool air next the tube, and the column of heated air rising in the center of the tube, all have their portions on the ceiling. The tube has its shadow, the cool air which encircles the inner surface of the tube has its circle of motionless light, and the column of moving air its dim, tremulous shadow. If a person sits by a common stove, with a brisk fire, so that the rays of the sun shine upon and above the stove, with the stove between him and a window, the vibrations of the rising air can be easily seen; and if the wall is capable of receiving a delicate shadow, the shadow of the moving air will also be visible.

Not long ago, one frosty morning, I was sitting by an air-tight stove. A pipe about two feet in length passed from the stove through a zinc fireboard. The rays of the sun fell upon them, and the shadow of the pipe and damper handle were as clearly defined upon the zinc as shadows usually are. There was no motion apparent in the shadow of the pipe, even along its edges. Below and south of the shadow of the pipe there was nothing but the motionless rays of the sun. Above the pipe, extending its whole length and rising to the distance of fourteen inches, was a dim, tremulous shadow. The question naturally arises, what was it we saw moving so distinctly; what cast this delicate, tremulous shadow? Was it the vibrations of the air, a delicate cloud of dust, or a misty exhalation? A misty exhalation could not have arisen from the top or sides of a heated metallic surface, or from the tube of a burning lamp. A delicate cloud of dust would have been as perceptible through the rays of the sun in other parts of the room, and as distinct at the distance of four feet from the pipe as they were at the distance of three. Then the substance we saw in motion must have been the air, and the tremulous shadow we saw was the shadow of the moving air. We may safely say, then, that air moving in a straight line, or in gyrations, is invisible and casts no shadow; but when it moves in a peculiar, wavy, irregular manner, like mist and steam, its vibrations are visible, and its shadow tremulous and delicately defined. HORATIO NOBLE.

East Windsor Hill, Conn.

Effect of Darkness and Silence.

MESSRS. EDITORS:—Under the above heading a report appeared on page 42, current volume, from Dr. Ralls Smith, who is said to be "confident that the sense of hearing, as well as that of sight, is lacking, among the fishes in the mammoth cave."

Allow me to remark, that Prof. Agassiz, and Prof. Wyman, have demonstrated that the fishes in the cave, of which there are several species, are all blind; that they all have rudimentary orbits, developed in some species more than in others; but that at the same time all have large well developed auditory organs, even larger in proportion than ordinary fish. See "Silliman's American Journal," for March, 1854.

Prof. Silliman visited the cave in 1850, and states that the cave rat possesses, when first captured, a very imperfect, if any, sense of vision, which, however, appears to improve when kept long in the light; but this same rat is extremely shy; and notwithstanding the cave is full of innumerable tracks, they are seldom seen, as they flee when hearing the approach of man.

Dr. Smith asserts that these animals are deaf, because there is nothing to be heard, forgetting that they make sounds by their own movements, and produce articulate sounds. It would be more probable that very acute hearing in these animals compensates for the loss of sight, as is the case with the blind in general.

A Standard Time for the Whole World.

MESSRS. EDITORS:—The annihilation of distance by the telegraph must have forced upon many minds the necessity of establishing at some point a timepiece which shall govern all the rest of the world, a time distinct from the "local," and which shall point to 12 o'clock at the same instant all over this sphere. The hours must be numbered from 1 to 24, inclusive, in order to distinguish it from local time, thus doing away entirely with A. M. and P. M. (when using standard or universal time); 12 then would mean midnight only at the governing point, while 24 would mean noon at that point. For the rest of mankind it would be a certain guide for all official purposes. Railroad-time cards would no longer perplex the

public, and trains would run on a uniform time everywhere. Every watch would have its two sets of hands, one for the local and one for the universal time.

A telegram sent from London to San Francisco, bearing the standard time at starting would show to the recipient thereof exactly how long it took to reach him, how much *actual* time *actually* consumed.

As it is now, no one can have a near idea without considerable figuring and then he may be figuring 24 hours too early or too late.

Every telegraph and railway office would receive its time daily, so that no where would the "times" be a minute "out of joint." January 31, 1868, 1 o'clock, would be January 31, 1868, 1 o'clock, all over the official world.

What a fine regulator of local time this would be: we should always have one right by having the other correct, there being always the same difference, so that should we know one we would know the other. Suppose, then, that Greenwich be the standard *time* as well as the calculating point for longitude.

There is a still better plan than this, but it so entirely supplants so many familiar terms, such as "noon," "morning," "evening," when used in connection with breakfast, dinner and tea, that it would go a little hard at first, though I have no doubt that, at some time, there will be but one time, and here at Cleveland it will some time be perfectly natural and easy to say "dinner at six o'clock," which would mean somewhere near our present time, 1 P. M. F. A. Stumm.

Cleveland, Ohio.

What Comes from the Ash Barrels?

The following, from the pen of Mrs. Frances D. Gage, published in the *Ohio Farmer*, is a good description of low life in this city. The number of inhabitants accorded by the writer is by far too small, however; twice that number, one million, would be nearer correct:

It is an old saying, and a true one, that "one half of the world does not know how the other half lives." Here in New York are nearly half a million of people. Rents are enormous—a garret, five stories in the air, low, dark, unblest with any modern improvement, usually rents at five to eight dollars a month at the lowest. Beefsteaks at forty cents a pound, and everything else graduated proportionally.

How do the poor live?

You may well ask the question, and we may ask another, which puzzles us quite as much. How do the common class, who are not poor, live?—for I call no man or woman who has two good hands, a healthy body, and a reasonable brain, poor. But live they do; and were you to see many of them upon the street, you would never dream that privation or want had been their neighbors, much less their intimate bosom friends.

"Out of my window," I can see across the street, in a little nook or enclosure at the end of a stately brick house on a corner, five stories high, and fronting upon two streets, three ash barrels, which were to me a wonder and a revelation for many weeks, as I sat in my arm chair, helpless and glad to amuse myself as I could. Every morning the barrels were full to overflowing—every evening they were empty. And what of it? the thoughtless dweller in the country will ask.

Much, my friend?—much that leads out into by-ways and highways, that, if we dare to follow where they lead, would open to us doors of trade, commerce, agriculture, and mechanism, that would astonish and interest, and perchance amuse, or stir up in the depths of our souls sympathy and kindness, and care and economy that has never before been awakened into active existence.

A very simple thing it is to fill the bucket with the worthless coal ashes in the morning, and carry it forth to fill a hollow or ravine in the garden, or build a crossing over a muddy street in the country town or village; but the ash barrels of the city have a more complicated history.

The brick house on the corner has at least one hundred tenants; every room, nook, and closet swarms with human life. A liquor store, a grocery, a tier of rooms occupied by women who work; seamstresses, tailor shops, nurseries, and I know not what. Each one of these families, or lodgers, brings down at morning his or her bucket of ashes, pours it into the barrel, and retires to the nook whence he or she came.

Now commences the process of distribution. An old woman, with a bag on her back, half bent, her old greasy hood and her tattered garments making one feel piteously for her age, her limping limbs, and heavy burden, comes up, lays down her pack by the barrel, and with a long iron hook turns over the contents of the same. Every scrap of paper, every bit of rag, every paring or thread that can be turned to account, goes into her bag and adds to the bulky load under which she bends. On she trudges to the next barrel in the next yard, only too gay if she is the first to glean. She is followed (if she is not crowded away) perhaps, by a rollicking boy; he comes with a hop, skip and jump round the corner; startles you with a shout or whoop that a Cheyenne might envy; he shakes up the barrel and takes every atom of coal and cinder that has an atom of carbon left in it, with which the miserable dweller on some more miserable street can cook a breakfast; his little sister brings up the rear and gathers out the bones, apple-skins, potatoes, and bits of anything that can possible feed a pig, or be cleansed to satisfy the "aching void within" of some poor hungry beggar.

Thus thousands upon thousands live; the old woman is the rag-picker, and will enrich the paper mill. A hundred thousand such ash barrels of the city give to our paper mills, shoddy establishments, and bone factories, material for buttons, knife handles, combs, harness rings, everything into which a bone can be worked; and then the debris is ground into dust, used for many things in commerce and trade.

Every particle of vegetable matter is useful; and when perhaps twenty of these street scavengers have shaken up and turned over the barrels of a morning, then comes the ash-man, tumbles all that is left into his cart, and drives off to deposit it where it will make a low, sunken lot up town, worth by-and-bye a thousand dollars per foot, that in its natural state was not worth a bucket of ashes. Perhaps he dumps it into his muck-pile, with stable manure and other debris, which sells for three or four dollars a car-load, to be taken into the country to enrich gardens and fields, and return again the wealth of which they have been robbed in the summer.

Why do people stay, do you ask? Because they can't get away, they know not where to go; thousands can't speak a word of English: thousands and tens of thousands find trades and openings for labor and bread-earning in this great, toiling city, that might hunt for months in the country for congenial employment and not find it. Nor would they know how to boil a potato well in our American kitchens: but they know how to make a living out of ash barrels. And many a poor woman thus keeps in bread and clothes a whole family of children, who perhaps are sent to the excellent New York public schools, and grow into respectable men and women. Truly, one half of the world does not know how the other half lives!

Nearsightedness.

Any one who has good eyes knows that a manuscript which he can read perfectly at the distance of three feet, can also be read as he brings it nearer and nearer to the eye, until only a distance of three inches intervenes. At three inches' distance, reading becomes difficult, and at two, hardly possible. A change has taken place in the interior of the eye, attended by a certain effort, to obtain this near sight; from optical reasons, the pupil must make a large curve in order to throw a picture of the object so close to the eye on the retina. This extreme convexity of the pupil is contrived by the action of a muscle at the back of the eye, called the accommodation muscle. For distant sight it is inactive, as the pupil requires only the ordinary gentle curve. But if that muscle is acted upon, a pressure at the back is felt; consequently, the most compliant part of the soft young skin at the back of the eye is distended, and the axis of the eye lengthened. If, then, the use of near sight is prolonged, if the pupil has not time to return to a level, if the muscle cannot repose, the continued effort will end in short sight. And it is not alone by this forced exertion, but also by the overabundance of blood in the veins of the retina, that the interior of the ball is enlarged. Such an overflow is generally produced by the return of the blood from the eyes having been arrested. This may be caused by the forward inclination of the head, and will infallibly lead to myopy. As it is, then, undoubtedly a fact that long attention to an object placed close to the eye, the head being bent down, will render healthy eyes shortsighted, we arrive at the consideration whether the furniture of the schools has anything to do either in hurting or repelling myopy.—*Bentley's Miscellany.*

Pneumatic Railroad and Country Homes.

In the language of Macaulay, "of all inventions, the alphabet and printing press alone excepted, those inventions that abridge distance have done most for the civilization of our species."

The observation of every thoughful man confirms this. Speed is the great civilizer and equalizer, for by it, the man who does business in Wall street, lives practically nearer his office if his home is in Newark, 8 miles off, than if he lived in 20th street, not half the distance away.

Enlightened philanthropy will eventually provide country homes for city laborers, as enlightened views of life have led so many professional and business men of the city to provide country homes for themselves and families. What railroads with a speed of 20 miles an hour and high fares have done and are doing for the wealthy; roads that will carry us 60 miles an hour, with low fares, would do for even the very poor whenever their labor is in demand in the city; and when it is not, their condition in the country would be far preferable to their present crowding in the disease-breeding cellars of the town.

Trains on pneumatic roads are in no danger of obstructions from malice, from snow, slides of earth or rock; or collision with men, beasts or vehicles, of running off the track, or of setting fire to buildings, stacks or woods; they relieve passengers from the smoke, cinders and dust that so oppress and injure eyes and lungs, and defile person and clothing; the roads can be built under cities, farms, gardens and pleasure grounds, thus greatly diminishing the damage done to property and consequently the cost of the right of way, dispensing with fences and leaving no land as a nursery for weeds; it is claimed that they can be built for the same cost as common railroads, be operated more cheaply; and are capable of higher speed. If these claims can be substantiated, pneumatic roads effectually solve the question, "How shall the laborers in our cities be housed?" Homes in the city *may* be as good for adults as homes in the country, but for children they *cannot*.

In addition, however, and auxiliary to these roads, men actuated by the spirit and resources of Peabody and Stewart, should buy 2,000 to 20,000 acres of land, from 20 to 40 miles from the city, accessible in as many minutes, lay it out into half acre lots, with streets, parks, church and school sites, houses, gardens, fruit trees and shrubbery; drains, water, sewers and gas, supplied in accordance with the best known methods, then sell or rent at a fair advance or interest on cost, and the poor as well as the rich, would have at command the facilities of improvement and innocent enjoyment which are so much more abundant in country than in city, and especially would exist in such a combination of city and country as is here suggested.—*Working Farmer.*

Valata Water Proof Cloth and Paper.

S. C. Bishop, of this city, has patented an application of valata gum, as follows:

"By soaking, macerating, and rolling in an even sheet, upon a web of cotton or other cloth previously coated or saturated with the substance, valata or balata, a gum which is obtained from a tree or plant indigenous to English, French, and Dutch Guiana, and other portions of South America, and which possesses, for the purpose of water-proofing, some advantages over both india rubber and gutta percha, as it needs no vulcanization like india rubber; and besides, being capable of withstanding a much higher temperature than gutta percha, is less friable and brittle than the latter substance. A most servicable water proof cloth, therefore, is thus prepared, by sheeting out valata or balata in connection with cotton or other suitable cloth, which may be applied to the manufacture of hose, or any other purpose for which water or damp proof cloth is required. In some cases, instead of the fully developed gum, the milk or milk juice of the younger shoots of the same tree may be used and applied to the cotton or other cloth by a brush, and the whole afterwards run through heated rolls.

"My invention has also for its basis or object the utilization of valata or balata in the manufacture of water or damp proof paper, applicable, among other purposes, as a substitute for parchment, and for making collars, cuffs, envelopes, bank-note paper, boot or shoe soles, and packing paper for silks, jewelry, and other purposes, where paper may be used, and which it is desirable should have a water or damp proof character. In the manufacture of my improved damp proof paper as prepared from or with the gum, the latter may be soaked, macerated, and rolled as india rubber is sheeted, and passed between calender-rolls with the sheet of paper applied to it, either on one or both sides. It may thus be made either in single or two or more thicknesses, the adhesive property of the gum serving to effect the union of the sheets."

Drinking Qualities of Water.—In a recent communication to the Chemical Society of London, it was stated that the noxious qualities of ordinary drinking water did not result usually from any mineral substances that might be dissolved in it. Ammonia should not be in appreciable quantity; but lime salts, while causing hardness, do not appear to affect the health. Nitrates too, alone, seem harmless, but when several of these substances occur together, the mixture seems to favor the rapid development of low forms of vegetable life, which are positively injurious. Experiments have been made in supplying pigeons with water containing these vegetable organisms, and it was found that they were purged almost to death; recovering, however, quickly, when the water was changed. The purification of such water, either by efficient filtration or by the precipitation of the organic particles, becomes clearly a necessity, if health is to be preserved.

Oak Feeding Silk Worms.—At the last session of the Royal Dublin Society, one of the members reported that his attempts to rear the Japanese silk worm in Ireland had been comparatively successful, and from the results obtained he was inclined to believe that the species could be easily acclimatized, and that before many years a new and important branch of industry would be opened from this source. The great disadvantage that the foreign worm labored under in that climate was that the worms were hatched before the oak trees leaved.

A Tale of Two Cities.—The Cheyenne papers having asserted that their city, boasting a population of seven thousand inhabitants, was probably the only city in the world free from rats, the Salt Lake *News* replies that its city is a place twice as large as Cheyenne, and twenty times as old, yet the presence of one of these generally well known rodents in Salt Lake would prove as great a natural curiosity as a chimpanzee in the streets of New York.

The Systems of Signaling and telegraphing adopted by government are now uniform in both our army and navy. The cadets at West Point and the midshipmen at Annapolis receive the same instructions, so that when they become officers in any contingency of land or naval service, they will be enabled to open and maintain communication, by codes of signaling and electric telegraphy identical in their operation.

The entire amount of gold in the world at the present time is estimated at about $5,950,000,000 in value. If melted together it would make a lump of 660 cubic yards. If beaten out into gold-leaf it would cover an area of about ten thousand square miles, a tract one hundred miles square, less than the extent of Vermont, and little more than a fifth of either New York or Pennsylvania.

It is said that omnibus signals have been introduced into Springfield, Mass., by which those who want to ride can communicate their wishes to the drivers. The character of the signals is not given, but anything would be preferable to the want of means of communication between passengers and driver now the rule in New York coaches.

Preserving Eggs.—A correspondent, I. H., of Chicago, Ill., writes that he is now using eggs two years old, preserved by a recipe which he has successfully tested for eight years. He gives it as follows: 1 peck good lime; 2 oz. cream tartar; 1 teacup of table salt. Slake the lime with hot soft water; when cold, stir in the salt and tartar.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

BEARING FOR SHAFTS.—John F. Laplace, Hamburgh P. O., Conn.—This invention relates to a new device for supporting the ends of vertical and inclined shafts, and of such horizontal shafts as are arranged in vessels, and which are, by the rocking motion of the vessel, liable to be thrown into an inclined or vertical position.

PIPE CUTTER.—Geo. B. Kirk, Newark, N. J.—This invention relates to the cutting of pipes or rods, and consists of a stock containing a cutting tool which is made to traverse around the pipe, and thereby cut a section of the same at right angles to the axis.

APPARATUS FOR STRAIGHTENING DEFORMED LIMBS.—H. R. A , M.D., Coarleston, Ill.—This invention consists of an apparatus for overcoming the deformity of the lower extremities when such deformity consists in the abnormal flexion of one or both of the lower limbs, as in some forms of anchylosis, or of club foot. It consists of a frame provided with straps to retain the limb firmly within it, and further providing the said frame with joints for flexing the same to fit the limb, together with springs for exerting a continual straightening tension, and other devices, perfecting the whole.

BOILER SCRAPER.—Auguste Poriel, New York city.—This invention relates to a new device for cleaning boiler tubes, and consists in arranging a series of disks upon a straight bar, said disks being held a suitable distance apart by means of washers interposed between them.

SHEARS.—A. H. Rennie, Binghamton, N. Y.—This invention consists in the use of one or more wheels which are attached to one of the blades and which are connected with the other blade by crank motion or its equivalents, so that when the handle of the immovable blade is grasped, and the wheel or wheels are placed on the counter and the shears then moved forward in any desired direction, the other blade will be set in motion by the revolution of the wheels, and will cut cloth or paper as quickly as the device is moved forward.

MILL STONE.—James Campbell, Peoria, Ill.—This invention relates to a new and useful device for conducting fresh air between a pair of mill stones and expelling it from the curb for the purpose of cooling the stones and carrying away the vapor arising from the friction when they are grinding grain.

PICKER FOR LOOMS.—Richard Leach, Linwood Station, Pa.—This invention relates to improvements in the construction of a picker for looms and consists in arranging and securing strips of leather upon the staff in such manner that the picker shall be very durable, while, at the same, it is exceedingly cheap and easy of construction.

SULKY HORSE HAY RAKE.—C. O. Luce, Brandon, Vt.—This invention relates to an improvement in the construction and arrangement of a sulky horse hay rake, and consists in attaching curved metal rake teeth to the axle instead of an independent cross-head, and connecting the thills to the axle by straps, or otherwise, so that the axle can turn freely and independently, instead of being rigidly connected with the thills; and further, in a segmental gear connection between the axle and the thills by which, at the pleasure of the driver, the rake teeth map be raised and lowered, while also, a clearer rod is worked by the same movement.

DIE PRESS.—John Mays and E. W. Bliss, Brooklyn, N. Y.—This invention relates to an improvement in a die press for heavy work, and consists in forming the sliding head or plunger with guides working in brass gibs set in solid cast boxes, and arranged in such manner as to be adjustable, to compensate or wear, and to be perfectly rigid and true in operation.

VEGETABLE CUTTER.—J. Caldwell, Chillicothe, Ohio.—This improvement relates to an improved vegetable cutter.

BURNER.—S. C. Pruden, Harmony, Ohio.—The present invention relates to a new and improved burner or tube for coal oil, and other similar lamps.

TRY SQUARE.—H. L. Ogden, Atkinson, Ill.—The present invention consists in so constructing a try square as to adjust itself to the edge of the material, and to afford a means of indication by a graduated scale, of the amount of accuracy in the work, whether it be more or less right angular.

REIN HOLDER.—Chas. A. Bradford, and Wm. Bradford, Crown Point Centre, N. Y.—This invention relates to an improvement in rein holders.

GRATES FOR STOVES AND FURNACES.—John W. Griswold, Philadelphia, Pa.—This invention relates to an improvement in the construction of grates to be used for stoves, heaters, and furnaces, for vertical steam boilers, or other purposes.

STOVE.—T. J. Frazier, St. Paul, Minn.—This invention relates to improvements in stoves, and consists in an arrangement of a bulkhead and of flues over and through which the products of combustion are led, giving a much greater radiating surface combined with less consumption of fuel than in the form of stove heretofore used.

BRICK MACHINE.—James Simpson, St. Louis, Missouri.—The object of this invention is to construct a cheap and simple machine by which compressed brick may be manufactured in a perfect and expeditious manner.

SINGLE HARNESS.—J. S. Reid, Orange, Ind.—This invention relates to an improvement in single harness, and consists in an arrangement of parts whereby the breeching hip strap, and the greater portion of the traces, are entirely dispensed with.

SOLDERING TOOL.—Joel Gleason, Whitestone, N. Y.—The design of this improvement is to make a solid soldering tool in two parts, and of the same or of different metals, and consists in forming the copper point with a screw in the back end which screws into a cast iron base, with a wrought iron handle, or a base and handle of copper, or any other suitable metal.

METALLIC FILE.—James Hatton, New York city.—This invention relates to a new and improved method of constructing file handles, and handles used for similar purposes, whereby files or screw drivers, and other tools of a similar nature, of different sizes may be used without changing the handle, and whereby the tool is much more securely fastened in the handle, while the handle itself is indestructible.

WASHING MACHINE.—Wm. Eberhard, Akron, Ohio.—This invention relates to an improved washing machine, and consists in a device for attaching to an ordinary washing tub, which device consists of two corrugated rollers, one of which has a slow rotary motion, and the other a reciprocating motion, between which rollers the clothes press and are rubbed.

ICE PICK.—S. Grant Hoyt, New York city.—This invention relates to a new ice pick, which is so arranged that it can be used for dividing blocks of ice into smaller pieces, and for separating such small pieces from the block, and also for breaking blocks into small fragments, which are used to cool beverages in the glass, and for other purposes.

SELF-BREAKING TELEGRAPH REPEATER.—J. H. Bunnell, N.Y. city.—This invention proposes to furnish an improved form of self breaking telegraph repeaters, by which the operator is enabled to do away with extra local batteries, heretofore generally used in all practical forms of self-breaking repeaters, and by so doing away with extra local batteries and the many necessary connections resulting from their use, to greatly simplify the general adjustment and operation of the complete instrument.

CULTIVATOR.—John T. Herndon, Bancroft, Mo.—This invention relates to a new and improved cultivator of that class which are provided with laterally moving shovels, arranged so that they may be moved by the feet of the driver, and also provided with shovels at the outer sides of the laterally moving ones, which, in connection with the latter, may be raised and lowered but have no other movement. The invention consists in a novel arrangement and construction of the parts, whereby a very simple and durable machine of the kind specified is obtained, and one which may be operated with the greatest facility.

CANE MILL.—B. F. Cauffman, Millerstown, Pa.—In this invention a partition is used to separate the juice expressed between the first two rollers with which the cane comes in contact from that expressed between the other rollers. The cane is partially crushed between the first pair of rollers, so as to obtain only a pure, colorless juice. It is afterwards thoroughly pressed by the second pair, and all the juice extracted.

HEAD REST FOR CAR AND OTHER SEATS.—James R. Childs, Richmond, Va.—In this invention the head rest is made vertically adjustable by means of a ratchet, and by the peculiar shape of the supporting rod the head rest is thrown forward when the seat is extended or reclined, so as to support the head in a more comfortable position, and dispense with the necessity of a pillow or other support under the head.

SLEIGHS, SLEDS, ETC.—David C. Frazeur, Sidonsburg, Pa.—In this invention the runner is used in connection with a wheel, the two being so arranged and operated that when desired the vehicle may be supported upon the runners, or by simply moving a hand lever, may be thrown upon the wheels, so that it can be instantly adjusted to travel upon snow or upon the bare ground.

MACHINE FOR BENDING TIRES.—Wm. Richardson and Louis Bermüller, New York city.—This invention combines a new arrangement of gear, by which great power is exerted at the points which require it; and a new method of adjusting the central roller, by which the tires can be more easily applied and removed than in machines used heretofore.

COUCH OR CRADLE.—Robert Hale, Chicago, Ill.—This invention has for its object to furnish an improved suspended couch, or cradle, designed especially for children, but equally applicable for other persons, which shall be cheap, durable, simple in construction, and portable, being capable of being packed in a very small space and carried in a traveling basket or satchel.

CROSS-CUT SAWING MACHINE.—Philander P. Lane and Joseph T. Bodley, Cincinnati, Ohio.—This invention relates to a new and useful improvement in cross-cut sawing machines, in which a reciprocating movement is connected to the saw carriage through the medium of a vibrating frame. The invention consists in the application to the saw carriage, or vibrating frame, either or both, of a center piece so arranged as to equalize the movement of the saw carriage. It further relates to an adjustable or graduated step for the purpose of limiting the backward or receding movement of the saw carriage to suit the length of cut required.

SKATING RINK.—J. H. A. Hervey, Cleveland, Ohio.—This invention relates to a new and improved skating rink, and has for its object the constructing of the same in such a manner that perfect ventilation will be obtained, and the water within the rink allowed to freeze without any difficulty whatever, and kept in a frozen state with a moderate temperature of the external air, the thawing or melting of the ice either from the rays of the sun or a high temperature within the rink being avoided when the external air in the shade is at, or a trifle above, the freezing point.

RECLINING CHAIR.—B. L. Southack, New York city.—This invention relates to a new and improved chair of that class which are provided with a movable hinged back and foot piece, connected together and arranged in such a manner that a person occupying the chair may convert the same from an upright sitting to a reclining chair, and consists in a novel manner of constructing and arranging the several parts, whereby chairs of this class may be very much reduced in the cost of manufacture, far more simple in construction and less liable to get out of repair than those now in use.

LAWN MOWER.—Amariah M. Hill, Hartford, Ct.—This invention relates to a new and improved device for mowing grass by hand, and is more especially designed for mowing lawns. The invention consists in a novel manner of constructing the frame of the machine, and inserting it on a roller, whereby the latter is made to have sufficient traction to drive in the most efficient manner the cutting device. The invention also consists in a novel manner of applying the handle to the frame of the machine, whereby the latter may be pushed along by the operator without at all affecting the equilibrium of the machine on its roller; in a novel and improved cutting device, which may be constructed at a very small cost and still be very strong and durable, and not liable to spring during the operation of cutting; and in a peculiar application of these to the device, whereby the hight of the cut may be regulated as desired.

PUMP LEVER.—Elijah Borton, Morris, Ill.—This invention consists in operating the pump by a cogged eccentric lever, which engages with cogged segments, which also cut eccentrically upon their centers, thereby imparting the required motion to the pump rod.

MACHINE FOR CLEANING AND SEPARATING WHEAT.—Thomas Hancock and John H. Leaman, Richmond, Va.—This invention has for its object to furnish an improved machine, by means of which cockle seed, onion seed, partridge peas, &c., may be separated from the wheat conveniently.

MEN'S SCARFS.—Henry G. Fisk and Thomas J. Flagg, New York City.—This invention has for its object to furnish an improved scarf, so constructed that it may be worn with a standing or turned-down collar, that it will fit all sizes of necks, and may be secured in place without hooks and eyes, buttons, or any other fastening.

CORN PLANTER.—James Gilbert, Wyalusing, Wis.—This invention has for its object to furnish an improved corn planter, which shall be simple in construction, effective, reliable, and accurate in operation.

BABY HOLDER.—Robert Hale, Chicago, Ill.—This invention has for its object to furnish a simple, cheap, and convenient device for holding a baby when left alone in a room, or at other times, or when traveling, so that the child may be protected from danger when left alone, and so that the mother may be relieved from the labor of constantly holding the child when present with it, or when traveling.

STEAM GENERATORS.—Edwin Chapman and Charles T. Allaire, Rochester, Minn.—This invention relates to a new and improved method of constructing boilers for the generation of steam, whereby the steam generating surface is greatly increased; and it consists, firstly, in the peculiar shape and formation of the fire box and combination chamber, and secondly, in the manner in which atmospheric air is introduced into the fire box.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisemets at $1 00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

M. W. H., of Ind.—Cloth is commonly made water-proof by the use of india-rubber in solution or in sheets.

T. C. E., of N. J., asks what is the coating which gives the Russia sheet iron its color and polish. This is a question our iron manufacturers have tried for many years to solve satisfactorily, but hitherto without perfect success. We believe the superiority of the Russian over our own plate is due to the quality of the iron as much as to some secret peculiarity in the processes of manufacture which many Americans have spent years in Russia to find out. In Vol. XVI. we published several articles on "Steam Boilers, Their Form, Construction, and Material," six of them illustrated.

E. A. M., of La.—"Will an air valve two inches diameter be large enough to prevent a vessel six feet diameter by five feet in hight from collapsing if the steam in the vessel is suddenly condensed? The vessel is made of three-inch cypress lumber, perfectly sound and clear." Much depends on the form and mode of construction of the tank as well as on the material of which it is composed. The valve is amply large for a tank properly built.

W. N. B., of Iowa.—"What is the best tool for checking gun stocks by hand?" A Yankee would reply "a pocket knife." We think a tool similar to a gager's marking tool would answer admirably. This is a blade, of a peculiar form, fixed in a handle, and having the end made into a V-shaped edge.

R. H. A., of Vancouvers Island.—This correspondent desires information on putting up salmon in hermetically sealed cans, and asks if he need fear explosion of the cans during the process of expelling the atmospheric air and how to determine whether the contents of a can will keep. We have seen the process of preparing lobster meat for market which will probably apply to his case. The meat was separated—after boiling the lobsters—by hand, placed in the cans, then a number of them closed—except a small hole in one end—placed on a rack, and lowered into a tank containing water kept at nearly a boiling heat by steam pipes. The heat expelled the atmospheric air in the form of steam, and soon as that ceased to be visible the small perforation in the top of the cans was dexterously closed by a bit of solder or a small cap of tin soldered on. Removal of the cans and their cooling completed the process. We think there is no danger of explosion. For an excellent method of soldering the cans we refer our correspondent to page 300, Vol. XVI. of the SCIENTIFIC AMERICAN.

S. M., of Conn., thinks we are wrong in doubting that cast-iron sled shoes run on snow with less friction than those of wrought iron. As the cast iron is cast in chills rendering the surface very hard, he thinks observation will convince any one that cast-iron shoes create less friction than those of wrought iron. There can be no doubt that a very hard, dense, and polished surface is better for this purpose than one of a more open and porous texture.

W. H., of Iowa.—"What amount of power is required to start (run?) a four-feet burr mill stone weighing 1,900 pounds, the stone to be properly hung, etc.?" Pallett, in his "Miller and Millwright" gives a five horse-power for a stone of that diameter. We suppose him to be as correct as any published authority.

D. McD., of Wis., says he has the pipe of his stove ascending several feet in an upright position, then horizontaly to a flue in the chimney, which connects, being open, with the room in which the stove is placed. At night he fills the stove with wood, nearly closing the draft, and in the morning the upright portion of the pipe is covered with black streaks made by the distillation and dripping of pyroligneous acid. None of this acid comes down the chimney flue. He asks, "how can I stop the acid running down the pipe when the draft is checked?" Open your drafts and, if you use green wood, burn it instead of distilling it. A sufficient amount of oxygen will produce combustion while an insufficient quantity will merely insure slow distillation; a fact of value to every householder.

S. H. B., of Me., in response to the inquiry of L. D. M., of Tenn., in No. 3, current volume, as to the best recipe for hardening mill picks, says that he uses the following, knowing it to be an excellent bath: 2 galls. rain water, 1 oz. corrosive sublimate, 1 oz. salammoniac, 1 oz. saltpeter, 1½ pints rock salt. The picks should be heated to a cherry red, cooled in the bath, and drawn to temper.

A. L. M., of Ind., asks how to polish plows from the grindstone. Either an emery wheel or an emery belt will do the business.

Business and Personal.

The charge for insertion under this head is one dollar a line.

For Improved Lathe Dogs and Machinists' Clamps, address, for Circular, C. W. Le Count, South Norwalk, Conn.

For Gas-Pipe Screwing and Cutting-off Machines for Hand or Power, or any tool used by Steam and Gas Fitters, address Camden Tool and Tube Works Co., Camden, N. J.

Inventors and Patentees wishing to get small, light articles manufactured for them in German Silver or Brass, address Schofield Brothers, Plainville, Mass.

$300 will buy a Patent of A. Grushus, St. Paul, Minn.

Agents wanted everywhere—enormous profits. Sample doz. $1 50. Retail for $3 each. Thomas Powell, Milroy, Ind.

Wanted, address of parties wishing scale removed from boilers by Winans' Anti-Incrustation Powder, 11 Wall st., N. Y., 12 years' recom's.

Wanted,—To be used in Elk county, Pa., a portable engine and boiler, of 30 horse-power, a circular saw mill, 30-foot carriage, planer, edger, shingle machine, and jack saw. Also, any other machinery connected with saw mill and tannery, if they are sold cheap. Address J. Schultz, Ellenville, Ulster county, N. Y.

One Third Interest in the Athens Foundery and Machine, Works for sale. Having an extensive collection of tools and patterns, a large circuit of custom, being in a healthy section of country, located among factories and mills. It is a desirable investment for a practical man. For full particulars address R. Nickerson, Agent, Athens, Ga.

Parties who have for sale instruments for measuring distances upon roads will please address Geo. C. Knapp, care C. E. Ward, Joliet, Ill. stating price.

Parties in want of a pair of Chilled Iron Rolls, 15-inch face, 9 inch diameter, with frame, can purchase them cheap by addressing Box 2,044, Boston, Mass.

Patent Right for sale. Curtain Fixture, Patented May 28, 1867. The whole patent right for sale. For particulars address C. H. Fowler, Box 35, Jamaica Plain, Mass.

Parties in want of an arrangement to open and close farm gates from team or saddle, which may be attached to any gate for two dollars, address E. Roth, New Oxford, Pa.

Parties in want of superior machinery for the manufacture of Sewing Machine Needles, address R. Thompson, Wolcottville, Conn.

Wanted—a small second-hand tubular boiler. Address J. J. Greenough, Deerfield, Mass.

EXTENSION NOTICES.

Henry Clark, of Cedar Keys, Florida, having petitioned for the extension of a patent granted to him the 25th day of April, 1854, for an improvement in machines for feeding sheets of paper to printing presses, for seven years from the expiration of said patent, which takes place on the 25th day of April, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 6th day of April next.

Nelson Gavit, of Philadelphia, Pa., having petitioned for the extension of a patent granted to him the 9th day of May, 1854, for an improvement in machinery for cutting paper, for seven years from the expiration of said patent, which takes place on the 9th day of May, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 20th day of April next.

John Myers and Robert G. Eunson, of New York city, having petitioned for the extension of a patent granted to him the 23d day of May, 1854, for an improvement in Machines for sawing thin boards, etc., for seven years from the expiration of said patent, which takes place on the 23d day of May, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 4th day of May next.

Harriet C. B. Bigelow, administratrix of the estate of Charles H. Bigelow, deceased, of Pittsfield, Mass., having petitioned for the extension of a patent granted to the said Charles H. Bigelow the 30th day of May, 1854, for an improvement in mode of manufacturing turbine wheels, for seven years from the expiration of said patent, which takes place on the 30th day of May, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 11th day of May next.

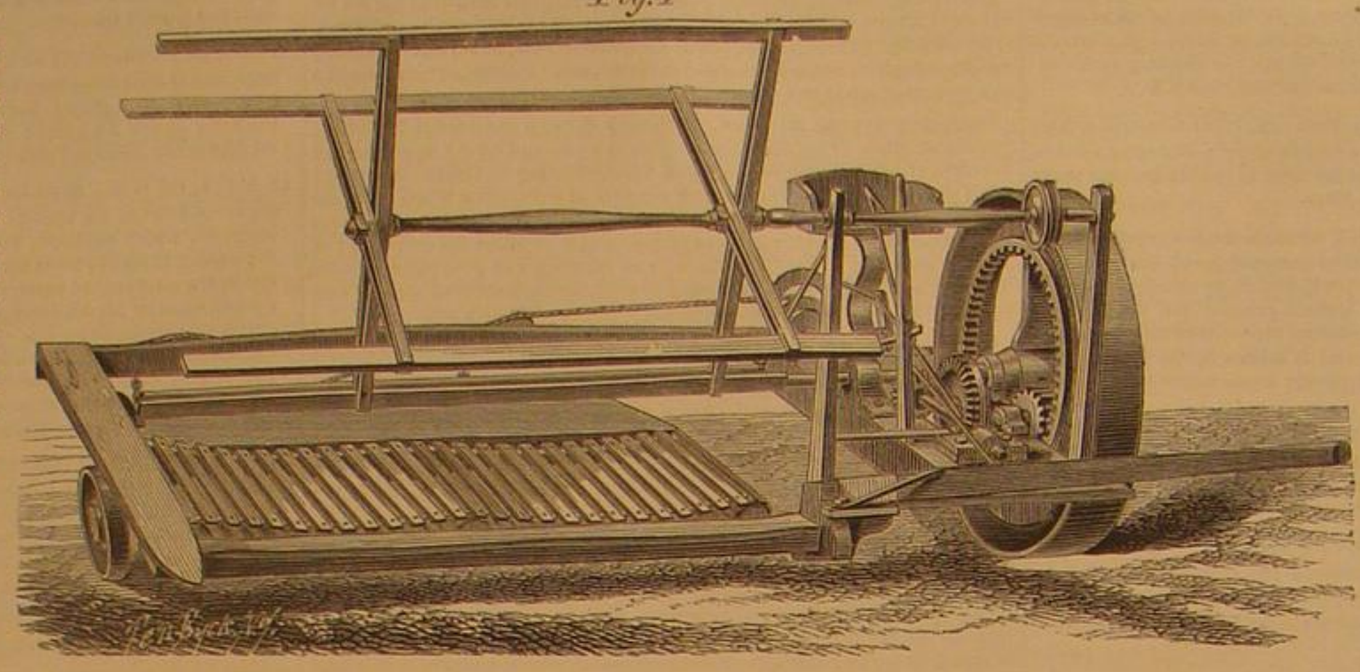
Daniel W. Shares, of Hamden, Conn., having petitioned for the extension of a patent granted to him the 1st day of August, 1854, for an improvement in cultivators, for seven years from the expiration of said patent, which takes place on the 1st day of August, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 22d day of June next.

Improvement in Automatic Harvesters.

The object of this invention is to automatically discharge the cut grain from the platform of a harvester in gavels ready for binding, the improvement consisting in combining an endless apron, moving intermittently, with a cut-off, which supports the falling grain while the apron is moving, and which is withdrawn when the apron stops, to permit the grain to fall upon the platform; the stoppage of the apron and the withdrawal of the cut-off being simultaneously effected by a single movement of mechanism operated by the driver.

In the accompanying engravings the rectangular frame of the machine is supported on two wheels, one the main driver and the other a smaller truck wheel. The driving wheel carries, as usual, a series of internal cogs, which drive a spur or pinion turning a counter shaft, which, by two bevel gears, drives the crank shaft, giving motion to the cutters by crank and pitman in the usual way. To the front end of the finger beam is hinged a platform, its rear end suspended from the frame by chains, by which the platform may be set at any angle with the ground. Parallel with the finger bar is a slotted endless apron mounted on rollers, the shaft of one projecting beyond the rear of the frame and carrying on it a pulley or a set of pulleys, driven by a cord or band from corresponding pulleys on the crank shaft. Intermediate pulleys are mounted in adjustable bearings to keep the belt taut. This arrangement of pulleys and belt drives the endless apron, the speed of which, relative to that of the other portions of the machine, being regulated by changing the belt from one series of the pulleys to another. In order to produce an intermittent action of the endless apron the pulleys on the crank shaft are made to shift or slide engaging with a feather and clutch; a link rod attached to a foot lever adjacent to the driver's seat enabling him to control the action of the apron. A cut-off between the reel and the platform is so arranged as to vibrate between and parallel to the reel and platform, and is operated at the same time as the pulleys which drive the apron, and by similar contrivances.

Fig. 1

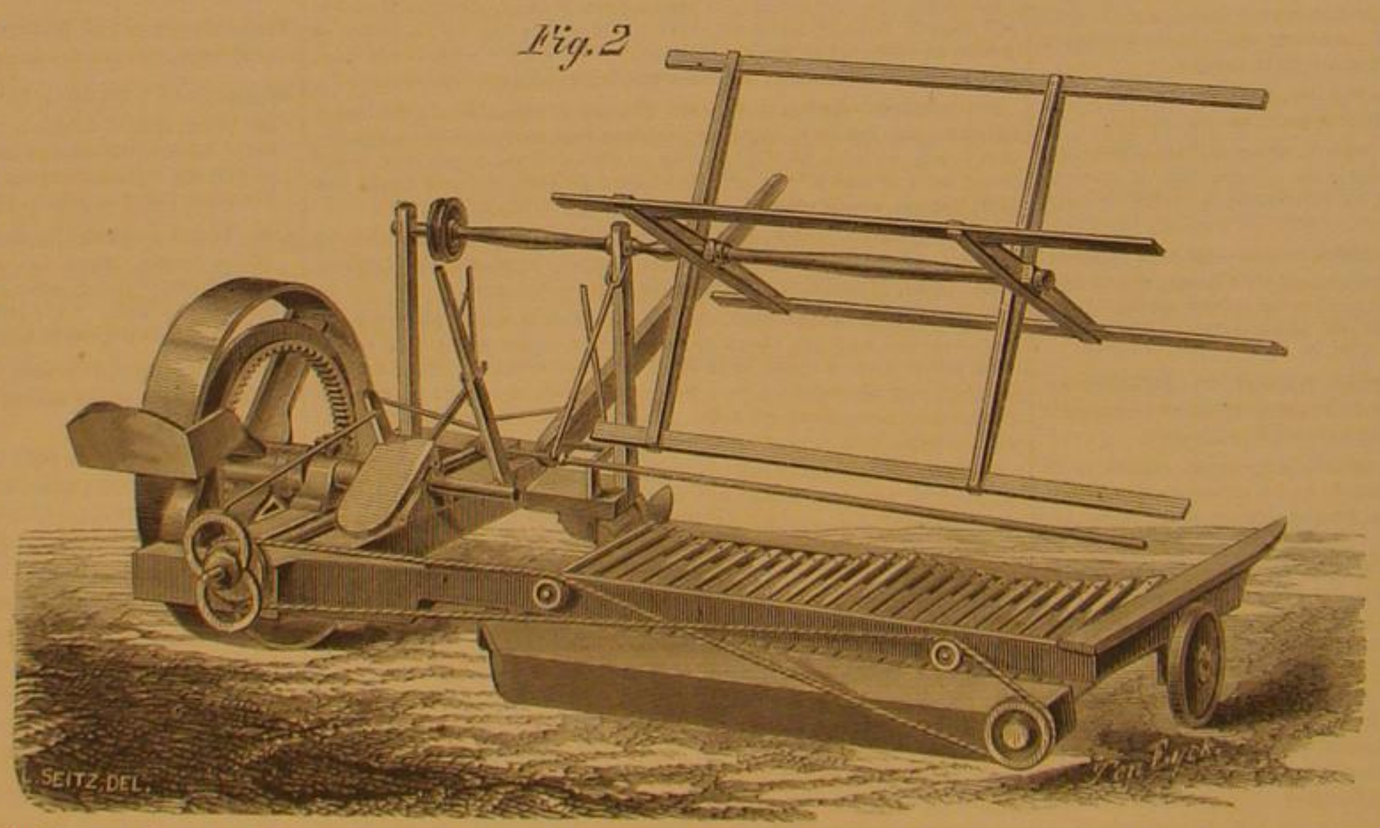


COLLINS' PATENT GRAIN HARVESTER.

The operation of the machine is as follows: the grain is swept up to the cutters by the reel, and when cut falls upon the endless apron, which is at rest, the cut-off rod being likewise withdrawn. When a gavel of sufficient size, in the judgment of the driver, has accumulated, he, with his foot, throws the pulleys into gear, starting the apron, which discharges the grain upon the ground between the driving wheel and the end of the platform and parallel to the latter. The same movement of the driver's foot which starts the apron, also interposes the cut-off, or receiving rod, between the reel and platform to retain and hold the grain from contact with the apron, while the latter is in motion. When the gavel is delivered the driver again throws the apron pulley out of gear, the apron becomes stationary, the cut-off is again withdrawn, and the process of receiving and discharging repeated.

In a test trial between nine different machines made October 27, 1867, in Huron, Canada, this machine received the first prize, showing, among its other advantages, much less draft, by the dynamometer, than the smallest and lightest machine on the ground.

Fig. 2



It was patented by James Collins, of Guelph, Canada, Feb. 19, 1867. All communications relative to rights and royalties should be addressed by B. G. Harris, No. 26 Commerce street, Baltimore, Md.

The Preservation of Leather.

A contributor to the *Shoe and Leather Reporter* gives some valuable hints in relation to the preservation of leather. The extreme heat to which most men and women expose boots and shoes during winter deprives leather of its vitality, rendering it liable to break and crack. Patent leather particularly is often destroyed in this manner. When leather becomes so warm as to give off the smell of leather, it is singed. Next to the singeing caused by fire heat, is the heat and dampness caused by the covering of rubber. Close rubber shoes destroy the life of leather.

The practice of washing harness in warm water and with soap is very damaging. If a coat of oil is put on immediately after washing, the damage is repaired. No harness is ever so soiled that a damp sponge will not remove the dirt; but, even when the sponge is applied, it is always useful to add a slight coat of oil by the use of another sponge.

All varnishes and all blacking containing the properties of varnish should be avoided. Ignorant and indolent hostlers are apt to use such substances on their harness as will give the most immediate effect, and these, as a general thing are most destructive to the leather.

When harness loses its luster and turns brown, which almost any leather will do after long exposure to the air, the harness should be given a new coat of grain black. Before using this grain black, the grain surface should be thoroughly washed with potash water until all the grease is killed, and after the application of the grain black, oil and tallow should be applied to the surface. This will not only "fasten the color," but make the leather flexible. Harness which is grained can be cleaned with kerosene or spirits of turpentine, and no harm will result if the parts affected are washed and oiled immediately afterward.

Shoe leather is generally abused. Persons know nothing or care less about the kind of material used than they do about the polish produced. Vitriol blacking is used until every particle of the oil in the leather is destroyed. To remedy this abuse the leather should be washed once a month with warm water, and when about half dry, a coat of oil and tallow should be applied, and the boots set aside for a day or two. This will renew the elasticity and life in the leather, and when thus used upper leather will seldom crack or break.

Band leather is not generally properly used. When oil is applied to belting dry it does not spread uniformly, and does not incorporate itself with the fiber as when partly dampened with water. The best way to oil a belt is to take it from the pulleys and immerse it in a warm solution of tallow and oil. After allowing it to remain a few moments the belt should be immersed in water heated to one hundred degrees, and instantly removed. This will drive the oil and tallow all in, and at the same time properly temper the leather.

Zig-zag Veneers.

A recent patent to Jno. B. Wilson, of New York city, is as follows:

"Previous to my invention it has been customary, in the cutting of veneers, to cut the log with a straight knife, in the direction of its length, so that the veneers would present little or no 'figure.' My invention consists in a veneer formed by cutting off a waved, crimped, or corrugated slab or stratum from the log, in such manner that the cut surface shall present the different shades of the grains, as cut at different angles alternately, in lieu of only the grain cut in one straight line from end to end, as heretofore. I propose generally, in the use of my improved veneers, to press them out flat, to apply to plane surfaces, but they may be made, adapted, and applied to corrugated or other-formed surfaces, with perfect facility, as will be understood by those familiar with the manufacture and use of veneers."

Surgical Pneumatics.

Dr. Maisonneuve, surgeon of the Hôtél Dieu, has communicated to the Academy of Sciences a paper on the advantages of a continuous aspiration in the healing of great amputations. He asserts that the liquids exuding from the surface of a fresh wound become morbid, in contact with the external air, and poisonous putrefaction at once ensues, and this is the principal cause of danger in surgical operations. The author was led to believe that if the liquid at the surface of the wound could be hindered from putrefying, that amputation, etc., could always be performed with safety to the life of the patient.

In carrying out this suggestion of Dr. Maisonneuve, an apparatus contrived by Dr. Guerin, was exhibited and explained at the same meeting of the Academy. It consists of a hemispherical balloon provided with three tubulatures, the central and largest one being fitted with a manometer of very simple construction, a graduated glass tube terminated by an india-rubber ball filled with mercury. The ball is inclosed in the balloon, so that in proportion to the vacuum effected in the latter the former is dilated, in consequence of which the mercury in the tube falls, a scale showing the amount of fall, and hence also the degree of rarefaction in the balloon. The second tubulature receives a tube communicating with the receiver of an air-pump, and by the third, communication is effected between the balloon and each patient or hospital bed by means of india-rubber tubes, so that "pneumatic occulsion," as it is called, may be extended simultaneously to all the patients confined in the same surgical ward. There are stop cocks for regulating the degree of vacuum in the central vessel, and the part under treatment is covered with a sort of india-rubber hood which effectually protects it in each case from the action of the external air. The inventor is convinced that by his method the expense of hospital dressings and the dangers of operations will both be much diminished.

Specific Gravity.

The weight of an equal bulk of different substances varies very much as every one knows. The plan has been adopted to compare them all with water, and the number representing how many times a body is heavier than water is called the specific gravity of that body. So as gold is 19 and silver 10 times heavier than water, those numbers 19 and 10 are said to represent the specific gravity of gold and silver. The heaviest of all known subtances is the very hard metal used for making points to the so-called diamond gold pens. It is called irridium; its specific gravity is 23. Next comes platinum, 21: gold, 19; mercury, 13·5; lead, 11·3; silver, 10; copper, 8; iron, 7; zinc, 6; different kinds of stones, from 4 to 1; aluminum, 2·5. Flax and all woody fibers have a specific gravity of 1·4 and are thus heavier than water, but wood will float or sink according to the number of its pores into which the water does not penetrate. So ebony and many kinds of hard wood sink, pine and all kinds of soft wood float. Cork is the lightest wood, its specific gravity being only 0·24, less than one quarter that of water. Alcohol is about three quarters the weight of water, and as the strength of liquor depends on the amount of alcohol it contains this strength is simply found out by its specific gravity indicated by the more or less floating of a little instrument called a hydrometer, the weaker liquid being little lighter than water has the strongest buoyant power; solutions of different salts, sugar, etc., being heavier than water, have a stronger bouyant power, and therefore vessels will sink less in the sea than in fresh water, and it is more difficult to swim in the latter than in the sea. The lightest of all liquids has a specific gravity of 0·6; it is called chimogene and is made from petroleum; it is exceedingly volatile and combustible; in fact, it is a liquefied gas. Carbonic acid gas or choke damp is about 500 times lighter than water; common air, 800; street gas about 2,000, and pure hydrogen, the lightest of all substances, 12,000 times. The heaviest substance has thus $23 \times 12{,}000$ or more than a quarter of a million times more weight than an equal bulk of the lightest; and the substance of which comets are made, has by astronomers been proved to be even several thousand times lighter than hydrogen gas.

AN exchange suggests that stoves on railroad cars should have a water reservoir underneath, so that if the car is overturned the water will be turned on the fire to extinguish it.

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MERETRICIOUS ORNAMENTATION OF MACHINERY VS. FINISH OF WORKING PARTS.

Considerable emotion has been manifested on the route of the New York Central Railroad, lately, in regard to the action of the recently elected President of the Company, Commodore Vanderbilt, in prohibiting the expenditure of time, labor, and money in the useless ornamentation of the locomotives run on that road. Being eminently practical he believes in sacrificing beauty to utility, appearances to efficiency. It is possible that the stir to which we refer is unnecessary and without adequate cause. To be sure, any machine may be made beautiful—agreeable and attractive to the eye—without impairing the efficiency of its action; but that efficiency may be secured with much less cost if the question of appearance should be left altogether out of the question.

It is undeniable that the most correct characteristic of beauty is the adaptation of the machine to the work to be performed, considered with reference to the circumstances under which the work is to be done. While we could expect no particular elegance of form or beauty of decoration either in a *Dunderberg* or a *Monitor*, or in a fifteen or twenty inch gun, we should look for both in a sewing machine. The one is intended for hard knocks, the batterings and hammerings of the elements and man's most destructive agents; the other subserves the comforts and enhances the elegancies of life. Still, a machine intended for the heaviest and roughest work, need not necessarily be uncouth, disproportioned, and ugly. It may present agreeableness of form and harmoniousness of parts without imparing its efficiency and be a pleasure to the eye of taste, even without the aid of useless ornament.

Evidently the primary object of a machine is to do the work expected from it effectually and economically. To this end proportion and fitness of parts, fine joints, fidelity of construction, and general good workmanship are necessary. These secured, the machine itself is completed. Whatever else of labor or time is added improves only the outward appearance of the machine without at all adding to its value for practical use. Yet it is safe to say that a large proportion of the work and time expended on machinery generally, is wasted in the effort to beautify without otherwise improving it. A few years ago we saw a set of machines for stocking guns, sent from a firm celebrated for producing highly finished as well as perfect work. Every portion of the machines was finished—not painted, nor only emery ground—but hand finished; the standards and frames as nicely polished as any of the working parts. This enhanced greatly the cost, and added to the attractiveness, but did not increase the working value of the tools. There can be no question, that the labor expended on this unnecessary finish was really wasted. This finicalness in machine manufacture is not to be desired.

There is no known method of finishing irregular forms by machinery; it must be done mostly by hand, which is costly, on account of the time required. It would seem to be the part of prudence to avoid this needless outlay, and divert the patient manipulation thus wasted to a perfection of the working parts. No intelligent and judicious manufacturer can object to the expenditure of time necessary to produce a perfect joint between working parts, as a valve and its seat, a journal and its box, etc.; but here the use of the scraper, the emery stick, the oil stone, and other similar appliances, might be measurably restricted, so far, at least, as most heavy machinery is concerned. Fancy tools, which are designed to be ornaments as well as useful appliances, need not be reckoned in this category.

Elegance of form and proportion of parts can be obtained with no additional cost over clumsiness and unfitness; it is just as easy to cast from a graceful pattern as from a combination of straight sticks. Paint and varnish, judiciously employed, will hide unsightliness of color and bring out the inherent beauties of form, while they will prevent oxidation, and save many hours of needless labor otherwise wasted in frequent cleaning. The mechanic can show his educated judgment in attention to these details, and in the avoidance of a waste of time, as well as in studious attention to perfection of parts and ease of working.

To this strictly utilitarian view, however, we do not wholly subscribe. Whenever and wherever the purchaser of a machine or tool desires the expenditure of the necessary labor, at a proper compensation, to make his machine a "thing of beauty," he provides a gratification not only for himself, but for others, which is truly commendable. The engineer and fireman of a locomotive will take more pride in a machine the finish and ornamentation of which attracts the attention and excites the admiration of others, than in a black, dingy, repulsive monster, whose only excellence is its power. Every piece of shining brass, polished iron or steel, or brilliant silver plate, becomes an object of care, attention, and solicitude, employing the time and attention which might otherwise be diverted to far less worthy objects. There is such a thing as esthetics in machinery, and our mechanics can justly lay claim to a large share of taste. It is sufficiently evinced in their laying out and contriving of tools, their combination of practical effect with pleasing appearances, and their delicacy of the finish of ornamental parts. This taste should be studied by managers, especially when its indulgence will not entail a heavy additional cost. The operator of a machine, taking the locomotive engineer as an example, becomes attached to the insensate mechanism he controls, and gradually makes it, or its welfare, a part of himself. He feels a pride in its action and in its appearance; but if that appearance is repulsive, he cannot long hold his rebellious tastes in control to his sense of duty, and the machine which should have been his pride becomes a source of annoyance.

These considerations should, we think, have some effect on our master mechanics and railroad managers. Give the operative mechanic a reason for a feeling of pride not only in the performance but the appearance of his machine, and his value as a workman or operative, as well as that of the machine, will be enhanced, while his own tastes and aspirations may be educated and elevated.

COMMISSIONER OF PATENTS' REPORT.

On another page may be found the annual report of the Patent Office for the year 1867. Persons versed in mechanical matters will be interested in examining the statistical portion of the report, which exhibits such a remarkable increase in the number of patents issued from year to year. The submitting of this report was about the last act of Commissioner Theaker before retiring from the Patent Office, and is a document very creditable to its compiler, being short and still comprehensive enough to contain everything of interest or importance to the public.

The financial condition of the Patent Office is most satisfactory, the surplus funds after paying the expenses continually augment. As in years past, the Commissioner shows the necessity for more room and justly pleads to Congress for relief in this respect. We hope the pressing necessities of the Office for additional space will be appreciated by Congress and that another session may not close without providing some remedy for the over-crowded state of the Office.

We observe that the report states, on the authority of the examiners, that the business of the Office is up to date. This is undoubtedly correct as applied to nearly all the classes, but there are a few out of the thirty-six which, to our certain knowledge, are not up with their work to within two or three months.

The present force is no doubt adequate to keep the work promptly up, and, if ample room can be provided, the business of the Office will be greatly facilitated.

IMPORTANCE OF A COMMISSIONER.

We notice, among a large number of names sent by the President to the Senate for confirmation, that of W. D. Bishop, of Bridgeport, Conn., for Commissioner of Patents. Mr. Bishop filled the office acceptably about the year 1860, and, if he is confirmed and accepts the appointment, he will give satisfaction to all having business with his department. Mr. Bishop is by nature and taste a mechanic, by profession a lawyer, and at present he occupies the important positions of President of the Naugatuck and New York and New Haven Railroads.

It is very important that the place made vacant by the resignation of Mr. Theaker, be filled without delay; and it is equally important that the office be filled by a competent person. Intricate questions arise every day, which require prompt and correct decisions; and, that uniformity of policy may exist throughout the office, it is important that it should not remain without an executive head longer than necessary.

Cases of extensions and reissue of vast importance to the patentees are coming up constantly for adjudication, and it is important in many cases, and desirable in all, that the Commissioner should review the decisions made by the examiners before they receive the official seal.

The office should be filled by a man of integrity, ability and executive force. Give us a Commissioner, possessing these qualifications, and that right early.

Patent Office Illustrations.

To Messrs. E. K. Jewett & Co., Buffalo, N. Y., we are indebted for another installment of their most excellent illustrations, prepared for the Patent Office Reports for 1866. The execution of these engravings is superbly done, and it is a pity their beauty should be spoiled by being printed on a Government press.

Singular Explosion.--Sorghum Separator Blown Up.

We copy the following account of an extraordinary occurrence from the *Prairie Telegraph*, Rensselaer, Ind., of Jan. 23, 1868:

We learn that quite a singular accident occurred at the residence of Mr. F. W. Bedford, half a mile east of town. Mr. Bedford has on exhibition a patent sorghum sugar separater, which is said to make 2,000 revolutions per minute, separating the sugar from the molasses through a screen by centrifugal force. One day, the first of the week, two or three gentlemen took some granulated sorghum and went out there to experiment with it; not finding Mr. Bedford at home they undertook to "run the machine" themselves, poured in the molasses cold, without thinning, and very fast, all the while working the machine to its utmost capacity. Becoming delighted with its working, they tried to put on more power when it burst with a noise like the explosion of a sixty-four pounder shell, and one of the fragments striking one of the experimenters, Mr. M. V. B. Warner, on the back of the head knocked him down; he was taken up senseless and brought to his home in town, but is now able to be about.

The question arises, what was the cause of the explosion? The machine is conical in form, ten inches in diameter at the top and some sixteen at the bottom: it is composed of thick Russia sheet-iron bound with two hoops of wrought iron three eighths of an inch thick by two and a half to three inches wide; inside of this is a conical-shaped sheet of perforated brass near a quarter of an inch in thickness, and working within this is an upright iron shaft with a cast-iron circular plate about half an inch thick and seven inches in diameter attached near the top. The explosion of the sorghum burst the circular cast-iron plate, the perforated brass cone, the sheet-iron casing and both of its wrought-iron bands, making a complete wreck of the machine, and scattering the fragments in every direction. After Mr. Warner recovered from the effects of the blow, he discovered that his clothing was thickly spattered over with a kind of black gummy soot, in appearance very much like burnt sugar. Was the explosion caused by the friction of the machinery and granules of sugar eliminating and igniting a latent and highly explosive gas contained in sorghum sugar? The effect of the explosion indicates a force but slightly inferior to gunpowder.

It seems to us that this explosion or bursting was the result of centrifugal force, as in the case of a grindstone driven at too high a velocity.

Sugar, when heated somewhat above 420°, yields combustible gases, with carbonic acid, empyreumatic oil, and acetic acid. A portion—about one-fourth in weight—is charcoal, so pure as to burn without residue. If the sugar had been confined, as in a retort, it would not be impossible that sufficient heat might be generated by friction due to the rapid motion of the machine to thus decompose the sugar and cause explosion. But, as we understand it, the cylinder containing the sugar was open to the air; consequently there was no confinement and apparently no sufficient conditions for gaseous explosion.

TURNING A MOVABLE WHEEL AROUND A FIXED WHEEL.

In continuing this subject it will be proper to refer again to the original question which gave rise to the discussion. The original inquiry, published on page 347 of Vol. XVI., was: "How many revolutions on its own axis will a wheel make in rolling once around a fixed wheel of the same size?" Our answer was, "One." Another correspondent, page 39, Vol. XVII., stated that we were wrong, and that "two" was the proper reply. We made some remarks in connection with the matter, but adhered to "one revolution" as correct."

On page 67 of the present volume, L. M. renews the subject and presents a diagram and postulate to demonstrate that we are wrong, and states that "the number of revolutions, on its own axis, that a wheel will make in rolling around a fixed wheel of the same size is two. "Don't you think so?" We replied that we did not think so, and that we still adhered to "one."

L. M.'s diagram seems to have created much interest in the subject, and since its publication we have received probably half a bushel of letters from correspondents, most of whom adopt L. M.'s theory, and insist that the rolling wheel makes two revolutions on its axis.

We shall make selections from some of these communications, and would gladly publish them all, but the number is too great and our space limited. We trust that no one will feel hurt by the omission of his letters. We will begin with "L. M.," who again writes as follows:

DEAR EDITORS:—Under the pressure of the multifarious exigencies of such an editorship as yours, you cannot afford to give much time or thought to those merely curious questions that seem to have little or no reference to your leading purpose—the utilization of scientific truths. The question at issue is probably ranked by you in the class of idle speculations. But it seems to me that every fact developed by the operations of various combinations of mechanical agencies, although at present of no apparent value, may, in the course of the rapid increase of mechanical devices, find in some of them a fitting place, where a knowledge of such fact might facilitate, or even be essential to the perfecting of the device.

It is manifest that your judgment, appended to my article on page 67, Vol. XVIII., was derived from a very hasty glance at my diagram, without giving any heed to my postulate or to my remarks on its application; for you ignore them all. I therefore beg to recall your attention to that postulate, which is in these words:

"Two diametrically opposite points on the periphery of a wheel cannot exchange places without half a revolution of the wheel."

This is self-evident, and you will not controvert it. But your assent to it will settle the question; for the diagram shows to the eye, in a manner admitting of no misconception, that in rolling once around the fixed wheel the opposite points on the periphery of the free wheel have exchanged places four times, each exchange involving half a revolution of the

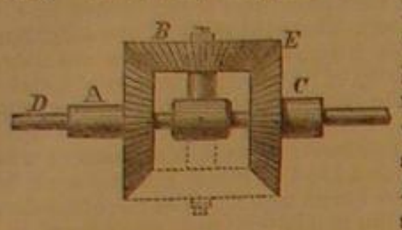
wheel. Therefore, as *two* is the sum of *four halves*, it follows that "the number of revolutions on its own axis that a wheel will make in rolling *once* around a fixed wheel of the same size is *two*. L. M.

Germantown, Phila.

We would say that we do not object to L. M.'s postulate nor ignore his remarks. He has a right to choose his own method of demonstrating the correctness of his conclusion. This he does by assuming that "Two diametrically opposite points on the periphery of a wheel cannot exchange places without a half revolution of the wheel. Therefore, as two is is the sum of four halves, it follows," etc.

We do not think it needful to discuss the correctness of L. M.'s postulate, because to do so would be to switch off on to another subject. The question under discussion is, "How many times does a wheel turn on its own axis in rolling around another wheel of the same diameter?" The subject of exchange of places of diametrically opposite points, as proposed by L. M., is still another question.

Messrs. Editors:—I have taken the "Scientific" all the time since 1850, except what time I served Uncle Sam in the little "onpleasantness," and I have always put faith in your decisions, but now I think you have made a mistake, Vol. XVIII., No. 5, page 67, in saying, "We still adhere to one." Look at my diagram and see if you are not wrong. Let the annexed represent what is known as a "compound" composed of three miter gears, such as are used in cotton speeders and fly frames. The gears, A and C, run loose on the shaft, D, the gear, B, runs on a stud fastened at right angles to shaft, D. Now if you turn one of these gears a revolution the other two will each make one revolution, but if you hold one fast, say A, and turn the shaft, D, once round, so as to carry the gear, A, once round A, the gear, C, will make two complete revolutions. Taking the diagram, if you mark a tooth at E, on the gear, C, and turn the shaft, D, until B is in the position of the dotted lines, the tooth, E, will be at the top, having made one revolution. I think you will now acknowledge that it is "two," and not "one." If you "don't see it," you can convince yourself, if you will take the trouble to get three miter gears and try it.



Any man who has worked in a cotton mill and knows the principle on which the speeder works, knows that a wheel revolving round one of the same size will make two revolutions round its own axis. I write this simply to correct your error, for having such faith in the "Scientific," I don't wish to see any mistakes uncorrected. J. H. Glover.

We don't see it. We still adhere to "one."

W. E. H. belongs to the "two" revolution philosophers, and says: "As seeing is believing, I send herewith a model designed to illustrate the question." We have received the model, which is quite neat, and clearly shows that the loose wheel turns only once on its axis in passing once around the fixed wheel. We are having the model engraved, and the diagram will appear next week. Will W. E. H. please send his explanation again? We have mislaid his letter.

Messrs. Editors:—I think your correspondent L. M. has rather the best of the argument in regard to the wheel revolving around one of its own size. You must certainly see that if your starting point, *a*, which is on the right hand side of the movable wheel, comes on the right hand side of the same wheel, it has made one revolution on its axis as certainly as the earth makes one revolution every time you see the sun in the east. It is not necessary that the same points should come together to produce one turn on its own axis.

Tom Brown, Foreman Buckeye Works.

Poughkeepsie, N. Y.

Messrs Editors:—Your correspondent L. M., Vol. XVIII., No. 5, page 67, gives you a diagram by which he proves himself correct, that a wheel rolled around a fixed wheel of the same size makes two revolutions around its own axis. You say by his diagram he proves himself wrong, and you give *a a* as the true starting point. It makes no difference what starting point you have, the result is the same. I have tried the experiment, to the satisfaction of all who have seen me roll the wheel around a fixed wheel of the same size. I believe I can convince any one by showing them the operation.

If you will look at the diagram you will see that your starting point, *a*, is on the right hand side of the center of the wheel before it is moved. When it is rolled to B, you see it stands on the left of its own center, showing one half revolution, and when rolled to C, your *a* stands again on the right, just as it stood before being moved, proving positively that it has made one revolution around its own axis. Rolling on to the place of beginning will duplicate the above result, proving I think beyond a doubt that a wheel rolled around a fixed wheel of the same size will make two revolutions around its own axis.

Are you now convinced or do you still adhere to "one?"

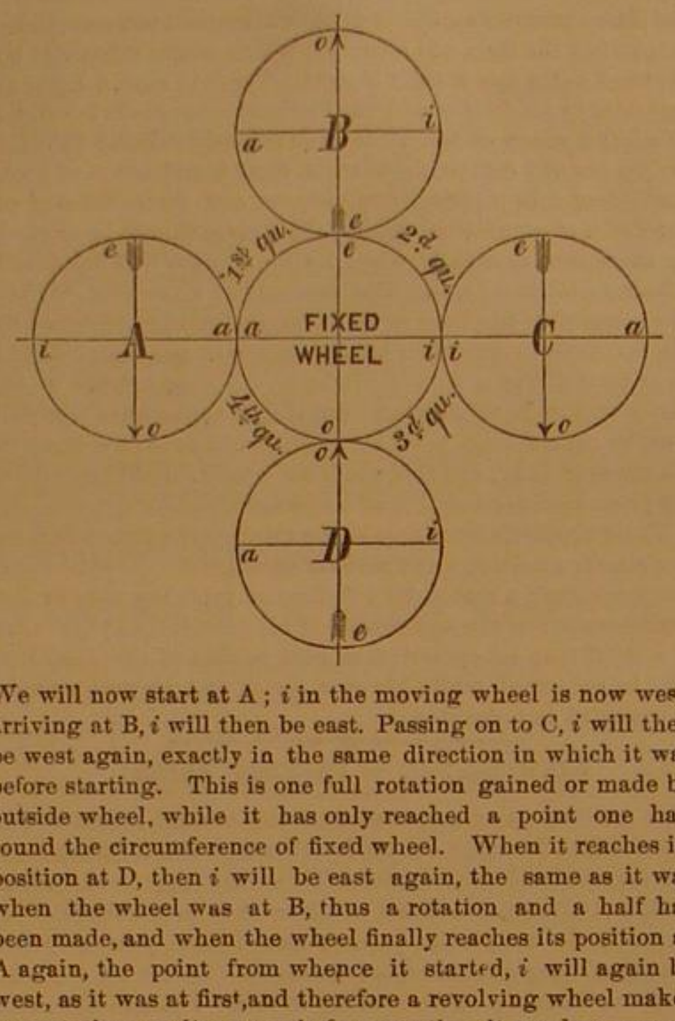
Tarrytown, N. Y. C. D. S.

You are wrong. We adhere to "one."

Messrs. Editors: I hope that you will excuse anything that may seem wrong or too officious on my part in this note. It is true I have no business with the point in dispute, but my anxiety and ambition for the success, worldwidely, of the Scientific American, and for the scientific renown of its editors, is such I cannot refrain from thus addressing them.

The diagram I give is copied from that of L. M., page 67, Vol. 17: it is therefore substantially the same; like letters representing like points, etc., and the only true way to read that diagram, in my opinion is to observe the points of direction in which the arrow or any one of the letters lie in, as the moving wheel reaches the successive quadratural points upon the fixed wheel. If we look only to the relative letters of the movable wheel as related to those of the fixed and central wheel, we shall be deluded and deceived, as sure as light shines; for *a c i o* in the moving wheel will run into *a c i o* in the fixed wheel forever and forever (as the saying is), but if we want to master the difficulty, and arrive at a true and absolutely certain solution of the point in question; we must at once look away from the central wheel, and their relative points upon the moving or outside wheel; and strike right into the point of inquiry which asks, "In what direction does any one point upon the periphery of the moving wheel lie when that wheel reaches the successive quadratural points of the fixed wheel.?

If we lay the diagram down upon the table in such a position that A will be west, B north, C east, and D south, then we can not fail to arrive at the true solution of the problem.



We will now start at A; *i* in the moving wheel is now west; arriving at B, *i* will then be east. Passing on to C, *i* will then be west again, exactly in the same direction in which it was before starting. This is one full rotation gained or made by outside wheel, while it has only reached a point one half round the circumference of fixed wheel. When it reaches its position at D, then *i* will be east again, the same as it was when the wheel was at B, thus a rotation and a half has been made, and when the wheel finally reaches its position at A again, the point from whence it started, *i* will again be west, as it was at first, and therefore a revolving wheel makes two rotations on its own axis for every time it revolves around a fixed wheel.

I hope that this will be sufficiently plain to satisfy Eds. that there are *two* revolutions or rotations instead of one, as they say. If it is not satisfactory, I hope they will overlook my officious anxiety, as it is for Eds'. sakes that I thus write.

Gloucester, N J. John Hepburn, Sr.

We feel obliged to Professor Hepburn for the kind feeling which prompts him to attempt to relieve us from what he supposes to be an error. The author of the great Hepburn theory of Recession will be a powerful aid to L. M., and his many supporters. But we still adhere to "one."

Messrs. Editors:—You and your correspondent, L. M., are both to a certain extent right.

Suppose a blacksmith wishes to take the size of a wagon wheel for the purpose of making a tire; he walks around the wheel, applying his "traveler" to its circumference and notes, say, six revolutions, but in walking around the wheel he turns his body once round. This is your case. In place of this, should he stand still, keeping the handle of "the travelers" always in one direction, say North and South, and so run it round the wheel, his chalk mark would pass the handle seven times. This is L. M's case.

In fact, this case is analagous to the revolution of the earth around the sun, when we have 366 sidereal against 365 solar days. M. B.

New Jersey.

Ice-House Knaves.

We are in receipt of letters from correspondents, in various parts of the country, stating that persons traveling in the guise of agents are demanding, of farmers and others, having ice-houses, payments for a pretended infringement of a patent. The alleged infringement consists in having a hole, or any other sort of ventilator, made in the ice-house. We are informed that thousands of dollars have been collected by this impudent system of swindling. If the Scientific American were read in every family, as it ought to be, it would be unnecessary to warn the public against such miserable deceptions. No valid patent can now exist upon the idea of ventilating ice houses. It was in common use before our patent laws were created. A good article upon ice-houses, in which the proper method of ventilation is described, will be found on page 144, Vol. II., of the Scientific American, January 30, 1847—twenty-one years ago. Other back numbers contain several articles upon the subject.

Remarkable Tenuity of Gold Leaf.

Probably one can get as good an idea of the surprising tenuity of the gold leaf ordinarily used in gilding from a consideration of its price as compared with its amount in square inches as by any other illustration. A "book" of twenty-six leaves, each four inches square, composed of gold of twenty-three carats purity, is sold, at retail, even in these times of a depreciated currency for fifty cents! Four hundred and sixteen square inches of pure gold for a fifty-cent scrip!

SHIPS' PUMPS DONE AWAY WITH.

Some of our Canadian papers and friends are excited over an alleged new invention, and, as they think, remarkable for removing water from vessels without a pump. A device was lately tried at Montreal, in a small boat, the ice on the river having been previously cut away. The result is not given. The invention consists in having a pipe projected through the bottom of the vessel, the pipe having an aperture which opens towards the stern. The idea is that the forward movement of the boat will produce suction through the pipe, and thereby draw out any water that may be contained in the vessel. E. P. Jay is the fortunate Canadian who is awarded as the discoverer of this improvement, and it is stated in the Montreal paper that he has obtained letters patent in the United States and other countries. But we observe no patent granted to him as yet in this country. The idea of the device is not new. It was described in the Scientific American, page 185, of our paper, Vol. 16, March 13, 1867; and on page 72 of the same volume is an engraving thereof. Letters patent of the United States were granted for the invention to Moses F. Bagley, Alton, Ill., Oct. 30, 1866.

A Near View of Flowing Lava.

Bayard Taylor, the celebrated traveler and writer was present on Mt. Vesuvius during its recent eruption, and describes the appearance of the moving lava as follows:—

"There appeared to be two streams, both moving in the same manner—that is, only partially flowing on the surface of the old lava, but burrowing under its loose crust, splitting and upheaving it, and mixing its materials with the new mass. The noise of the flow was thus produced. The fire was silent and irresistible; there was no hiss or spluttering of the molten elements, but the stream lifted and threw off solid masses, even tuns in weight, without the least apparent force or check.

"I had always imagined a thick, sluggish stream, with a tolerably smooth surface, something like the flow from a smelting furnace—but here were moving mounds, rough and shapeless, the chief power of which lay in their bases, hidden from sight—strange creeping, mining forces, moving forward with a horrible, pitiless certanty in their locomotion. If the scene was less grand in its features than one would expect, it was at least diabollically impressive. It expressed only destruction, and of the most cold-blooded, deliberate kind. The main stream had raised a long ridge, some twenty feet in hight, apparently cold on the surface, until some squirming movement in advance shook off the crust in scales, and showed fangs and throats of intensest fire. The front of this ridge was constantly hurling huge masses, some of them red-hot, down the gorge. The nearer stream was not more than four feet in hight, and allowed us to approach near enough to poke its glowing sides with a stick. All along its edge boys were busy roasting eggs for travelers, or imbedding coins in the fluid lava, which they snatched out of the mass and twisted off, very much as I have seen children manage molasses candy. The heat, even at a hundred yards distance, was uncomfortable, and I could not stand beside the moving lava for more than a few seconds at a time."

Business Shrewdness.

"A New England manufacturer performed a shrewd trick. The chief market for his wares has been found for many years in Boston, but early in the spring his customers notified him that their stock was full, and that they required no more till next year. This was very unpleasant news; the factory was in danger of stopping if no more orders came. Thereupon, without delay, the manufacturer went to New York, got an order for five thousand dollars' worth of goods from one of the heavy wholesale dry goods houses, went home, and started his factory to fill the contract. The Boston houses were immediately notified that he had received a large order from New York. 'Bless us!' they said, 'business must be coming up—make us five thousand dollars' worth.' The maker began work upon contract No. 2, and two days afterward the New York house sent another order, which was also duplicated by the Boston dealers. At last accounts, the factory, just out of Boston, was spinning merrily, and the owner was a proud and happy man."

We copy the above from an English paper. The dodge accredited to New England was probably never heard of down there; but knowing that the manufacturers of Massachusetts, as well as other States, are anxious to adopt every honorable strategy to sell their goods, we publish this for their benefit.

Aluminum.

F. W. Gerhard obtained a patent in 1856, in England, for an "improved means of obtaining aluminum metal and the adaptation thereof to the manufacture of certain useful articles." Powdered fluoride of aluminum is placed alone or in combination with other fluorides in a closed furnace, heated to a red heat and exposed to the action of hydrogen gas which is used as a reagent in the place of sodium. A reverberatory furnace is used by preference. The fluoride of aluminum is placed in shallow trays or dishes, each dish being surrounded by clean iron filings placed in suitable receptacles; dry hydrogen gas is forced in and suitable entry and exit pipes and stopcocks are provided. The hydrogen gas combining with the fluorine "forms hydro-fluoric acid, which is taken up by the iron and is thereby converted into fluoride of iron." The resulting aluminum "remains in a metallic state in the bottom of the trays containing the fluoride," and may be used for a variety of manufacturing and ornamental purposes.

OFFICIAL REPORT OF PATENTS AND CLAIMS

Issued by the United States Patent Office,

FOR THE WEEK ENDING JANUARY 28, 1868.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each Caveat.....$10
On filing each application for a Patent, except for a design.....$15
On issuing each original Patent.....$20
On appeal to Commissioner of Patents.....$20
On application for Reissue.....$30
On application for Extension of Patent.....$50
On granting the Extension.....$50
On filing a Disclaimer.....$10
On filing application for Design (three and a half years).....$10
On filing application for Design (seven years).....$15
On filing application for Design (fourteen years).....$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $300 on application.

☞ *Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to Inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.*

73,687.—CONSTRUCTION OF MILK CAN.—Estes Abbott, Willoughby, Ohio.

I claim a new and improved milk can, as described, constructed in the manner substantially as herein set forth.

73,688.—WELL TUBE.—Hiram Arnold, Gowanda, N. Y.

I claim the combination of the interposed shoulder, f, of the driving point, C, and the interposed section of tubing, i, with the external tube, H H', and internal tube, A, said interposed portions being of a different material, for the purpose of relieving the parts in contact from the injurious effect of the concussion in driving, constructed and arranged substantially as set forth.

73,689.—MANUFACTURE OF SODA AND SULPHURIC ACID.—Haydn M. Baker, Rochester, N. Y., assignor to himself and H. M. French, Springfield, Mass.

I claim, 1st, The recovery of the sulphuric acid from salt cake, by the use of silicic acid, with or without charcoal, in the manner herein described, or any other process substantially the same.

2d, The decomposition of the silicate of soda with quicklime, in the manner herein described, or any other manner, substantially the same, and which produces the same intended results.

73,690.—CAR SPRING.—E. U. Benedict, Chicago, Ill.

I claim, 1st, A spring so applied between the bearings that the weight of a light load is sustained about midway of the length of the spring, the manner of application being also such that the resisting power of the spring is proportionately increased according to the increase of the weight to be sustained, all substantially as herein described.

2d, The upper bearing block, or blocks, so constructed and applied upon a spring that the weight of a light load is sustained at the middle of the length of the spring, and the weight of a heavier load transferred nearer the ends of the spring, substantially as described.

73,691.—FRUIT DRYING APPARATUS.—D. K. Boswell, Columbus, Ohio.

I claim, 1st, The herein described dryer, when constructed in sections, so that it can be taken apart and put together, in the manner and for the purpose substantially as set forth.

5d, The top, B', when constructed so as to form an air chamber, H, provided with ventilations, I, dampers, F, in combination with the walls of the dryer, for the purpose and in the manner substantially as described.

3d, The flue, L, jacket, I', as arranged in combination with the chamber, H, in the manner as and for the purpose set forth.

73,692.—FRYING RACK.—Frederic Bucknam, Portland, Me.

Antedated Jan. 11, 1868.

I claim the reversible frying rack, substantially as herein set forth and described.

73,693.—MACHINE FOR MOLDING PAPER COLLARS.—George W. Cilley and George H. Spaulding (assignors to the Norwich Paper Collar Company), Norwich, Conn., assignors to American Molded Collar Company.

We claim, 1st, The two flexible clamping plates or formers, A B, in combination with eccentrics, h, and handles, i, for closing and bending the same, substantially as and for the purpose specified.

2d, The cams or eccentrics, h, handles, i, hinge straps, t, and bars, g, in combination with the clamping plates, A B, springs, m, and supporting piece, n, substantially as and for the purpose specified.

73,694.—COMPOSITION OF MATTER.—George F. J. Colburn, Newark, N. J.

I claim, 1st, Doing away with the frangibility of gum shellac by means of asbestos, as specified.

2d, Also increasing the strength and tenacity of shellac, in the manner described.

3d, Also rendering the shellac less liable to the action of heat by the incorporation with it of asbestos in the manner specified.

4th, Also the compound, substantially as and for the purpose named.

73,695.—RAG CUTTING MACHINE.—John Collins, Jr., and Nicholas R. Nixon, Richmond, Ind., assignors to N. R. Nixon, Thomas Nixon and Allen T. Bennett.

We claim the combination of the knives, n n n, arranged upon the shaft, c, with the guard plate, A, all constructed and operating substantially as and for the purposes described.

73,696.—SEWING MACHINE.—Emil Cornely, Washington, D.C.

I claim, 1st, The combination, with the revolving looper, constructed as described, of an auxiliary looper, under the arrangement described, whereby a Wilcox & Gibbs machine, without changing its functions as a single thread machine, may be used as a double thread machine, substantially in the manner and for the purpose described.

2d, Operating the reciprocal auxiliary looper, when combined with a rotary looper, constructed as above described, by means of a circular eccentric substantially as and for the purposes set forth.

3d, The combination of the driving mechanism of the reciprocal looper with the driving mechanism of the rotary looper, by means of a reciprocating lever, receiving its movements by means of an oblique pin on the connecting rod of the eccentric of the main shaft.

4te, In combination with the lever, N, for driving the reciprocating looper of the coupling and uncoupling device, substantially as and for the purposes described.

73,697.—KNITTING MACHINE.—Thomas Crane, Fort Atkinson, Wis.

I claim, 1st, The mechanism, substantially as described, for allowing the cam plate, by which the needles are moved, to have an oscillating motion, substantially as described.

2d, Mechanism, substantially as described, for the adjustment of the needles in front of the cam plate, H, when it is desired to throw some or all of the needles out of action, substantially as described.

3d, The attachment of the arm, J, or its equivalent, directly to an oscillating cam plate, H, which is provided with a pivot, f, about which it moves, substantially as described.

4th, The combination of an adjustable work holder, D, and an adjustable jack, substantially as described.

5th, The spool or yarn holder, F, with the tube, I, or the equivalent thereof, constructed to operate substantially as described.

6th, The bow spring, G, applied to the reciprocating perforated arm, C2, in such manner as to lift the yarn between the two passages, c d, on its way from the spool to the work, said spring being so constructed as to keep an even tension upon the yarn, with little or no friction, substantially as described.

7th, A setting-up device, S t, constructed with its hooks, t, all arranged in the direction of the length of the plate, S, as shown and described.

73,698.—SIGNAL ROPE GUIDE.—Wm. G. Creamer, Brooklyn, N. Y.

I claim the application to the roofs of railroad cars, of a pulley guide for the signaling rope, substantially as described, and for the purposes mentioned.

73,699.—SHOVEL PLOW.—Thaddeus Donely and Joseph B. Cressler, Southampton, Pa.

We claim, 1st, The combination of lever, L, with subordinate levers, l l, and their attachments, pawls and springs, when operating upon the sleeves, S S, substantially as described.

2d, The combination of lever, L, with sleeves, S S, and shaft, s1, to move laterally, as substantially described.

3d, The arrangement of levers, T2 T1 and t, in connection with the tongue, substantially as described.

4th, The use of a central plow, F, detachably arranged, in connection with the side plow, substantially as described.

5th, The combination of lever, L, and its attachments, forming a combined lever, with vertical and horizontal motions, coincident when necessary and convenient, together with the adjustable devices, T2 T1 and t, all operating together, substantially and for the purposes specified.

73,700.—RAILWAY SWITCH.—M. H. Dooly, Atlanta, Ga.

I claim the elongated crank shaft, D, connecting with the sliding bars, J and C, by the pitman, e and K, in combination with the rails, A' A' A'' and B, and the target signals, whereby the switch rails and signals are shifted, simultaneously, and the ordinary "frogs" dispensed with, substantially as specified.

73,701.—WASHING MACHINE.—Ezra Philo Doty and Ellis Doty, Janesville, Wis., assignors to themselves and Wm. M. Doty, New York city.

We claim, 1st, The segmental arm for carrying the washboard, the center of the curve of said arm being the pivot or axis upon which it oscillates, substantially as and for the purposes herein shown and described.

2d, The combination, with the segmental arm, of a radial arm which, while uniting the segmental arm with its pivoted point, constitutes a socket for the lever handle, substantially as and for the purposes set forth.

3d, Forming the bowed or segmental arm which carries the washboard, of angle iron, so as to reduce the size of the opening in the tub, through which the said arm plays, without detracting from the strength of the arm itself, substantially as shown and set forth.

4th, The combination, with the wash tub, of a hinged cover and spring, or its mechanical equivalent, applied to the cover hinge in the manner described, so that the cover may be readily adjusted to or removed bodily from the tub, substantially as and for the purposes shown and set forth.

5th, The combination with the legs, when united with the wash tub by a tongue and groove joint, as described, of the braces or handles, extending between the legs, and attached to each, in the manner and for the purposes shown and set forth.

73,702.—ADJUSTABLE HOE.—Timothy Drake, Hartford, Ct.

I claim the mode of construction and arrangement of the blade, a, shank, b, shank and head, c d', gib, e, fastening screw, f, substantially as described.

73,703.—BAKING PAN.—R. G. Elder, New York city.

I claim a baking dish, provided with a sectional or broken rim, b, under, and holes, a, at the bottom, substantially as and for the purpose described.

73,704.—GATE.—Charles H. Embree, West Dresden, N. Y.

I claim the arrangement and use of the adjustable extension stem, g, and the inclined slots, I I, with the swivelled suspension loop, C, operating in the manner and for the purpose herein set forth.

73,705.—GRATE OF COOKING STOVE.—Lewis Emmons, Hamilton, Ohio.

I claim the elevated removable fireplace for cooking stoves, constructed and used in the manner substantially as and for the purpose described.

73,706.—MATCH SAFE.—John A. Evarts (assignor to Bradley and Hubbard), West Meriden, Conn.

I claim the match safe herein described, consisting of the front and back, constructed from cast metal, and the two parts united in the manner described, as a new article of manufacture.

73,707.—GANG PLOW.—A. Farrow, Carrollton, Ill.

I claim, 1st, The combination and arrangement of the lever, C, link, c, and traction connection, b b1, herein shown and described.

2d, The lever, C1, arm, C2, sector, C3, rack, C4, and plow beam, B, when combined and operated in the manner and for the purpose herein shown and described.

73,708.—STAMP MOISTENER.—J. M. Flagg, Providence, R. I.

I claim the combination of the elastic reservoir, a, the perforated cup or top, b, the absorbent material, d, and the wire gauze support, substantially as and for the purpose specified.

73,709.—SEWING MACHINE.—E. W. French, South Scituate, Mass.

I claim the combination with a tube, a looper, and a folding mechanism, of a sewing and feeding mechanism, substantially such as described, so that the material being operated upon may be fed and sewed successively forward and backward, and around the tube, so as to connect the edges of the material, and the ends of portions of the same, all in one continuous operation, substantially as described.

73,710.—LAMP.—John A. Frey, Washington, D. C.

I claim, 1st, The water chamber making a part of the burner, provided with an oil feeding duct and a water feeding duct, with the wick tube passing through the same, and nearly or entirely surrounded by water, arranged and combined substantially as described.

2d, The deflection in the top of the cone, g, as and for the purpose set forth.

73,711.—HALTER.—Wilson Garrison and Charles H. Stevens, Syracuse, N. Y.

We claim, 1st, The metallic eye, H, constructed by two hooked plates being clamped upon each other, and upon their strap, substantially in the manner and for the purpose set forth.

2d, The method of securing the opposite parts of the metallic connections to each other, and to their straps, namely, one plate provided with pins or projections, h', and the opposite plate with corresponding holes, h, in connection with a binding screw or rivet, J, as and for the purpose set forth.

3d, The transverse rib, j, with corresponding recess in the opposite plate, at the junction of the plates, as herein shown, and for the purpose described.

4th, The combination of buckle, P1, with the double securing plate, M m, as herein shown and for the purpose described.

5th, The cross bar, r, substantially as and for the purpose set forth.

6th, In connection with the cross-bar and tongue, r R, the shoulder, s, to improve the downward bearing surface of the tongue, substantially in the manner described.

73,712.—APPARATUS FOR CHARGING WATER WITH CARBONIC ACID.—Robert Grant, Brooklyn, N. Y. Antedated Jan. 17, 1868.

I claim, 1st, The cylinder, A, regulator, C, injector, P, water tank, B, and regurgitating valves, 2 and 3, arranged and operated as described, and shown in the drawings, or otherwise modified for the purpose set forth.

2d, The continuous automatic process of compressing carbonic acid or other gases in water, by the means substantially as described and for the purposes above set forth.

73,713.—METALLIC TIE FOR COTTON BALES.—Theodore Guyol, New Orleans, La.

I claim, in connection with a copper or other suitable wire for encircling and fastening bales of cotton, or other baled material, a metallic saddle, A, with its brace, c, constructed and operating to hold the two ends of the wires substantially as herein described and represented.

73,714.—MACHINE FOR CUTTING SOAP.—Joseph Hadfield, New York city.

I claim, 1st, The combination and arrangement of the movable table, C, the follower, D, and the racks, E E, which are attached as specified to the follower, substantially as described.

2d, The arrangement and combination of the latch, K, attached to the table, C, with the cam, J, for the purpose of detaching the table from the follower, substantially as described.

3d, Making the follower, D, separate and detachable from the rest of the machine, and attaching it thereto by means of removable pins, n n, substantially as described, for the purpose of being able to change the follower at pleasure.

4th, The arrangement and combination, with the printing roller, M, of the bars, G H, and the gear wheels, F, F1, F2 and 1, substantially as and for the purpose described.

5th, The moistening roller, Q, arranged and combined with the printing roller, M, substantially as and for the purpose described.

6th, The cutting frame, R, made substantially as described, with the truss, V, and straining screws, X X Y, for tightening the wire, z.

7th, Making the several cutters of the cutting frame of a single strand of wire, substantially as described.

8th, The transverse cutting wire, f, combined and arranged substantially as described, with the sliding rods, c, the slotted tubes, d, the springs, c, and the shaft, B, whereby the soap is divided transversely, during the return movement of the table.

73,715.—APPARATUS FOR DRAWING TAPERED TUBES.—Gustavus Palmer Harding, Chiswick, England. Patented in England Sept. 14, 1865.

I claim the combined arrangement herein described, with reference to figs. 1 to 8 of the drawings, consisting of the parts, h h i j j1 j2, with suitable gearing for giving motion thereto, when a tube or rod is being drawn by hydrostatic or other power, substantially as above described.

73,716.—RICE HULLING MACHINE.—J. Moore Hendricks, Philadelphia, Pa.

I claim, 1st, The cylinder, o, in combination with its shaft and corrugated curved arms, q, for chafing the cuticle and removing the same from the rice, substantially as set forth.

2d, The combination of the mortar and pestle, k l, the cylinder, o (with its shaft, p, and corrugated arms, q), and the polishing cylinder, u, with its covered drum, all constructed and arranged in the manner and for the purpose substantially as set forth.

73,717.—STONE-DRILLING MACHINE.—Charles W. Hermance, Saratoga, N. Y.

I claim, 1st, The arrangement of the follow blocks, E, and their lifting pawls, e, with the cross head, H, and its lugs, a, and the plates, o, for the purpose of lifting and discharging said cross head, as is herein set forth.

2d, In combination with the cross head, H, and rod, I, thus operated, ratchet wheel, K, lever, J, and slotted guide, L, all constructed as described for the purposes set forth.

3d, In combination with the follow blocks, pawls and cross-head carrying the drill rod, the arrangement of the pitman, F G, and wheels, G G, all constructed and operating substantially as described.

73,718.—STOVE-PIPE COUPLING.—Orlando, M. Higgins, Lowell, Mass., assignor to himself and Freeman Higgins, Manchester, N. H.

I claim, 1st, The endless metal band, a, and coupling tubes, A, combined with the heads, b, for the purpose and substantially as described.

2d, The heads, b, constructed as described whereby the endless metal band may be adjusted, substantially as set forth.

3d, The partition, E, and screws, g, combined with the heads, b, and endless band, a, as and for the purpose set forth.

4th, The dampers, F, combined with the partition, E, heads, b, and endless band, a, in the manner and for the purpose substantially as described.

5th, In combination with the head, b, the slide, k, and holes, h, for the purpose and substantially as described.

6th, The perforated movable disk or stand, m, applied to the top of the case or heater, as and for the purpose described.

7th, The combination of all the correspondent parts specified, arranged for action and effect substantially as described and for the purposes specified.

73,719.—MODE OF PRODUCING A VIBRATING SWELL IN ORGANS.—Alonzo Hitchcock, New York city.

I claim the construction of a fan in sections, substantially as described for the purposes herein set forth.

73,720.—WOOD BENDING MACHINE.—Martin Van Buren Howe (assignor to himself and Levi Heywood), Gardner, Mass.

I claim the coupling links, a, or their equivalents, for connecting the ends of the links, A, of a chain for bending timber constructed to operate substantially as and for the purpose set forth.

73,721.—TILTING CHAIR SEAT.—Martin V. B. Howe (assignor to Heywood, Brothers, and Co.), Gardner, Mass.

I claim connecting the seat of a chair to the rear posts, E F, or their cross bar, D, by means of springs, b, substantially as and for the purpose set forth.

Also the stop, e, in combination with the above, substantially as and for the purpose specified.

Also the springs, b, constructed, applied, and operating substantially as and for the purpose set forth.

73,722.—MANUFACTURE OF SODA AND POTASH.—A. G. Hunter, Flint, Wales.

I claim the process herein described of decomposing chloride of sodium and chloride of potassium for the purpose of converting them into silicated, carbonated or caustic alkali.

73,723.—SPOKE SHAVE.—Seth T. Hutchins (assignor to Horace A. Lathrop), North Anson, Me.

I claim, 1st, The combination of the separate abutments, D E, applied to the stock, A, so as to be adjustable in manner as described with the gage, C, hinged to one of such abutments and being separate from the other and to operate with respect to it, substantially as explained.

2d, Also the application of the gage to its adjusting devices so as to be removable from them or either of them and the knife when the means of the adjustment of the gage is held stationary relatively to the stock, as described.

73,724.—CLOSING FRUIT JARS.—William L. Imlay, Philadelphia, Pa.

I claim, 1st, The rectangular recess or cavity, E, in the neck of the jar with its inclined and corrugated side, F, retaining the bail and tightening it by sliding the bail over the corrugations, as shown and described.

2d, The combined arrangement and construction of the jar, A, cover, B, bail of hoop, C, with its springs, D, plain round recess, G, rectangular and inclined recess, E, corrugations, F, substantially as and for the purposes specified.

73,725.—DUMPING CART.—Asa A. Jennings, Webster, N. Y.

I claim in combination with the pivoted sections, B B, the rigid sides f f, of the body, A, and the transverse and longitudinal braces, x x and y y, connecting the same with the bolsters, substantially as and for the purposes set forth.

73,726.—SODA FOUNTAIN.—J. C. Johnson, Philadelphia, Pa.

I claim a soda-water fountain which is constructed with a contracted perforated bottom and a flanged foot piece, B, and provided with a removable bottom, C, fitted within said fountain upon a seat which surrounds an oblong opening, c, and held in place by means of a screw, b, and external cap or bar, D, substantially as described.

73,727.—FELTED FABRIC.—Moses A. Johnson, Lowell, Mass.

I claim the manufacture of felt cloth by forming the bat and as it is fed to the felter of a series of side drawings or rovings laid together lengthwise or crosswise or lengthwise and crosswise both and run in from spoools, creels, or otherwise, substantially as herein described and represented.

73,728.—DIES FOR HEADING BOLTS.—Charles Kane, Pittsburg, Pa. Antedated January 16, 1868.

I claim the inclining of the plane of the ledges in the direction of the gripping dies and from the axis of the bolt in combination with pressing surfaces parallel to the axis of the bolt, as specified.

73,729.—CASKET FOR PRESERVATION OF CORPSES.—Charles H. Kimball, Quincy, Mass.

I claim, 1st, The ice chamber or casing, s, in combination with the compartments, A and B, as and for the purpose set forth.

2d, Also the ice chamber, s, in combination with the compartment, A, and air spaces, s, as and for the purpose specified.

3d, Also the casing or opening, b, in combination with the ice chamber, s, as and for the purpose set forth.

73,730.—JAPAN PASTE BLACKING.—Henry Lake, San Francisco, Cal.

I claim the making of a superior article that I call the Japan Paste Blacking of the commodities specified, and substantially as set forth.

73,731.—HAY RAKE AND LOADER.—Stephen M. Livingston, Claverack, N. Y. Antedated January 17, 1868.

I claim, 1st, The combination substantially as described of the rake the balance levers, the rope and windlass, whereby the rake can be controlled from the front of the wagon, as set forth.

2d, The combination as described of the rake arms or balance levers mounted on the detachable frame with the pressure springs mounted on the main frame.

73,732.—CALCULATING MACHINE.—James A. Loomis and Alonzo Johnson, Springfield, Mass., assignors to themselves and Charles Gifford, Gardiner, Me., and said Loomis and Johnson assignors to Charles Gifford.

We claim, 1st, The plates, A D and E, when connected by the pins, b and e, respectively and when operated by means of the pointer, H, all made substantially as herein shown and described.

2d, The plates, A D and E, and pointer, H, in combination with the pawl, J, plate, G, and ratchet disk, I (or I and J), all made and operating substantially as herein shown and described.

3d, The device for counting the hundreds consisting of a combination of the spring, F, with the lug, o, on spring, n, and with the disks, A D F, and pin, m, all made and operating substantially as herein shown and described.

73,733.—PROCESS OF BLEACHING CLOTH, YARN, ETC.—Wheaton Luther, Niagara Falls, N. Y.

I claim, by the use of the chemicals herein mentioned, or by those which produce equivalent results, the process substantially as herein described.

Also immersing the article in the bleaching mixture while it is saturated with the acid.

73,734.—BUCKLE.—Frederick William Maes, Iserlohn, Prussia.

I claim a buckle composed of a separate axle, b, perforated to admit the tines, d d, and provided with journals at its ends which fit into boxes, e e, formed by the ends of the bow, a, as set forth.

73,735.—BUTTON FASTENING.—H. S. Magrane, Hoboken, N. J.

I claim an improved button fastener made in substantially the form and manner herein shown and described as a new article of manufacture.

73,736.—GRAIN SEPARATOR.—Thomas H. McCulloch, Monmouth, Ill., assignor to George H. Rich, Geneva, Ill., and George H. Rich, assignor to the Hart Grain Separator Company.

I claim, 1st, The employment of one or more cylinders with cellular convex surfaces, arranged and operating substantially as and for the purposes specified.

2d, Also in combination with said cylinders the employment of a brush or brushes, arranged and operating as and for the purposes specified and shown.

73,737.—ASH PIT COVER FOR STOVE.—William L. McDowell, Philadelphia, Pa. Antedated Jan. 14, 1868.

I claim the gravitating plate, E, and the sloping side plates, B B', in combination with the hearth plate, A, and the front plate, C, of a stove, substantially as and for the purpose set forth and described.

73,738.—THIMBLE SKEIN.—R. M. McGrath, Lafayette, Ind.

I claim, as a new article of manufacture the skein of cast iron with wrought-iron bands or supports, as herein set forth.

73,739.—PRIMING METALLIC CARTRIDGE.—Henry Meigs, Jr., Bergen Point, N. J.

I claim, 1st, The thin-edged radially-slotted centrally-perforated iron-disk anvil, constructed as described.

2d, The combination as described of the flange shell the radially-slotted centrally-perforated, thin-edged, iron-disk anvil and the central fulminate chamber, all constructed and arranged as described for joint operation.

73,740.—MACHINE FOR MAKING WOODEN BOWLS.—Henry Mellish, Walpole, N. H.

I claim, 1st, The hollow cylinder, E, when constructed with the cutter guide, H, or its equivalent, substantially in the manner and for the purpose above described.

2d, Also the concavo-convex cutter, G, when arranged in combination with the cylinder, E, to swing in a circle corresponding to its curve, substantially in the manner and for the purpose above described.

3d, Also the cutter, I, when constructed and arranged to operate with the cutter, G, and lever, F, or its equivalent, substantially as and for the purpose above specified.

73,741.—BRICK MACHINE.—George Metcalf, Leland, Ill.

I claim the vertically-oscillating frame, H, with its levers, A B and C, the mold cover, E, press block, D, and mold bar, M, with button and slide, F and u, all combined and arranged to operate substantially as and for the purposes set forth.

73,742.—PERMUTATION LOCK.—L. H. Miller, Baltimore, Md.

I claim, 1st, A permutation lock so constructed as to bring the spindle or arbor which operates it on the outside of the lock proper, substantially as set forth.

2d, The two wheels, F G, capable of limited independent motion in combination with a suitable catch adapted to engage with the said wheels, F G, when they are properly adjusted and at other times riding on the unbroken periphery of the two wheels, substantially as explained.

3d, The flaring or under-cut rim, m2, of the rotary tumblers to adapt them for ready removal by hand, substantially as explained.

4th, The combination of the notches, m3, radial holes, m4, and pin, Q q, when constructed, arranged and employed substantially as and for the purposes specified.

73,743.—POTATO MASHER.—M. H. Monroe, Rochester, N. Y.

I claim the combination of the coil, a, stays or braces, b b b b, and handle, c, all in the manner and for the purpose herein set forth and described.

73,744.—SPRING BED BOTTOM.—A. W. Newell, Bradford, Pa.

I claim the combination of the braces, E G, the boards, F H, with the springs, A, the cross bars, C, the casters, D, and the webbing, I, when constructed and operating substantially as and for the purposes described.

73,745.—LAMP CHIMNEY CLEANER.—Abram G. Newkirk, Warren, Pa.

I claim the rod or wire, B B, constructed and bent in the form substantially as shown and arranged in the manner and for the purpose specified.

73,746.—BLACKING BRUSH.—H. E. Newton, Manchester, N. H.

I claim the combination of the angularly-surfaced block, c, the angular handle, t, and the back, e, all in one piece connected to block, a substantially as set forth.

Also the combination of the block, c, handle, f, and back, e, in one piece substantially as described.

73,747.—HAY RAKER AND LOADER.—W. T. Nichols, Rutland, Vt.

I claim, 1st, A combined hay rake and hay wagon in which the rake is made the wagon bed, whereby the separate uses and purposes of a hay rake and hay wagon can be accomplished by one and the same machine using the same for either purpose at will and by which hay and grain can be raked and loaded at the same time without any intermediate appliance other than the rake itself, substantially as set forth and described.

2d, The device of a rake which for purposes of transportation may be be raised to form a part of the bed of a wagon for carrying the hay gathered thereon, substantially as and for the purposes set forth and described.

3d, The combination of the unloading rope, B, and gathering rake, A, or their equivalents, substantially as and for the purposes set forth and described.

4th, A rake having four or more ground or carrying wheels, so that it may be used both for raking and caarying the hay when raked.

5th, A coupling device for connecting the rear and forward parts of the machine, substantially as described.

6th, The combination of the rake, A, hoisting lever, N, and hinged clapper K, or their equivalents, substantially as and for the purposes set forth.

7th, The teeth extending in rear of their supporting axle so that the rake and its load may be balanced upon said axle, or nearly so, substantially as and for the purposes set forth.

73,748.—HAY STACKER.—W. T. Nichols, Rutland, Vt.

I claim a hoisting machine, for unloading hay or other purposes, composed of a lever beam, B, attached to four or more legs, A, revolving upon fulcra, H H, operated by rope, C, or their equivalent, substantially as set forth and described.

73,749.—FOLDING BASKET.—A. M. Olds, New York City.

I claim, 1st, as an improvement in the art of constructing baskets, boxes, or crates, forming the sides of a series of slats or bars, united at the corners by means of a wire or rod passing through them, and pivoting the same together, so as to permit the article to be folded, substantially as described.

2d, Also, the folding bottom, when constructed and arranged to operate substantially as set forth.

73,750.—POLING HOPS.—Garret J. Olendorf and Albert O Parshall, Middlefield, N. Y.

We claim the herein described combination and arrangement of the poles A, cords, B, and rings, C, as and for the purpose set forth.

73,751.—FILTER.—George T. Palmer, Brooklyn, N. Y. Antedated January 16, 1868.

I claim, 1st, the combination and arrangement of the filters, B B' B'', wate

channels, H and a, valves, l l' l", and b b' b", and stop cocks, k k' k" and l, in manner substantially as shown and for the purpose set forth,

2d, The removable filter, B, having an inside water chamber, g, provided with a neck or pipe, o, all constructed substantially as shown.

3d, The ribs, f and s, on the inside of the perforated plates, c c, arranged in relation to each other substantially as set forth and for the purpose specified.

4th, The arrangement and combination of the coarse wire supporting screen, D, with the perforated plates, c c, fine wire confining screen, E, and filtering medium, F, as and for the purpose shown and described.

5th, A filter containing chest having casing, A A, partitions, A' A", water channels, H and a, valves, b b' b" and l l' l", and cocks, k k' k", arranged substantially in the manner shown.

73,752.—RAILROAD SWITCH.—William P. Patton, (assignor to William P. Patton, Theophilus Weaver and Isaac Lloyd,) Harrisburg, Penn.

I claim, 1st, the arrangement of a lock shield and key, in combination with the shifting mechanism of a railroad switch, so that the key can only be withdrawn from the lock when the switch has been returned to the main track, and been locked in that position, substantially as set forth.

2d, Also, the guard, L, in combination with the key, 2, and a lock, attached to the shifting mechanism of a railroad switch, substantially in the manner and for the purpose set forth.

73,753.—ENHARMONIC KEY BOARD FOR ORGANS, &c.—Henry Ward Poole, South Danvers, Mass.

I claim, 1st, the four broad white keys, and the three elevated black keys, in each octave and in each signature, arranged in the positions and relations substantially as described and shown.

2d, The arrangement of keys divided into the five series of key notes, thirds, perfect sevenths, dominant thirds, and dominant sevenths, each series being uniform in shape, color and size, but different from the other series, substantially as described and figured.

3d, The pedal key board, containing the three rows of pedals for the three series of sounds, key notes, thirds, and sevenths, arranged in a series of fifths, substantially as shown and described.

73,754.—NECK YOKE SLIDE.—George Purple, Wellington, O.

Antedated January 16, 1868.

I claim a slide, constructed in the manner as described, as a new article of manufacture, for the purpose set forth.

73,755.—SPRING BED BOTTOM.—Barney Rear, Toronto, Canada.

I claim the combination of the springs, E, sockets, F, and webs, C C, supported by a frame having detachable side pieces, A, substantially as and for the purposes set forth.

73,756.—PREPARATION OF DYE.—John Reynolds, San Francisco, Cal.

I claim a new article of manufacture in a preparation for dyes of the materials specified, and substantially as described.

73,757.—INJECTOR FOR STEAM GENERATOR.—Samuel Rue, Jr., Chester County, assignor to himself, Samuel McCambridge, and Edward G. Martin, Philadelphia, Pa.

I claim the construction and arrangement of the receiving chamber, A, with its nozzle, B, the water receiving chamber, C, and adjustable plug, E, substantially as hereinbefore described.

73,758.—ANCHOR.—John W. Russell and David Joline, Tottenville, N. Y.

We claim the combination of the double and pivoted flukes with the double shanks of the anchor, when constructed substantially in the manner and for the purpose as herein described and shown.

73,759.—GAGE FOR SEWING MACHINE.—T. S. Scranton, Madison, Conn.

I claim the arm, C, combined with the elastic guide, D, the said guide being attached to the arm, C, and the said arm made elastic at or near its connection with the gage by the reduction of the said arm, substantially as herein set forth.

73,760.—CONDENSING CARDING MACHINE.—John C. Shaw, Manayunk, Pa.

I claim, in combination with the collar, D, of the roll, C, and bracket, A, the slotted plate, B, and set screw, E, substantially as and for the purpose set forth.

73,761.—FENCE.—A. Sheldon, Greenwich Station, Ohio.

I claim the bar, a', provided with rounded corners, so that the gate on being opened will easily vibrate, as indicated by the dotted lines, d, thereby allowing it to pass readily over obstructions, in combination with the rails, A, cross bars, B, in the manner and for the purpose specified.

73,762.—STOVE DRUM.—Antonio F. Smith, Ellsworth, Me.

I claim the arrangement as well as the combination of the hollow frustum, B, with the deflector, D, and the box, A, provided with induction and eduction passages or conduits, b E, arranged in it as specified.

Also, the arrangement as well as the combination of the auxiliary air chamber, F, and its air register or valve, and opening or openings with the box, A, the frustum, B, or the said frustum and its deflector, D, the whole being substantially as specified.

73,763.—CARRIAGE TOP.—William Smith and Emery M. Pike, McDonough, N. Y.

We claim, 1st, the construction of the sleeve, c, the brace stay, d and o, when made and used as and in the manner described.

2d, The sway piece, g, when made and used as and for the purpose described.

3d, The arrangement of the sway piece, g, and the brace stay and segment, o and d, in combination with the sleeve, c, and spring, b, for tilting and holding the top in any desired position.

73,764.—CAR STARTING APPARATUS.—Joseph Steger, New York City.

I claim the springs, e e, in combination with the traction bar, H, rope or chain, s, lever pawl, I, drum, G, and ratchet wheel, D, all constructed and operating substantially as and for the purpose set forth.

73,765.—METALLIC LATHING.—J. F. Walter, Jr., New York City.

I claim sheet metal lathing, formed with oblong apertures, A A B B, the same being punched in the metal, so as to produce the projecting lips or burrs, a a, at the edges thereof, substantially as herein specified.

Also, the overlapping or "break joint" arrangement of the alternate rows of apertures, A A and B B, substantially as and for the purpose herein set forth.

73,766.—COMBINED CHURN AND ICE CREAM FREEZER.—Geo. C. Westover, Paducah, Ky.

I claim the revolving inside cylinder, H, pivot, J, beaters, K K, and wire wing, L, when arranged, combined, and operated as herein described, and for the purposes set forth.

73,767.—GRATE.—John H. Yocum, Ashland, Pa.

I claim, 1st, The provision, in a grate, of one or more openings, E, to permit the removal of slag, clinkers, stones, and other substances too large to be raked through the interstices of the grate bars, substantially as described.

2d, The bars or shields, F, in combination with the enlargements or extensions, G, to form shields to the openings, E, substantially as and for the purpose set forth.

73,768.—STRAIGHTENING CLUB FEET AND CROOKED LEGS.—H. R. Allen, M. D., Charleston, Ill.

I claim, 1st, the employment of a jointed frame, substantially as shown at A B D C D', and straps, E F G, in combination with any constant spring tension applied to the said frame for the purpose of straightening it when on the limb, and thereby overcoming any anchylotic rigidity of the knee or ankle joints of the said limb, all as set forth.

2d, The vertically movable foot plate, J, substantially as shown and described, in combination with its proper spring attachment, as described, or other equivalent device, and frame plates, C, as and for the purposes set forth.

3d, The latterally moving foot plate, I, in combination with the bearing plates, L and O, and lateral spring attachment, all substantially as shown and described, and for the purposes set forth.

4th, The lock, S, substantially as shown and described, or other equivalent device, in combination with the frames, A and C, substantially as and for the purpose shown and described.

5th, The spring attachment, consisting of the hooked wire, f', shoulder lugs, k', springs, g', and burr, i, constructed and operated substantially as shown and described, in combination with the foot plate, J, and frame plate, C, for the purpose of removing anchylosis, all as set forth.

6th, The foot strap, G, or other equivalent device, in combination with the movable foot plates, J and I, of an apparatus for straightening feet or lower limbs, all substantially as shown and described, and for the purpose set forth.

7th, The elastic strap, H, or other equivalent device, applied, substantially as shown and described, to the frame plate, A, of an apparatus for removing anchylosis, all as and for the purpose set forth.

8th, The metallic strap, P, or other equivalent device, in combination with the strap, G, and movable foot plates, J and I, substantially as and for the purpose shown and described.

73,769.—BROOM.—Nathan E. Badgley, New York City.

I claim the combination of the scalloped edged cap, D, its neck, E, the tying of broom corn in one place, and securing the same with cord, C, to the square end of handle, B, all as and for the purpose herein described.

73,770.—SPRING BED BOTTOM.—A. Milton Blake, Canton, O.

I claim the arrangement and combination of the slats, F G, straps, D D, bungs, H H, and springs, A A, when said slats, F G, are so arranged as that each alternate one is supported by a spring, A, and the others by the straps, D D, substantially in the manner and for the purpose herein specified.

73,771.—DEVICE FOR OPERATING PUMPS.—Elijah Borton, Morris, Ill.

I claim the eccentric segment, F, supported at b upon the bed piece, B, the eccentric semi circular gears upon the lever, D, sliding vertically in the slot, l, the upper eccentric segment, E, sliding vertically in the slotted frame, B', and pivoted to the arm, G, carrying the pump rod, C, all constructed and arranged to operate as herein shown and described.

73,772.—REIN HOLDER.—Charles A. Bradford and Wesley Bradford, Crown Point Centre, N. Y.

We claim the bar, A, having the worm, a, at its lower extremity, in combination with the eyes, b, and clamp, C, in manner substantially as above set forth and described.

73,773.—SHOES.—Libertine Bullard, Marlboro, Mass.

I claim the combination of the parts, A or A', B and C, constituting, respectively, the vamp, quarter, and counter of a shoe, when the said parts are cut in the form and secured together in the manner shown and described.

73,774.—TELEGRAPH REPEATER.—J. H. Bunnell, New York City.

I claim, 1st, the employment of two governor magnets, placed in the same local circuit as the respective local sounders in a telegraphic repeater, when the said governor magnets are there placed for the purpose of making the repeater self-breaking, and controlling its operation, substantially as herein shown and described.

2d, A governor magnet, wound with wire of such relative size and resistance to that upon the local magnet, as that when both are included in the local circuit, the governor magnet shall be charged while the local magnet is not.

3d, The combination of fine wire governor magnets, as herein described, with the regular local batteries and sounder magnets of a repeater, as an i for the purpose set forth.

73,775.—VEGETABLE CUTTER.—J. Caldwell, Chillicothe, O.

I claim, 1st, the rear extension, B, in combination with the platform, A, and horizontal knife, D, substantially as herein set forth and described.

2d, The box, E, provided with the grooves, e, in the bottoms of its walls, substantially as herein shown and described.

73,776.—VENTILATING MILLSTONES.—Jas. Campbell, Peoria, Illinois.

I claim the hoods, g g, and the pipes, e e, passing through the cap piece, B', the channels, c c', in the runner, B, the washer, c, the flange, h, and the vent holes, m m, in the curb, D, all arranged and operating as and for the purpose herein described.

73,777.—CHECK REIN HOOK.—J. S. Campbell, Newton, N. J.

I claim the hinged tongue, B, in combination with the plate, b, for attachment to the check rein hook, substantially as set forth.

73,778.—BUTTON FOR CARRIAGE CURTAINS.—Stillman P. Campbell, Quincy, Mass.

I claim the button, B, provided with a stem, part of which is rectangular, in combination with a pressure spring, S, the whole constructed and operating substantially as and for the purpose set forth.

73,779.—CANE MILL.—B. F. Cauffman, Millerstown, Pa.

I claim the combination and arrangement of the compartments, c c', partition, D, and curved perforated plate E, substantially as and for the purpose specified.

73,780.—STEAM GENERATOR.—Edwin Chapman and Charles T. Allaire, Rochester, Minn.

We claim the steam generator, constructed as described, consisting of the conical furnace, D, having the air tube, F, and supporting the conical combustion chamber, E, the points of their connection forming shoulders, connected by the diving flues, J, with the casing, B, enclosing the water space, and placed concentrically within the outer casing, A, the space between said casings forming the ascending flue, H, all arranged and operating as herein shown and described.

73,781.—HEATING RAILROAD CARS.—Robt. A. Chesebrough, (assignor to William H. Chesebrough,) New York City.

I claim, 1st, the arrangement, in a railroad car, of steam pipes, a b, in combination with registers, g h, or equivalents, whereby the heat can either be thrown into or to the outside of the car, without interrupting the action of the steam in the succeeding car or cars, substantially as set forth.

2d, The arrangement, with a railroad car, of inside and outside steam pipes, when constructed and applied substantially as described in fig. 3, for heating purposes.

73,782.—HEAD REST FOR SEATS.—James R. Chiles, Richmond, Va.

I claim the head rest, C, when made adjustable by means of a ratchet, r r, substantially as and for the purpose specified.

73,783.—PADDLE WHEEL.—Rowland Cromelien, Washington, D. C.

I claim the combination of paddles or buckets with annular toothed wheels, operated substantially as described for the purpose specified.

73,784.—PUNCHING AND RAISING DISKS FROM METAL.—Charles Diedrichs, Philadelphia, Pa., assignor to James S. Mason & Co.

I claim the combination of the punch, G, stamp, J, feed board, K, consisting of the parts, l m n n', and carrier, N, sliding beneath the punch in the channel, M s, and advancing but one disk directly to the stamp before another is cut, substantially as described.

73,785.—WASHING MACHINE.—Wm. Eberhard (assignor to himself and A. P. Baldwin), Akron, Ohio.

I claim, 1st, The washing machine constructed as described, and consisting of the rollers, B C, frame, A, shaft, b, vibrating frames, g g, pitman, b, crank shaft, k, shaft, e, crank, m, worm, d, pinion, c, fly and gear wheels, lever, p, and rod, n, all arranged and operating as describe l and for the purpose specified.

2d, In combination with the vibrating frames, g, and roller, C, the lever, p, and rod, n, substantially as and for the ourpose set forth.

3d, In combination with roller, B, the guards, q, substantially as set forth.

73,786.—GUNPOWDER.—L. H. G. Ehrhardt, London, Eng., assignor to Geo. B. Upton, David D. Stackpole, and Samuel H. Gookin,

I claim the powder herein described, consisting of the ingredients named, prepared and mixed as described.

73,787.—ARTIFICIAL LEG.—Ephraim Elliott and Charles E. Newton, Lowell, Mass.

We claim, 1st, The self-adjusting sockets, c and c', for the purposes substantially as described and set forth.

2d, The extensions, i i and j j, applied to the upper and lower sockets, b b' and c c, for the purpose of adjusting the same in position, as described and fully set forth.

3d, An artificial leg provided with straight side beams, a a, bands, b b' c c' and d, when arranged as herein described and for the purpose set forth.

4th, The double stop, h h, in combination with the straight side beams, a a for the purposes as described and set forth.

5th, The arrangement and combination of the thumb wheel, o', ratchet, o, pawl, p, and frame, m m, for the purpose substantially as described.

6th, The combination of the ankle seat, q, pivots, u u and w, block, v, and adjustable heel cord, t, when arranged to operate substantially as described and set forth.

73,788.—HARVESTER.—E. Emmert, Franklin Grove, Ill.

I claim the combination of the fingers and cutter bar with the notched pitman, when the latter is pivoted to the outer end of the cutter bar, for the purpose of scattering the cut grass, as herein shown and described.

73,789.—CAR REPLACER.—Daniel Fisher and William Cumming, Oil City, Pa.

We claim, 1st, The universally pivoted reversible inclines, C D, constructed and adaptad to operate substantially as and for the purpose described.

2d, The pivot, c1, in combination with the reversible guide, c1, incline, C, and bearing, E, substantially as set forth.

3d, The combination of the dog, F f f1 f2, bearing, E, and incline, C, substantially as described.

4th, The combination of the dog, I i i1 i2, bearing, G, clamp, H, and incline, D, substantially as and for the purpose specified.

5th, The adjustable support, d2, substantially as and for the purpose set forth.

73,790.—NECK TIE.—Henry G. Fisk and Thomas J. Flagg, New York city.

We claim as a new article of manufacture a scarf, constructed as described, consisting of the cylindrical knot, A, to which the scarf, B, and apron, C, are attached, said knot provided with an elastic pocket, which expands to permit the scarf, B, to pass through, and contracts to hold it in place, as herein shown and described.

73,791.—BALE FASTENER.—Addison C. Fletcher, New York city. Antedated Jan. 16, 1868.

I claim a bale fastener composed of a plate, A, provided with an opening, a, and a slot or slots, b, one or both of the latter having arches, c, at their sides, for use in connection with a pin or nail, or pins or nails, D, to secure the bent or doubled end or ends of the baling hoops or wires, substantially as specified.

73,792.—HARROW.—Emanuel Forney, Fishersville, Pa.

I claim, 1st, The combination with the main frame of the harrow, of two or more sets or pairs of revolving frames or arms for carrying the teeth, tilted or set at angles to the main frame, in the manner described, and arranged to gear or mesh with each other, substantially as herein shown and for the purposes set forth.

2d, The combination with the harrow frame of the reversible drag bar and eye bolt, or equivalent means for holding the said bar in position, under the arrangement and for operation as herein shown and specified.

73,793.—HEATING STOVE.—T. J. Frazier, St. Paul, Minn.

I claim the combination of the flues, D, up-take, E, and bulk head, B, substantially as described, or their respective equivalents, with a stove, as herein set forth.

73,794.—BAG FOR PACKING TOBACCO.—G. W. Gail, Baltimore, Md.

I claim a bag for packing tobacco, when folded as described, and secured by means of a cord passing round its center, substantially in the manner set forth.

73,795.—OIL CUP FOR LUBRICATING SHAFTS.—Emerich J. Gerdom and Charles W. Schindler, Albany, N. Y.

We claim in combination with an oil cup, A, a shaft, S, constructed of tubes, communicating with the journal, J, and rotated by the motion of the journal, substantially as and for the purpose described.

73,796.—SCREEN ATTACHMENT FOR WASH STAND.—Edward F. Gilbert, Lyons, N. Y.

I claim, 1st, The combination of an adjustable screen, covered with oil cloth or equivalent, with a wash stand so arranged that it may be raised or lowered at will and hidden from view when not in use, substantially as herein set forth.

2d, The combination of the wings, C C, with the adjustable center, B, so arranged as to expand and retain the screen, elevated, or to fold to be depressed from sight, substantially as herein set forth.

73,797.—CORN PLANTER.—Jas. Gilbert, Wyalusing, Wis.

I claim, 1st, Connecting the plow standards, S, to the frame, A, by means of the rollers, U, substantially as hererin shown and described, and for the purpose set forth.

2d, The combination of the levers, V, and connecting rods or chains, W, with the plow standards, S, and frame, A, for raising, lowering, and supporting said standards, substantially as herein shown and described.

3d, The combination of the weighted elbow lever, O, and shaft, M, having arms or stirrers, N, attached to it, with the seed box, G, and with the projections, k formed upon or attached to the dropping cylinder, H, substantially as herein shown and described, and for the purpose set forth.

4th, The combination of the harrows, Y, with the plow standards, S, and frame, A, substantially as herein shown and described and for the purpose set forth.

5th, Applying the draft below the horizontal plane of the frame, A, substantially as herein shown and described, and for the purpose set forth.

73,798.—CONSTRUCTION OF SOLDERING IRON.—Joel Gleason, Whitestone, N. Y.

I claim constructing a soldering tool formed of the copper point, A, screwed into a cast iron base, B, and provided with a wrought iron handle, C, as and for the purpose herein described.

73,799.—BED BOTTOM.—F. C. Gridley, Hudson, Wis.

I claim the arrangement of the bars, b and G, elastic straps, g g, and slats, D D, in the construction of a bed bottom, when such bottom is made in sections, and adjustable in the manner shown and described.

73,800.—GRATE FOR STOVES AND FURNACES.—J. W. Griswold, Philadelphia, Pa.

I claim the conical rotating grate, B, in combination with the cylinder, A, both provided with teeth, l l, at the base, constructed, arranged, and operating substantially as and for the purpose herein described.

73,801.—BABY HOLDER.—Robert Hale, Chicago, Ill.

I claim an improved suspended baby holder, formed by the combination of the wo larger hoops or rings, A, the two smaller hoops or rings, C, the cloth or equivalent coverings, B and D, the three or more supporting straps or cords, E, and slide or buckle, H, with each other, substantially as herein shown and described, and for the purpose set forth.

73,802.—COUCH OR CRADLE.—Robert Hale, Chicago, Ill.

I claim an improved portable suspended couch or cradle formed by the combination of the jointed frame, A, removable cover or bottom, F, straps or cords, B, and adjustable cord or strap, D, and slide or buckle, E, with each other, substantially as herein shown and described, and for the purpose set forth.

73,803.—MACHINE FOR CLEANING GRAIN.—Thos. Hancock and J. H. Leaman, Richmond, Va.

We claim, 1st, The combination of the hollow rollers or cylinders, B and C, having small holes or cavities formed through or partly through their walls, with each other, and with the frame in which they work, substantially as herein shown and described and for the purpose set forth.

2d, The combination of the bars, D, and spouts, F, with the interior of the hollow cylinders, B and C, substantially as herein shown and described, and for the purpose set forth.

3d, The combination of the guard plates or bar, G, with the exterior of the cylinders, B and C, substantially as herein shown and described, and for the purpose set forth.

4th, Forming shallow grooves, H, around the lower ends of the cylinders, B and C, for the escape of the fine seed, substantially as herein shown and described.

73,804.—METALLIC HANDLE.—Jas. Hatton, New York city.

I claim constructing the handles for files, screwdrivers, and for other purposes, of metal, with elastic packing, substantially in the manner herein shown and described.

73,805.—CULTIVATOR.—J. T. Herndon, Bancroft, Mo.

I claim, 1st, The combination and arrangement of the beams, E J, connected by chains, U, to pulleys, V, on the shaft, W, substantially as and for the purpose set forth.

2d, The connecting of the inner beams, J J, by the bar, h, and the attaching of the uprights, g g, on said beams, to the arms, Q, by the bars, N, arms, O, and shafts, P, for the purpose of giving a lateral movement to the shares or shovels, L, substantially as and for the purpose specified.

73,806.—SKATING RINK.—I. H. A. Hervey, Cleveland, Ohio.

I claim a skating rink provided with a cold air trunk, D, extending partially or entirely around its foundation or lower part, and provided with doors, b b', at its inner and outer sides, for the admission of external air in connection with the openings, a, in the roof of the rink, all constructed and arranged substantially in the manner as and for the purposes set forth.

73,807.—LAWN MOWER.—A. M. Hills, Hockanum, Conn.

I claim, 1st, The balanced frame on the roller, E, provided with the fixed cutter bar, D, in combination with the hail-shaped rod, Q, to which the handle S, is secured, all constructed and arranged substantially as and for the purpose set forth.

2d, The horizontal cutter, M, having the spiral flanges, c c, when adjustably hung in the slotted upright, O, upon the covered shoe, N, and in front of the cutter, D, all constructed as described for the purpose specified.

3d, The combination of the frame, roller, cutting device, and the handle attachment, all constructed and arranged to operate in the manner substantially as and for the purpose set forth.

73,808.—PICTURE-FRAME SUPPORTER.—Leonard L. Hodges, Boston, Mass.

I claim the combination of the catches and catch racks with the suspension cord and picture frame, the whole being substantially as described.

73,809.—ICE PICK.—S. G. Hoyt, New York city.

I claim an ice pick consisting of a handle, A, having a many-pointed pick, B, at one end, and a single-pointed pick, C, at the other end, substantially as and for the purpose herein shown and described.

73,810.—SUGAR MOLD.—John S. Inskeep, West Middleburg, Ohio.

I claim a sheet metal box, B, having its vertical corners loose or detached, in combination with a frame, A, into which it fits, and within which it is supported by its horizontal edges or flanges, substantially as described and for the purposes set forth.

73,811.—CURTAIN FIXTURE.—Charles R. Jenkins, Philadelphia, Pa.

I claim interposing between pulley cap and roller a tube of india-rubber, yielding laterally and vertically, as and for the purpose described, and serving itself as a pulley for the cord.

73,812.—FELTED HAT BODY.—R. Johnson, Danbury, Conn.

I claim the admixture of wool and fur fibers, the former being cut into short lengths to equalize the relative weight of fibers, substantially as and for the purpose described.

73,813.—PIPE AND BOLT CUTTER.—G. B. Kirk, Newark, N. J.

I claim, 1st, The cutting tool, d, consisting of a fixed steel cutter, painted substantially as shown and described, in combination with the screw blank, l, stock, A, and adjustable claw, B, all constructed and operating as and for the purpose set forth.

2d, The flange, i, and pin, g, substantially as shown and described, or other equivalent devices, when in combination with the holder, G, stock, A, and cutting tool, d, for the purpose set forth.

3d, The slot, n, substantially as shown and described, in combination with the cutting tool, d, and stock, A, all set forth.

73,814.—SAWING MACHINE.—P. P. Lane and J. T. Bodley, Cincinnati, Ohio.

We claim, in a cross-cut sawing machine, the combination of a reciprocating saw carriage with a graduated counter balance, constructed and operating substantially as described.

73,815.—BEARING FOR SHAFTS.—John F. Laplace, Hamburgh, Conn.

I claim, 1st, The perforated plate, E, carrying the balls, D, when such plate is arranged to turn loosely in the groove, constructed as described, in the flanges, a, of the disk, as herein set forth, for the purpose specified.

2d, The disk, B, constructed as described, bearing the perforated plate, E, held in place by the ring, b, and pins, c, in combination with the balls, D, shaft, A, and stationary plate, C, as and for the purpose specified.

73,816.—GAS ENGINE.—W. H. Laubach, Philadelphia, Pa.

I claim the combination and arrangement of the devices, as herein set forth, whereby the igniting flame is caused to pass directly through the inflammable gas, inside of the cylinder, substantially as herein set forth and described.

73,817.—HOOKS AND EYES.—William Law, Birmingham, England.

I claim the hook and eye, the latter constructed of a bar bent at right angles to the plane, and divided in the middle at m n, for engaging with the bent sides of the tongue, l, which fits in the angular part, O, of the eye, the sides, p and q, of the latter springing open to admit of the attachment, and closing upon the narrow part of the tongue, l, as herein shown and described.

73,818.—PICKER FOR LOOMS.—Richard Leach, Linwood Station, Pa.

I claim the combination of the pan, B, band, C, staple clasp, b, and screw, c, with the staff, A, all constructed, arranged, and operating as described.

73,819.—MACHINE FOR HULLING COFFEE.—Daniel Lombard, Boston, Mass.

I claim, 1st, The combination of the endless band, d, composed of serrated metal plates, with the serrated plate, e, provided with the sides, e', substantially as and for the purpose set forth.

2d, The combination of the endless band, d, the supporting frame, h i, and the elastic bearings, r', as described.

73,820.—HORSE RAKE.—C. O. Luce, Brandon, Vt.

I claim the oscillating axle, D, connected with the thills by the straps, a, segment rack, C, on the lever, b, footboard, B, segment rack, c', and curved teeth, c, in combination with the clearer bar, E, extending across the teeth, e, and supported by the curved bars, s, from the footboard, B, as herein described, for the purpose specified.

73,821.—MODE OF SUSPENDING CARRIAGE BODIES.—H. W. Libbey, M.D., Cleveland, Ohio.

I claim the special arrangement of the bars, D D, with their springs, d d, and the rods, E E, in combination with the running part of the carriage, provided with sliding extension bar, I, substantially in the manner shown, and for the purpose set forth.

73,822.—FAUCET.—John Marchbank (assignor to Wm. H. Low), Lansingburg, N. Y.

I claim, 1st, The arrangement of the guide brace, C, in relation to the gate, B, and body, A, substantially as and for the purpose herein set forth.

2d, The inclined plane, b, provided upon the gate, and arranged upon the gate, and in relation with the body, A, and the guide brace, C, substantially as and for the purpose specified.

3d, The inclined plane, c, arranged upon the gate, and in relation with the body, A, and guide brace, C, substantially as and for the purpose specified.

4th, The stud, a*, arranged upon the gate, and in relation with the guide brace, substantially as and for the purpose specified.

73,823.—DIE PRESS.—John Mays and E. W. Bliss, Brooklyn, N. Y.

We claim the solid boxes, E E, the sliding head, D, with V-bearings, and the adjustable gibs, a a, all constructed and arranged with the lever, substantially as and for the purpose herein described.

73,824.—PILE-CUTTING MACHINE.—John B. Mignault (assignor to himself and Alfred P. Hall), Boston, Mass.

I claim a cutter, X, pivoted loosely to a spring arm, W, in combination with a spring, Y, substantially as and for the purpose set forth.

Also, the combination of the adjustable block, Z, cutter, X, and bed, R, substantially as and for the purpose set forth.

Also, the lever 27, with its slotted arm, 29, in combination with the adjustable screw, 31, or its equivalent, substantially as and for the purpose described.

73,825.—THREAD AND YARN HOLDER.—Freeman F. Myrick, Dublin, N. H.

I claim the combination of the frame, A, with the spindle, B, substantially in the manner as and for the purpose set forth.

73,826.—HARVESTER.—Frederick Nishwitz, Brooklyn, N. Y.

I claim, 1st, A dumping box tilting diagonally on a rolling fulcrum, substantially in the manner and for the purpose described.

2d, The combination of a concave platform with a diagonally tilting dumping box, substantially as described.

3d, The combination of a reel rake, a concave platform, and a diagonally tilting dumping box, substantially as described.

4th, The combination of a reel rake, with a dumping box, tilting diagonally to the reel shaft, substantially as described.

5th, The combination with the tilting dumping box, of the tilting lever, operated either by the hand or foot of the driver, or by both combined, substantially as described.

6th, The combination of the projecting supporting arm, K, with the tilting platform or dumping box, rolling fulcrum, and retaining guide, substantially as described.

7th, The adjustable supporting arm, K, constructed and arranged as described.

73,827.—HARVESTER.—Frederick Nishwitz, Brooklyn, N. Y.

I claim the combination, in the manner described, of the concave platform, the reel rake, the reel supports, and the tilting dumping box, in an independ-

ent frame, so that they can be bodily attached to or removed from the machine.

73,828.—TRY SQUARE.—H. L. Ogden, Atkinson, Ill.

I claim a try square, constructed as described, and consisting of the blade, B, provided with a slot, a, and pivoted within a slot in the handle, C, spring, F, and stop-pin, b, the square being provided with a graduated scale, all arranged and operating as set forth.

73,829.—SPRING DOOR HOLDER.—Joseph B. Okey, Indianapolis, Ind.

I claim a device for holding a door in any desired position, when constructed with the base, A, and standard, B, made in one piece, with the spring, C, held in position by the key, D, substantially as described and set forth.

73,830.—LATHE FOR TURNING IRREGULAR CURVED FORMS.—Walter Payton, London, England.

I claim 1st, The combination and arrangement of devices herein set forth, for cutting or planing curved forms, when operating in manner substantially as described.

2d, Also, the axes, F F, and L2 L2, when operated by rack and pinion, L L, and clicks, L6 L8, so as to give the desired progressive motions to the work to be cut or planed, or to retain such work stationary during the return motion of the cutters, in manner substantially as described.

3d, Also, the arrangement of the cutters, so as to admit of their several adjustments and correct action, in manner substantially as described.

4th, And also, the method of imparting motion to the support, N1, of the cutting tool or tools, by an adjustable arm, J9, and parts acting therewith, in manner substantially as described.

73,831.—PERMUTATION LOCK.—Oliver E. Pillard (assignor to Frederic H. North), New Britain, Conn.

I claim, 1st. The ring or blocking piece, o, suspended from the dog, i, in combination with the hub, g, and arm, 2, on the spindle, d, as and for the purposes set forth.

2d, The plate, or lip, 9, in combination with the hub, g, ring, o, and bolt, h, as and for the purposes set forth.

3d, The combination of the ring, o, dog, i, bolt, h, hub, g, lip, 9, and circular tumblers, k k, as and for the purposes set forth.

4th, The combination of the bolt, h, and hub, g, with the plate or flange, 9, that is notched, to allow the hub, g, to be moved to connect with the tumblers when the bolt is projected, but prevents the tumblers being acted on when the bolt is retracted, substantially as set forth.

73,832.—BOILER SCRAPER.—Auguste Poirel (assignor to himself and Pierre Bernard), New York city.

I claim, 1st, The construction of the metallic scraping disks, of unequal diameters, arranged upon the same rod, whereby each disk will perform a portion of the work without permitting the front disk alone to scrape the tube, as herein shown and described.

2d, The construction of the metallic disks, with perforations, to give them elasticity, whereby obstructions in the tube will not prevent the operation of the scraper, as herein shown and described.

73,833.—LIFTING JACK.—Lyman B. Prindle, Litchfield, Conn.

I claim the extension pawl, C D, as constructed, in combination with the ratchet or notched lever, B, and the single mortised and notched standard, A, whereby the fulcrum of the lever may be placed in any position for the hight of the article to be raised, as herein set forth.

73,834.—BURNER.—Samuel C. Pruden, Harmony, Ohio.

I claim a burner, made substantially as and for the purpose described.

73,835.—SINGLE HARNESS.—J. S. Reid, Orange, Ind.

I claim the straps, C C', when combined with the back strap, B, and shaft, A, substantially as above set forth and described.

73,836.—SCISSORS.—A. H. Rennie, Binghamton, N. Y.

I claim the combination of the blades, A B, handle, C, arms, a, wheel, b, crank, c, and pinion, d, substantially as described, for the purpose specified.

73,837.—BENDING MACHINE.—Wm. Richardson and Louis Ber Müller, Baltimore, Md.

We claim the combination of the roller, R, with the jointed frame which supports it, constructed substantially as described.

73,838.—METHOD AND MEANS FOR TREATING ORES OF GOLD AND SILVER.—Louis Edouard Rivot, Paris, France, assignor to Jacques Gaillardon, San Francisco, Cal.

I claim, 1st, The roasting of silver and gold ore by superheated steam in the manner as herein described, that is, by separating the ore from the flames by the interposition of cast iron plates, and by superheating the steam in the furnace itself, substantially as shown and set forth.

2d, The reverberating furnace, substantially as herein described, when provided with steam pipes on or about the fire bridge for discharging steam upon the sole, whether such furnace be arranged for burning vegetable or mineral fuel, as set forth.

3d, The arrangement, as herein shown and described, of a double furnace, or of a single furnace with two fire chambers, together with the use of cast iron plates at the level of the fire bridge, to separate the flames from the ore, substantially as set forth.

4th, The arrangement of the furnace herein shown and described, in which superheated steam is made to impinge upon the ore, when separated from the flames of the fire chamber.

5th, The method of amalgamating the roasted ore, without the adoption of any reagents, in apparatus of ordinary or suitable construction, substantially as herein show and set forth.

73,839.—APPARATUS FOR AMALGAMATING GOLD AND SILVER ORES.—Louis E. Rivot, Paris, France, assignor to Jacques Gaillardon, San Francisco, Cal.

I claim the herein described method of and apparatus for amalgamating auriferous and argentiferous ores.

73,840.—TREATING ORES WITH SUPERHEATED STEAM.—Louis E. Rivot, Paris, France, assignor to Jacques Gaillardon, San Francisco, Cal.

I claim the herein described method of and apparatus for roasting argentiferous and auriferous ores, that is to say, the employment, in connection with superheated steam, of a rotary roasting cylinder, substantially in the manner shown and specified.

73,841.—TRUNK LOCK.—George Ruppel, Harlem, N. Y.

I claim the manner herein shown and described of attaching the cup, B, to the plate, A, and to the two parts of the trunk or bag, by means of sliding bolts, D D, and central head stem, C, all made and operating substantially as herein shown and described.

73,842.—HEAT RADIATOR.—S. B. Sill, Three Rivers, Mich.

I claim, 1st, The adjustable chamber, B, when furnished with valve, G, vertical plate, n, and horizontal plate, S, in combination with flue, D, the whole constructed and operating as set forth.

2d, The four radiating chambers, arranged in the manner and for the purpose specified.

73,843.—BRICK MACHINE.—James Simpson, St. Louis, Mo.

I claim, 1st, The combination of the pivoted arm, P, having receiving plate r, bar, S, and rod, t, with the cross head, h, compressers, F G, and opening, m, in the bottom plate, l, as herein described, for the purpose specified.

2d, The plate, n, and screw, o, in combination with the hopper, J, and compressers, F G, as herein described, for the purpose specified.

73,844.—MACHINE FOR MORTISING FENCE POSTS AND SHARPENING FENCE RAILS.—John A. Snyder, Georgetown, Pa.

I claim, 1st, The rail carriage consisting of the adjustable bar, D, mounted on the upright reciprocating carriage, C, and provided with the swiveling clamp standard, D1, the whole constructed and operating in the manner and for the purpose set forth.

2d, The reciprocating rail carriages, I and K, adapted to be moved in paths at right angles to each other in combination with the toothed racks and pinions for operating said carriages, the whole arranged and operating as described.

73,845.—RECLINING CHAIR.—B. L. Southack, New York city.

I claim a reclining chair constructed as described, and consisting of the fixed seat, A, hinged back, C, and leg piece, E D, ninged rack bar, F G, pawl, H, lever, I, legs, a, arms, B, and hinges, a' b c c, all arranged and operating as described and for the purpose specified.

73,846.—FRUIT JAR.—Charles F. Spencer, Rochester, N. Y.

I claim the combination of the hinged loops, I, of cover, B, with the notched lugs, g, of jar, A, for the purpose of adapting to different thicknesses of the packing rings, and to different inclinations of their seats, the whole arranged as described and operating in the manner and for the purpose set forth.

73,847.—SHOE.—Laroy S. Starrett, Newburyport, Mass.

I claim as an article of manufacture the fastening, a a', when constructed and applied to a boot or shoe, as and for the purpose specified.

73,848.—LEATHER BELTING.—Wm. Strevell, Jersey City, N. J., and Geo. B. Kerper and Sidney B. Wells, New York city.

We claim, 1st, A leather belt produced by combining with a "side" a split, whether such split is from the same or a different "side," or whether it be continuous or in detached pieces, as described.

2d, Also a leather belt produced by combining with the inner or flesh surface of a leather side, a split from the corresponding or the flesh surface of another side, as described.

73,849.—VEHICLE.—George Stricker, Catawissa, Pa.

I claim the arrangement of the supplemental spring D, and the side springs C, the spring, D, having its ends attached underneath the axles, and the springs, C, having their rear ends attached at or above the upper side of the rear axle, and their forward extremities to the cross bar, b, substantially as and for the purpose specified.

73,850.—WATER WHEEL.—J. M. Tanner, Albert Lea, Minn.

I claim, 1st, The combination of the centrally pivoted arm, D, movable buckets, B, and body, A, all arranged and operating as herein described, for the purpose specified.

2d, The thin curved buckets, B, attached to the ends of arms, D, pivoted in recesses in the heads of the wheel, A, and operated and guided by wrist or guide pins, G, or by friction wheels or rollers, I, pivoted thereto, said pins or rollers working in eccentric grooves in the casing, H, of the wheel, substantially as herein shown and described and for the purpose set forth.

73,851.—INSECT GUARD FOR HORSES.—Bradley Treadwell, Reading, Conn.

I claim the insect guard, C, for horses, in combination with the bridle or halter, substantially as and for the purpose herein shown and described.

73,852.—HAND LOOM.—Clemens Unverzagt, Terre Haute, Ind.

I claim, 1st, The combination of the grooved plate, A, batten, F, feather, a b c, and traverse bar, F', when arranged and acting substantially as and for the purpose herein described.

2d, The triggers, K K', as set forth, in combination with the traverse bar, F', and its pins, e e'.

3d, The combination of the traverse bar, F', feather, a b c, and the grooved plate, A, constructed and operating as herein fully set forth.

4th, The ratchet bar, A', with its head, m, and lower inclined surface, x, in combination with the inclined bracket, B, and notched revolving plate wheel b, as and for the purposes set forth.

5th, The combination of the shaft, D, wheels, C C', pitmen, E E', batten, F, traverse bar, F', feather, a b c, and grooved plate, A, all as constructed and arranged, as is herein substantially set forth.

6th, The combination of the sliding ratchet bar, A', constructed as described, with the strap, C, cord, D, or their equivalents, when operated by the batten, F, for the purposes set forth.

7th, The arrangement and combination of devices herein set forth, by which the picker staffs are set and sprung alternately simultaneously by the backward motion of the batten.

8th, The combination of the picker staffs, L L, triggers, K K', and traverse bar, F', when arranged and constructed as is herein set forth.

73,853.—BRIDLE BIT.—George Webb, Lewiston, Me.

I claim my improved bit, as made, with each of its headstall hangers, C, and its martingale or curb-rein hitching arm, g, in one piece, to revolve on the cross bar, a, provided with rein rings or eyes, b b, as specified.

73,854.—TUBE WELL.—B. Weirich and H. H. Shartle, Middlebury, Ind.

We claim the perforated well tube, provided with a screw thread, a, around it, to receive different-sized coiled wires, whereby the openings between the coils of said wires are regulated, adapting the tube for use in fine sand or coarse gravel, as herein shown and described.

73,855.—MATCH BOX.—J. H. Wheeler, Addison, Vt.

I claim the combination with the box, A, of the sliding cap, J, slides, a g, separator, f e c', and slide lock, o, all constructed, arranged, and operating substantially as set forth and for the purpose specified.

73,856.—BUNG.—Eli White and Wm. Shilvock, N. Y. city.

We claim a bushing for the bung holes of barrels, etc., constructed with the body, B, flange, C, and prongs, D, substantially as described.

73,857.—COFFIN.—John C. Williams, Newton, N. J.

I claim as an improved article of manufacture, a coffin constructed as described, the bottom, A, provided with a recess, a, fitting into the grooves near the lower ridges of the sides, B, the bottom and sides secured together by means of the head and foot boards, C D, grooved upon their inner sides, near their ends, b, and fitting over the rebates, c, upon the sides, B, and the lower edges of the said head and foot boards rebated, to fit over the ends of the bottom, A, preventing its longitudinal displacement, as herein shown and described.

73,858.—DITCHING PLOW.—J. L. Wilson and J. R. Haworth, Iowa Falls, Iowa

We claim, 1st, The beams, R R, the gage beams, N N, and wheels, C, when combined and constructed as set forth.

2d, The levers, M M, constructed and operating in the manner specified.

3d, The mold boards, d, the supplementary mold boards, E, in combination with lever, P, the whole constructed and operating substantially as set forth.

4th, The wheel, U, in combination with colter, T, and shovel, e, when arranged and operating substantially as described.

73,859.—MANUFACTURE OF REFINED GRAHAMITE.—Henry Wurtz, New York city.

I claim the new chemical preparation or article of manufacture specified and described above, called by me Purified or Refined Grahamite, and obtained by the action of solvents upon the mineral Grahamite, substantially as above set forth.

73,860.—PREPARATION OF GRAHAMITE.—Henry Wurtz, New York city.

I claim, 1st, The separation from any impurities with which it may naturally occur commingled, of the mineral substance called by me Grahamite, by the use of a liquid medium or menstruum, substantially as above set forth.

2d, The separation of Grahamite into two distinct substances by the action of solvent media or menstrua, substantially as above set forth.

73,861.—PREPARATIONS FROM GRAHAMITE.—Henry Wurtz, New York city.

I claim the chemical preparation or article of manufacture specified and described above, called by me Beta Resinoid of Grahamite, or Irisine, and consisting of the residue left undissolved in the extraction from Grahamite of the vicosine, whether the said irisine be refined by solution in one of its solvents and evaporation or not, all substantially as set forth.

73,862.—PREPARATION FROM GRAHAMITE CALLED VISCOSINE.—Henry Wurtz, New York city.

I claim the chemical preparation or article of manufacture specified and described above, called by me Alpha Resinoid of Grahamite, or Vicosine, and obtained by the action of solvents upon the mineral Grahamite, substantially as set forth.

73,863.—BRICK MACHINE.—Edwin F. Andrews, Glasgow, Mo.

I claim, 1st, The vertical mold frame, K, constructed and operating substantially as and for the purposes specified.

2d, The combination of the plunger, H', with the mold frame, K, when constructed and operarting substantially as set forth.

3d, In combination with the cams, C, and frames, D, the adjustable bars, E E', and flanges, b, for assisting the operation of the plungers to carry the clay, substantially as set forth.

4th, The frame, A, with rollers, F F, secured upon shafts, m m, above the throat, G, frames, D, operating plungers, H H', receptacle, V, knife, l, platform, J, with board, I, and frame, K, all constructed, arranged and operating with their repective parts, as and for the purposes herein fully described.

73,864.—DRAFT EQUALIZER.—James Averill, Champlain, and Elisha S. Fitch, Mooers, N. Y.

We claim, 1st, The combination of a curved segment, b', with the central part of the forward side of the equalizer, B, substantially as herein shown and described, and for the purpose set forth.

2d, The combination of the friction roller or wheel, F, and pivoting-pin, G, with the tongue, A, and with the curved segment, b', to sustain the draught, substantially as herein shown and described.

3d, The combination of the strap, H, or its equivalent, with the pin, G, roller, F, equalizer, B, and tongue, A, substantially as herein shown and described, and for the purpose set forth.

4th, The combination of the long staple, E, with the equalizer, B, and hammer pin, C, substantially as herein shown and described, and for the purpose set forth.

5th, Attaching the equalizer, B, to the tongue, A, substantially in the manner herein shown and described, so that the said equalizer may be readily detached from the said tongue.

73,865.—COMPOSITION FOR COLORING HAIR.—James C. Ayer and Edward Haeffeley, Lowell, Mass.

We claim the combination of the tartro-plumbite of soda or potash, the oxalo-plumbite of soda or potash, either or all of them, with glycerin, spirits, and water, in the proportions above specified, or in any other proportions, for the purpose specified.

73,866.—GUIDE FOR CARDING ENGINE.—John Bachelder, Norwich, Conn.

I claim, 1st, The combination of two or more adjustable guide bars, constructed substantially as described and for the purpose set forth.

2d, The arrangement of the screws, h and l, with the bolt, g, for the purpose specified.

73,867.—AXLE GAGE.—Allen J. Beach and Alexander H. Beach, Linden, Mich.

We claim the horizontal bar, A, in combination with the sliding gage, B, the angle bar, C, provided with knuckle-joints, D D, the adujustable bars, E E, provided with other joints, F F, the gage bars, G G, working in the slots, H H, and the set screws, I I, when constructed and arranged substantially as and for the purpose described.

73,868.—ELECTRIC GAS-LIGHTING APPARATUS.—Frank Bean, Boston, Mass., assignor to himself, E. E. Bean, and Levi H. Straw.

I claim, 1st, In combination with the ratchet and its crank, the spring connecting the crank to the valve rod, substantially as shown and described.

2d, Also, the combination and arrangement of the valve, the valve chamber, and the inlet and outlet for the gas, when the valve is so arranged that it shuts off communication between the valve chamber and the valve rod tube when connection is open between the supply pipe and the burner, and shuts off communication between the supply and burner pipes when the gas is not burning.

73,689.—MEASURING RECEIVER FOR STILL.—William M. Blume, New York city.

I claim, 1st, The rod, H, provided with the cups, I I, whereby the hight of the liquid is automatically recorded, as set forth.

2d, The arrangement of the perforated plates, D G, and G1, whereby the liquor is caused to enter the measuring compartment, b, steadily, as desired.

3d, The perforated false cover, E, when arranged below the real cover of a receiver, substantially as and for the purpose herein shown and described.

4th, The arrangement and combination with each other, of the vessel, A, plates, D G, G1, covers, B and E, rod, H, and cups, F, all made and operating substantially as and for the purpose herein shown and described.

73,870.—LAMP.—Arthur W. Browne, Brooklyn, N. Y.

I claim, 1st, The inclining tube, T, in combination with the central shaft, F, wheel, W, and rotating bottom piece, arranged in the manner and for the purpose substantially as described.

2d, In combination with the inclining tube, T, the central opening through the tube, B, for the purpose of facilitating the filling of the lamp.

73,871.—BUTTON.—Francis M. Bugbee, Kingsville, Ohio.

I claim a sleeve button, the outer button, a, of which is constructed with a notched recess, and with a shank, c, to which is attached a disk, g, carrying a spring, e, said head being placed within the recess in the button, a, and the latter is connected with the lower button, b, by a stem, c, passing through the shank, and rigidly connecting the two buttons, the parts being arranged substantially as described.

73,872.—PREVENTING INCRUSTATION OF STEAM BOILERS.—Samuel G. Cabell, Quincy, Ill.

I claim, 1st, The multiplied or compound electro-magnet, L, constructed substantially as described, and arranged in combination with the chamber, C, points, G, and battery, O, essentially as described.

2d, The application of the electro-magnet, within a steam boiler or chamber connected therewith, to prevent incrustation, substantially as specified.

73,873.—FASTENING FOR CORSETS.—W. B. Cargill (assignor to himself and I. Strouse & Co.), New Haven, Conn.

I claim the within-described corset fastening, consisting of the hook and eye, formed as shown, and secured to the steels without riveting, as herein set forth.

73,874.—REDUCING LEAD ORES.—Charles F. Carpenter, Louisville, Ky.

I claim the introduction of atmospheric air and steam, together or separately, directly into the space marked B, in a reverberatory furnace, so that they may pass directly between the flame and the ores of lead upon the hearth,

Also, introducing air and steam through the fire bridge, so that they may be intensely heated before acting on said ores, as herein described, or any other method substantially the same.

73,875.—CHECK AND HARNESS REIN.—William Clark, Valatie, N. Y.

I claim the check rein, fastened at one end to the main or driving rein, and extending through a runner on the billet for the throat latch; thence downwards and through the bit ring, or a pulley connected to said ring; and thence upwards to the upper runner, where its other end is fastened, substantially as described.

73,876.—DEVICE FOR SCARIFYING THE SOIL PREPARATORY TO PLANTING.—Elisha Crane, Elkhart City, Ill.

I claim, 1st, Arranging in a suitable frame a series or gang of cutting blades or disks, when the same are so adjusted as to cut the soil in parallel channels, substantially as described and for the purpose specified.

2d, The lever, H, and curved arm, I, in combination with the windlass frame, when the same are arranged substantially as described and for the purpose specified.

73,877.—PRIMING METALLIC CARTRIDGES.—James F. Cranston, Springfield, Mass.

I claim the manner of fastening in the fulminate in a metallic cartridge shell, by means of the cover, b, attached upon the outside of the shell, substantially as described.

73,878.—HARVESTER RAKE.—Jos. Dick, Jr., Canton, Ohio assignor to himself and Eugene Glen, Rochester, N. Y.

I claim, 1st, The gear-plate or casting, made in one piece, with bearings for the crank wheel and vibrating rake shaft or support, and provided with standards, a, and adjustable stops, substantially as described.

2d, The arrangement of the crank wheel which drives the rake relative to the shaft or support of the rake, substantially as described.

3d, The arrangement of the crank wheel in the described relation to the uprights or arms in which its driving shaft is mounted, as described.

4th, The horizontal shaft, through which motion is imparted to the vibrating rake and rake gearing, mounted in uprights on the gear-plate or its equivalent, and over the crank wheel, substantially as described.

5th, The vibrating rake carrier and sector arms, combined and operating substantially as described.

6th, The vibrating rake arm, in combination with its tubular carrying arm, substantially as described.

7th, The vibrating sector arm, in combination with a toothed segment or its equivalent on the rake arm, operating substantially as described.

8th, A latch connected to the vibrating rake arm, and operating in connection with the vibrating sector arm to hold the rake in its elevated position, substantially as described.

9th, The arrangement of the lever, k, relative to the vibrating arms, and rake latch for releasing the same, as set forth.

10th, The latch lever, operated to release the latch by means of a cam or projection on the crank wheel, as set forth.

11th, The employment of a yielding or spring stop for limiting the upward throw of the rake.

12th, The arrangement of the spring stop or its equivalent upon the vibrating rake arm, substantially as described.

13th, The adjustable dove-tail lug, through which the pitman is connected with the vibrating rake carrier, substantially as described.

73,879.—DEVICE FOR SETTING SAWS.—Henry Disston, Philadelphia, Pa.

I claim, 1st, The tapering block, A, with one or more angular recesses, in combination with the tapering plate, B, the block and plate being adjusted longitudinally, and being otherwise constructed substantially in the manner and for the purpose herein set forth.

2d, The combination of the said block and plate with the adjustable rods, D D, for the purpose specified.

73,880.—SAW-GUMMING MACHINE.—Thos. S. Disston (assignor to Henry Disston), Philadelphia, Pa.

I claim, 1st, The frame, A, with its curved guides, b and b', in combination with the adjustable frame, B, and its cutter, F, sliding on the said guides and carrying a cutter, F.

2d, The adjustable guide bar, G, combined with the frame of the machine, substantially as and for the purpose specified.

3d, The jam nut or nuts, d, in combination with the screw, C, for adjusting the frame, B, substantially as described.

4th, The recesses, t t, on the guides, b', of the frame, A, constructed as described, when the said recesses are arranged in respect to the sliding frame, B, for the admission of the latter to, and its withdrawal from, the said frame, A, as set forth.

73,881.—ADDRESS CASE FOR RAILROAD CARS.—Stephen W. Downey, Piedmont, W. Va.

I claim, 1st, A tablet case for railroad cars, constructed substantially as herein shown and described.

2d, The slate, C, and the hinged top, D, having a glass, E, when the whole is constructed and arranged substantially as described.

73,882.—MORTAR AND CEMENT.—Edward A. Ellsworth, Washington, D. C., assignor to himself and Lysander Hill, Alexandria, Va,

I claim, 1st, The use of vegetable fiber in combination with plasterers' mortar and cement, substantially as and for the purpose specified.

2d, Mortar or cement, when prepared with vegetable fiber, substantially as and for the purpose specified.

3d, As an article of manufacture, vegetable fiber, when reduced to fine filaments, and cut into short lengths, as a substitute for plasterers' hair, substantially as described.

73,883.—LEAD PENCIL.—Eberhard Faber, New York city.

I claim a pencil, provided with a rounded convex head, formed by dipping said pencil in a suitable compound, substantially as herein set forth.

73,884.—COMB.—Caleb Foster (assignor to Elias Brown), Wappinger's Falls, N. Y.

I claim an enameled steel comb, the teeth of which are punched out of a single steel plate, and finished, substantially as herein described.

73,885.—SLEIGH AND SLED.—D. C. Frazeur, Sidonsburg, Pa.

I claim, 1st, The combination and arrangement of the wheels, D D, and runners, C C, substantially as and for the purposes specified.

2d, The combination of the lever, G, shaft, F, pitmen, H H, and cross-bars, E E, with the pivoted runners, C C, bearing the wheels, D D, substantially in the manner and for the purposes set forth.

73,886.—DRUM ATTACHMENT FOR STOVES.—J. C. Gaston, Cincinnati, Ohio.

I claim a stove provided with the domes, B and C, and the dampers, E, all constructed and arranged substantially as set forth.

73,887.—CONNECTING STOVE PIPES.—Nelson W. Green, Cortland Village, N. Y.

I claim, 1st, The open spring or elastic sleeve, B, when the same is constructed substantially as described, and for the purpose specified.

2d, The wire spring, C, when the same is constructed so as to be applied substantially as described, and for the purpose specified.

3d, The open spring or elastic sleeve, B, and the wire spring, C, when the same are combined so as to operate substantially as described and for the purpose specified.

73,888.—DIE FOR FORMING SLOTS IN SCREWS.—Henry Hammond, Hartford, Conn.

I claim, 1st, The combination of the devices, A e B f, when constructed and arranged to be used in conjunction, substantially as specified.

2d, The combination of the devices, A e B, constructed and operating substantially as herein set forth.

73,889.—CAR COUPLING.—David Harger, Des Moines, Iowa.

I claim the revolving coupling bar, G, when constructed and arranged as herein specified, in combination with the lever, H, keeper, I, and spring jaws, A A, as and for the purposes herein described.

73,890.—WOOD-SAW FRAME.—Jesse Havens, Auburn, N. Y.

I claim, 1st, A saw frame, in which a bifurcated wooden brace, C C', constructed in one piece, as described, is used, in combination with the end pieces, substantially as described.

2d, The piece, D, constructed with a neck and head, D3, and used in combination with the frame pieces, A B and C, with which it is united, substantially in the manner and for the purpose set forth.

73,891.—CULTIVATOR.—Christofer Heffit, Tazewell county, Ill.

I claim, 1st, The combination and arrangement of the diagonal frame, A, and cross-bar, C, pivoted to the main frame, and having the standards, h and u, attached thereto, as shown, with the levers, c, all as shown and described.

2d, In combination with the above, the detachable handle, F, and the lever, H, arranged to operate as and for the purposes set forth.

73,892.—CRADLE.—Lysander Hill and Adelaide R. Hill, Alexandria, Va.

We claim, 1st, A cradle, so constructed and operating that it vibrates longitudinally, the body of the cradle always keeping a horizontal position substantially as and for the purpose set forth.

2d, In connection with a cradle, operating as above described, the axles, G G, arranged transversely under the body of the cradle, and having rockers, B B B, attached to their extremities, and operating in the manner and for the purposes substantially as specified.

3d, The combination of the cradle-body, A, with the rockers, B B, and wheels, C C, when the parts are so constructed and connected that the device may be adjusted to serve either as a cradle or a wagon, substantially in the manner described.

73,893.—SHUTTER FASTENING.—Gibbons G. Hickman (assignor to himself and George Windle), Coatesville, Pa.

I claim, 1st, The elastic strap or connection, C, substantially as and for the purpose explained.

2d, The combination of the elastic strap, C, stud, D, and button or latch, E, arranged and operating substantially as described.

3d, In combination with the subject of the preceding clause, the rings, F F', applied in the manner and for the purpose set forth.

73,894.—MANURE DRAG.—Uriah Hummer, White Oak, Pa.

I claim the arrangement of my drag-arm, G, with its hook, g, in combination with the two cross-pieces, J I, hook and link, J R, and connecting rod, O, with the lever, P, notched pawl, T, and spring, S, substantially in the manner and for the purpose specified.

73,895.—CHURN.—Benjamin Illingworth, Freeport, Ill., assignor to Andrew J. Brubaker and Albert Bliss, Jr.

I claim the dasher, A, as constructed, used with the staff, B, made hollow, and provided with the plug, D, and nipple, C, substantially as and for the purpose set forth.

73,896.—ALARM FOR GRIST MILL.—James D. Irvin, Corydon, and Bryson I. Seward, Bloomington, Ind.

We claim, 1st, The movable standards or frames, B, the wheels, C, provided with the adjustable arms, D, and stops, t, substantially as and for the purposes specified.

2d, The triggers, E, provided with the stops, r, the springs, p, acting upon the wheels, C, for the purposes set forth.

3d, The combination of the running-gear with the wheels, C, provided with the adjustable arms, D, and shanks, x, of hammers, h, furnished with points, i i i, the whole forming a double alarm for mills, substantially as herein described.

73,897.—BURGLAR ALARM LOCK.—Albert Isensee, Indianapolis, Ind.

I claim, 1st, The sliding tumbler, D, and arm, I, arranged to operate in combination with the bolt, B, substantially in the manner and for the purpose set forth.

2d, The set, P, in combination with the trigger, O, substantially as and for the purpose set forth.

73,898.—CENTRIFUGAL PUMP.—Edmund M. Ivens, New Orleans, La,

I claim, 1st, The arrangement of the valve, G, relatively to the pump, B, suction pipe, F, and branch pipes, d d', and their connection, e, substantially as shown and described, for the purpose set forth.

2d, The arrangement of the branch pipes, d d', and their connection, e, relatively to the valve, G, essentially as and for the purpose set forth.

73,899.—ROOFING MATERIAL.—A. Jameson, Trenton, N. J.

I claim a roofing material, consisting of a sheet of felt, in which is embedded a textile fabric or fibrous strands, substantially as described.

73,900.—CARBURETTED AIR LAMP.—J. D. Jenkins, Charlestown, Mass.

I claim as a new article of manufacture a lamp in which the vapor for burning is produced by sending a current of air through a saturated packing, said current being impelled by a fan blower, substantially as and for the purpose set forth.

73,901.—DEVICE FOR SHARPENING HORSESHOE CALKS.—John Johnson, Barrington, N. Y.

I claim, 1st, The claimb bar, A, or its equivalent, adapted to be secured to the shoe, substantially as and for the purpose set forth.

2d, The adjustable swinging arm, provided with the rotary file, G, in combination with the clamp bar or its equivalent, substantially as described.

3d, The rotating circular file, arranged on a vertical or nearly vertical shaft and operating substantially as and for the purpose described.

4th, The removable sleeved cap or plate, J, for holding the shaft and circular file in place as described.

5th, The standard, F, and set screw, f, in combination with the dovetail slide, C, for holding said slide in place on the clamp bar, as described.

73,902.—CAR COUPLING.—John B. Johnson, Laurel, Ind.

I claim, 1st, The combination of the spring, B, pin, D, lever, E, and wheel, F, and chains, E' and C', with the pin and link of a railroad car, substantially as set forth.

2d, Suspending the coupling pin, C, from a wheel, on the opposite side of which is a lever suspended so as to more than counterbalance the weight of the pin, when said lever is so supported that by the entrance of the link into the drawhead, the pin, released from the weight of the lever, will fall by its own gravity, substantially as set forth.

73,903.—CLIP AND FERRULE FOR JOINTS ON FELLIES.—Phineas Jones, Newark, N. J.

I claim the combined clip, a, and ferrule, b, with the rib, c, made substantially as specified and shown.

73,904.—HORSE RAKE.—A. S. Kendall, Guilford, Me.

I claim, 1st, The rake teeth in combination with the secondary teeth, Q, and spring, R, substantially as described and for the purpose set forth.

2d, The rake teeth, P, and secondary teeth, Q, in combination with the hay gatherer, M N O, operating as set forth for hauling the hay into the receptacle, substantially as described.

73,905.—SPRING FOR BED BOTTOMS, CHAIRS, ETC.—A. H. Knapp, Newton Centre, Mass.

I claim the wire springs, b b, constructed by bending the same into a succession of loops, as shown in the accompanying drawings, to be used in constructing the bottoms of beds, chairs, settees, sofas, and lounges.

73,906.—BATH TUB.—Ernest J. Knowlton, Ann Arbor, Mich.

I claim the portable frame, A, constructed of a series of hinged sections, as specified, and provided with a flexible bath apparatus, in the manner and operating substantially as set forth.

73,907.—URINAL.—Samuel Males, Cincinnati, Ohio.

I claim a urinal, or necessary, having two or more doors, F F', so constructed as to stay each other in the partially open position, and to close automatically when liberated, substantially as and for the purposes set forth.

73,908.—SPIKE.—Wm. W. Martin, Allegheny City, Pa.

I claim a new article of manufacture, viz., a spike constructed and operating substantially as herein described, and for the purpose set forth.

73,909.—MACHINE FOR OILING WOOL.—Miles Mayall, Roxbury, Mass.

I claim, 1st, The combination of the elevated reservoir, connecting tube and hollow perforated shaft, substantially as and for the purpose set forth.

2d, The combination of the elevated reservoir, the connecting tube, hollow perforated shaft and revolving perforated cylinder, from which the oil is applied to the wood, substantially as described.

3d, In combination with the tube for applying the oil from the reservoir, an oscillating perforated hollow shaft, i, from which the oil will be made to flow, on starting the carding machine, and be cut off on stopping the same, by means of connecting mechanism acting upon the arm or wheels, g, substantially as described.

4th, Regulating and indicating the supply of oil to the cylinder, m, by means of the valves, o o and h h, indicator, q q, and dial plate, r r, substantially as set forth.

5th, In combination with a perforated cylinder, m, the brushes, y and z, for cleansing the apertures, arranged substantially as set forth.

5th, The combination of the endless apron and cylinder, m, when the frame supporting the latter is constructed with the pipes, d d, resting upon standards, b, to permit the cylinder to rise and fall, substantially as set forth.

7th, The combination and arrangement of the perforated cylinder and perforated shaft, i, as and for the purpose set forth.

73,910.—SPINNING MACHINE.—John McCune, Auburn, Ind.

I claim, 1st, The double horizontal spindles, Q, constructed substantially in the manner set forth.

2d, The treadle, the yarn guides the tension regulator, the spindles, and the carriers, constructed and arranged substantially as set forth.

3d, The combination of the pulleys, C and D, connected by a crossed belt, and the pawl, T, for regulating the tension of the belt when the shaft of the elevating pulley is attached to the frame by adjustable bearings, substantially as set forth.

73,911.—APPARATUS FOR COUNTING MONEY.—J. W. Meaker, Chicago, Ill.

I claim, 1st, A series of tubes of varying diameters, to suit different sized coins, and provided with graduations corresponding with the varying thickness of different coins, and numbers to indicate the amount contained in each tube.

3d, A coin assorter, consisting of an inclined way for the coin to pass down, with openings corresponding in size with the various sized coins, said openings being arranged with the smallest at the upper end of the inclined way, and increasing in size in regular order towards the lower end, with partitions or guides to direct the various coins to their respective receptacles, substantially as described.

3d, The yielding bed, m, pivoted at one end, in combination with the stationary support, a, arranged as and for the purposes set forth.

73,912.—LAMP.—Rufus Spaulding Merrill and William Carleton, Boston, Mass.

We claim in a lamp burner in which the cone and chimney holder are connected with a sleeve fitting the wick tube the arrangement of the parts substantially in the manner herein described so that the removable parts of the burner when taken from the wick tube may be deposited in an upright position and supported upon a broad base, as and for the purposes set forth.

73,913.—VAPOR INHALER.—Mason M. Miles, Aurora, Ill.

I claim the combination of the tubes, C D, with the vessel, A, and bulb, B, the various parts constructed substantially as and for the purposes specified.

73,914.—HARVESTER.—C. Moul, Hanover, Pa.

I claim a shaft for connecting the driving power of a harvester with a rake or reel or other device applied upon a hinged finger beam or platform and to be driven when such shaft is constructed of three or more than two longitudinally-adjustable telescopic sections and such sections fitted together by tongues and grooves and shoulders and stops, all substantially as and for the purpose described.

73,915.—BEEHIVE.—Jacob Neal, Orleans, Iowa.

I claim, 1st, Providing the moth slides, G G, with metal scrapers, t t, when used in the boxes, B B, in the manner and for the purposes specified.

2d, The boxes, B B, communicating as described, moth slides, G G, having scrapers, t t, blocks, H H, with their small cavities, perforated slides, F F, and buttons, E, the whole being constructed, arranged and used in the manner and for the purposes set forth.

73,916.—MANUFACTURE OF ARTICLES OF RUBBER, GUTTA-PERCHA, ETC.—J. B. Newbrough and Edward Fagan, New York city.

I claim the manufacture of articles of utility or ornament by subjecting rubber, gutta-percha, or similar gum either before or after it is formed of the desired shape, to the action of bromine, substantially as described.

73,917.—MATERIAL PRODUCED BY HEATING CAOUTCHOUC AND OTHER GUMS.—J. B. Newbrough and Edward Fagan, New York city.

We claim the within-described new manufacture or substance consisting of caoutchouc, or equivalent gum, incorporated with iodine and sulphur (after treating the said iodine and sulphur substantially as specified), and subjected to heat.

73,918.—DUMPING CART.—G. E. Newell, Pawtucket, R. I.

I claim, 1st, The combination and arrangement of the hinged rack, C, the train of gear wheels, k l m n o, and the pressure roller, f, with the body of a dumping cart, substantially as described for the purposes specified.

2d, Combining with the hinged rack, C, a pressure roller for the purpose of keeping the teeth of the rack in engagement with the teeth of its operating pinion at all positions of the cart body, substantially as described.

73,919.—COMPOSITION FOR THE SOLES OF BOOTS AND SHOES.—Jeremiah L. Newton, Boston, Mass.

I claim a mixture composed of caoutchouc or rubber, gutta-percha, or an equivalent gum, mixed with pulverized quartz, sand, felt, or their equivalents, and applied to or for the soles of boots and shoes for the purpose of preventing slipping, substantially in the manner and for the purpose above set forth.

73,920.—HAIR CLOTH.—John Noblit, Philadelphia, Pa.

I claim, 1st, Two or more nippers or hair carriers in a loom for weaving hair cloth which are operated so as to close upon two or more hairs simultaneously and then to drop the hairs singly and at different points in the shed or warp, substantially as described.

2d, A fabric, each lay of the woof of which is composed of two or more hairs laid together, substantially as described.

73,921.—APPARATUS FOR CLEANING CLAY.—Luman P. Norton, Bennington, Vt.

I claim, 1st, The screw shaft, E, in combination with the stopping and reversing cams, N, and the pins, P, on the lever, M L, substantially as and for the purpose set forth.

2d, The sieve, W, the pressing plate, D, in combination with the stopping and reversing cams, N, and their adjuncts, arranged and operated substantially as and for the purpose set forth.

73,922.—COMPOSITION FOR KINDLING FIRES.—Warren C. Philbrick, Lynn, Mass.

I claim the use of the several ingredients hereinbefore mentioned in combination for the purpose of kindling hard-coal fires, substantially as above set forth.

Also in a particular manner the pressing of the material while hot into blocks or cakes as stated having the bevelled edges, C C, and especially the openings or draft holes, a a a, for producing strong and ready combustion.

73,923.—TOOL FOR OPENING BARRELS.—Thomas J. Phillips, Washington, D. C.

I claim, as a new implement for removing hoops from barrels, etc., the herein-described head, A, provided with the hammer, C, or its equivalent, a suitable handle, and the hook, D, all constructed and operating substantially as described.

73,924.—INDIA-RUBBER SOLE.—R. S. Pickett, New Haven, Conn.

I claim the rubber sole described the edge of which is formed of a harder compound than the body of the sole and the whole formed and finished by the process of vulcanization and so as to be attached to the boot or shoe, in the manner set forth.

73,925.—WINDOW SCREEN.—C. C. Plaisted, Hartford, Conn.

I claim, 1st, The combination of the screen and pins, b, in the manner and for the purpose herein set forth.

2d, The combination of the screen and clamp or clamp bar, E, in the manner and for the purpose herein set forth.

73,926.—SPOOL STAND.—G. A. Pridham, Newark, N. J.

I claim the box, A, in combination with the bar, B, with its arms, C C C', and used as and for the purpose set forth.

73,927.—METALLIC BAND FOR TRIMMING CAR SEATS.—D. F. Randall, Chicopee, Mass.

I claim a metallic band, having the projections, a a', formed thereon, substantially as and for the purpose set forth.

73,928.—MACHINE FOR THREADING SHEET-METAL PIPE.—Carl Recht, New York city.

I claim, 1st, The combination of the cam roller, f, or its equivalent, with the movable or sliding strip, h, or its equivalent, when arranged as specified and used for the purpose set forth.

2d, The combination of the gage plate, H, with the cylinders, A and B, substantially as set forth.

3d, The combination of the clutch, O, and set screw with rest, I, all constructed as described, when used for the purpose set forth.

73,929.—SHEET-METAL PIPES.—Carl Recht, New York city.

I claim, 1st, Cutting sheet metal into rhomboids, a l d m, for the purpose of making an overlap, z, equal to the pitch of a thread which, after rolling said rhomboidal sheets into pipes, I turn on the ends of said pipe, substantially as herein specified.

2d, Also, making sheet metal piping, the ends of which are parallel to the thread which is turned thereon, substantially as herein specified.

73,930.—BRAID-MAKING MACHINE.—Geo. Rehfuss, Phila., Pa., assignor to the American Buttonhole, Overseaming, and Sewing Machine Company, Pennsylvania.

I claim, 1st, The combination of the plate, B, lever, G, rod, D, and its needle, d, the whole being constructed, arranged, and operated substantially as and for the purpose described.

2d, The combination of the above and the spring plate, o, for the purpose set forth.

73,931.—PUDDLING FURNACE.—Henderson Ross, Pittsburgh, Pa.

I claim, 1st, A water clamp for furnaces, constructed, arranged, and operating substantially as herein described and for the purpose set forth.

2d, Surrounding the neck or throat with water, substantially as herein described and for the purpose set forth.

73,932.—CHURN.—Jesse B. Rumsey, Port Huron, Mich.

I claim, 1st, The vessel or hopper, C, provided with a long slot in its bottom and with a slide or cover, D, to close this slot for regulating and controlling the supply of milk to the churn below, substantially as set forth.

2d, The shaft, E, provided with wings, and situated beneath the vessel or hopper, C, as and for the purpose specified.

3d, The wings or paddles, G G, made in a curved form, and arranged upon the shaft, F, near the bottom of the churn, with holes made diagonally through them, and with journals on each end, so that they will fold up on the shaft, substantially as set forth.

4th, The collars, P, for the ends of the shaft, F, said collars being provided with arms in which are holes to receive the journals of the wings, G G, as and for the purpose set forth.

73,933.—HILLSIDE PLOW.—Hiram Sloop, Mount Healthy, assignor to himself and Jeptha Garrard, Cincinnati, Ohio.

I claim a reversible hillside plow, characterized by two plows proper, secured back to back, and provided with a beam capable of being swung and locked in diametrically opposite directions, dogs, I J, abutment bar, H, sheaths, E E', lever, M, and rack, N, or their equivalents.

73,934.—LANTERN.—A. G. Smith, Jersey City, N. J.

I claim, 1st, An inwardly-projecting flange around the base or top of a lantern glass, substantially as and for the purpose set forth.

2d, A shoulder or depression in the side of the lantern glass, in combination with a spring or automatic catch, to lock and retain the globe within the guard frame, substantially as set forth.

3d, Holding a movable lamp or oil pot down in its proper place upon the base plate, f, by means of the burner shaft.

4th, Securing the bottom, B, and the guard frame, A, to each other, by passing the burner shaft, F, through both of the bands, a and b, and at opposite sides of the lantern, substantially as set forth.

5th, In combination with the burner shaft, F, extending through both sides of the bands, a and b, and securing the bottom, B, and guard frame, A, together, a spring catch, H, substantially as and for the purpose set forth.

6th, In combination with the burner shaft, F, and slot, g, or its equivalent, the notch, r, substantially as and for the purpose set forth.

7th, Holding a burner down in its proper place by means of the burner shaft, secured to both sides of the band, b, substantially as set forth.

8th, Projecting the lower end of the lantern glass, C, downward within the band, b, substantially as and for the purpose set forth.

9th, The combination of the burner shaft, F, secured at each end to the band, b, with the top of the lamp pot, G, in such a manner that the said burner shaft shall, when in position, be slightly bent or sprung so as to produce a pressure upon the burner, E, and lamp, G, sufficient to retain them respectively in their places, substantially as herein specified.

10th, Fastening a movable lamp pot, which rests on the bottom of the lantern without any part extending through the same, down in its place, by means of a fastening bearing upon its top, as set forth.

11th, A seat, p, formed in the base plate, f, to retain the movable lamp pot in a central position, substantially as set forth.

73,935.—CAR COUPLING.—Jas. W. Smith and John P. Smith, Elder's Ridge, Pa.

I claim the spring, c, in combination with the lever and foot rod, a, upright, a3, and chain, a1, and coupling pin, b, when the same are so arranged as to operate substantially as described, and for the purpose set forth.

73,936.—APPARATUS FOR MAKING ICE AND FOR COOLING AIR AND LIQUIDS.—Daniel E. Somes, Washington, D. C.

1 claim, 1st, the bed frame, as and for the purpose set forth.

2d, Atomizing liquids, substantially as shown in fig. 2.

3d, Connecting cars or boats, and other vessels, as and for the purpose set forth.

4th, Cooling cars, for the transportation of meats and other food, substantially as set forth.

5th, Cooling and ventilating passenger cars, substantially as set forth.

6th, Cooling ships, boats, and other vessels, as described.

7th, Cooling corn, wheat, and other kinds of grain, in canal boats and other vesels, substantially as set forth.

8th, Cooling grain in granaries and other buildings, substantially as set forth.

9th, Using ice and other cooling or freezing substances, in combination with a machine or machinery for producing cold, and as an alternative or reinforcement of cold, when such machine or machinery shall from any cause cease to operate, for the purposes herein set forth.

10th, Making ice and freezing cream as herein described.

11th, Cooling liquids and condensing steam, gases, or vapor, substantially as set forth.

12th, Purifying air and cooling it, substantially as and for the purposes set forth.

13th, Cooling or freezing meats, fish, fruits, and other kinds of food, substantially as described.

14th, Cooling or freezing meats, vegetables, or other food, by means of machinery, in combination with chemical agents.

15th, Cooling cars by means of a machine or machinery.

16th, A car having in it or connected with it a machine or machinery for cooling or freezing, as an article of manufacture.

17th, The apparatus herein described, or its equivalent, as an article of manufacture.

18th, Canal boats and other vessels, with lining and tubes, substantially as described, in combination with the apparatus herein described.

19th, Flexible air tubes for connecting cars or boats and other vessels.

20th, Canal boats with tubes for conducting cooled air, and means for ventilating, and the apparatus, or an equivalent, for cooling or freezing, substantially as described.

73,937.—WATCH.—O. F. Stedman, Ravenna, Ohio.

I claim the band or ring, C, beveled or made thin near its upper edge, with its lower edge resting upon the case frame, B, said ring being made narrower than the movement, and just wide enough to cover the space between the plates, a and b, substantially as and for the purpose set forth.

73,938.—APPARATUS FOR CLEANING PRIVIES.—Louis Straus, Louisville, Ky.

I claim, 1st, The combination of the reservoir or receiving tank, A, and deodorizer, B, with a forcing engine, substantially as and for the purposes described.

2d, The sliding valves, 1, of the engine, constructed with cutting edges, substantially in the manner and for the purposes described.

3d, An apparatus for emptying privy vaults, constructed and operating substantially as described.

73,939.—MEDICAL COMPOUND.—John M. Thompson, Saltillo-ville, Ind.

I claim the within described mixture, compounded as and for the purpose set forth.

73,940.—CAR REPLACER.—Alban N. Towne, Chicago, Ill.

I claim an apparatus for replacing cars upon the track formed by a combination of the clamp, E, and bars, D, the former to be attached adjustably to the rail by keys, J, and the latter made of unequal lengths, and terminating with dog, H, for attaching adjustably to the track, substantially as set forth.

73,941.—RUNNING GEAR FOR CARRIAGES.—J. B. Withey, Lexington, Ky.

I claim the combination and arrangement of a running gear for carriages, as hereinbefore described, when constructed with the wrought spindle or journal shaft, A, the hub, B, a collar and nut, C, boxes, D, bars, E F G H I and K, reach, J, plate, L, dog, M, and draft rods, N, when put together and operating substantially as and for the purposes set forth.

DESIGNS.

2,860—COFFIN.—Wm. G. Algeo, Pittsburgh, Pa.

2,861.—SCARF PIN.—Chas. A. Flesche and John Perpente New Haven, Conn.

2,862.—OIL CAN.—Chas. J. Hauk, Brooklyn, N. Y.

2,863.—FRAME.—Wm. J. Lusk, Fentonville, Mich.

2,864 and 2,865.—CARPET PATTERN.—Levi G. Malkin, New York city, assignor to Hartford Carpet Company, Hartford, Conn. Two patents.

2,866.—MASONIC HALL.—John McArthur, Jr., Philadelphia, Pa.

2,867 and 2,868.—TRADE MARK.—Theo. G. Meier, St. Louis, Mo., assignor to St. Louis Cotton Factory. Two patents.

2,869.—TRADE MARK.—Chas. J. Miller, Philadelphia, Pa.

2,870.—TRADE MARK LABEL.—James M. Taft, North Providence, R. I.

2,871.—CARPET PATTERN.—Henry G. Thompson, New York city, assignor to Hartford Carpet Company, Hartford, Conn. Thirty-two other patents having the same title as the above also granted, the numbers extending from 2,871, ending 2,902.

2,904.—GOOD TEMPLAR BADGE.—W. H. Wilson, Providence, R. I.

PENDING APPLICATIONS FOR REISSUES.

Application has been made to the Commissioner of Patents for the Reissue of the following Patents, with new claims as subjoined. Parties who desire to oppose the grant of any of these reissues should immediately address MUNN & Co., 37 *Park Row, N. Y.*

67,855.—MACHINE FOR GRINDING REAPER KNIVES.—Henry Richardson, New York city, assignee by mesne assignments of Edwin M. Scott, Auburn, N. Y. Dated July 30, 1867. Application for reissue received and filed Jan. 17, 1868.

1st, I claim as the invention of Edwin M. Scott, in combination with an oblique revolving grinding wheel or stone on the end of a shaft the vertically or nearly so swinging frame for holding the reaper knife to be ground so that it may be swung up to the stone or back to be examined by the operator, substantially as described.

2d, In combination with the swing frame the inclining of the clamping bar or of the knife so that the sections or edges to be ground may be brought in their entire length to the grinding surface of the stone, substantially as described.

3d, In combination with the clamping bar and the knife the hook-headed clamp, o, for holding the knife to the bar and so that the stone or the bar and knife may be moved without interfering with the grinding operation, substantially as described.

4th, The combination of the disk, slides, and thumb screw, as and for the purpose set forth.

5th, The combination of the disk, slides, bolt and lever, substantially as and for the purpose described and represented.

56,102.—CULTIVATOR.—John S. Rowell and Ira Rowell, Beaver Dam, Wis. Dated July 3, 1866. Application for reissue received and filed Jan. 18, 1868.

We claim the combination of the slotted beam, A, shank, A, brace bar, C, and bolt, D, when the parts are constructed and arranged to operate as and for the purposes herein specified.

70,782.—BEEHIVE.—James M. Beebe, Casadaga, N. Y. Dated Nov. 12, 1867. Application for reissue received and filed Jan. 20, 1868.

I claim, 1st, Constructing beehives of comb frames so formed that when combined together they will form a tight hive, substantially as and for the purpose set forth.

2d, Securing the said comb frames together by means of a wire bail, b, and wedge, c, in the manner shown and described.

3d, The construction of the ventilating board, H, in the manner and for the purpose specified.

4th, The combination and arrangement of the outer case, A A', ventilating board, H, inner hive and packing material, J, substantially as and for the purpose set forth.

5th, Bridging the space between the ends of the hive and outer case so as to form a continuous passage, I, for the bees and to prevent the same being closed by the packing in winter, substantially in the manner set forth.

6th, The employment and combination of the partition board, E, with the comb frames, C C, for reducing or dividing the hive, for the purpose and in the manner specified.

7th, The mode of forming the passages, g g, in a hive composed of comb frames, C C, to the surplus honey boxes above, as herein shown and described.

38,373.—BOOTS AND SHOES.—Boston Shoe Stud and Button Company, Boston, Mass., assignees by mesne assignments of David N. B. Coffin, Jr., Newton, Mass. Dated May 5, 1863. Application for reissue received and filed Jan. 22, 1868.

We claim, 1st, The button-laced boot as a new article of manufacture, the distinguishing feature of which consists of the arrangement and combination of a series of buttons on one part with a lacing and a series of holes, eyelets, loops, studs or buttons upon the other of the parts to be drawn toward and fastened to each other in such manner that the loops formed by the alternating of a lacing, string or cord from the individuals of one series to those of the other may readily be unlooped from the buttons and relooped or buttoned irrespective of the fastening or unfastening of the lacing at the ends of the series so unfastening and refastening the boot or shoe and so that the unlooping of one loop relieves the tension of the next, substantially as described.

2d, In a button for lacing boots and shoes having a head and neck and a base for attachment we claim placing an excess of base or an extension from the neck upon the side opposite to the direction of the tension of the lacing or loops thereby to counteract the tendency of the button to tip or incline.

☞ NOTE.—*The above claims for Reissue are now pending before the Patent Office and will not be officially passed upon until the expiration of 30 days from the date of filing the application. All persons who desire to oppose the grant of any of these claims should make immediate application.* MUNN & CO., *Solicitors of Patents, 37 Park Row, N. Y.*

MANUFACTURING, MINING, AND RAILROAD ITEMS.

The railway company running the Boston and Erie line, to save bridging the Quinnebaug river and a curve in the road, are excavating a new channel for the stream, two hundred feet wide, and nearly a quarter of a mile long. The railroad will run over the old river bed.

Another establishment for the manufacture of artificial stone has just been started in St. Louis. The new concern is engaged in making from common white sand, with soda, flint, chlorine and calcium as compounding materials artificial marble mantels of any pattern required.

A company has been organized in Bridgeport, Conn., for forming wagon bodies of hardened india-rubber composition.

The locomotives on the New York Central railroad are to be shorn of all their brass ornamental trappings, and be painted a dull brown color. This is done to save unnecessary work in cleaning, and will, no doubt, be appreciated by the engineers.

The Californians have discovered another convincing proof of the wonderfully copious natural resources of the Pacific coast, where, they proudly assert, everything requisite for human existence abounds in inexhaustless quantity. The last discovery is a mine which yields a mixed ore of lead and antimony, in the proportion of thirty parts of the former and seventy parts of the latter. This composite, until lately, was discarded as valueless, but now some genius has discovered that it only requires the proper admixture of the other minor ingredients to form a superior type metal. In San Francisco the imported antimony is worth sixteen, and lead nine cents per pound, but the metal from the new mine costs but eight cents the pound.

The yearly production of pig iron by the furnaces of Great Britain, forty years ago, was a little under 700,000 tuns, and that of the United States the same year about one-fifth that amount, or 140,000 tuns. Last year the production may be taken in round numbers, for the former country, 5,000,000 tuns, and the latter, 1,250,000 tuns, showing an increase, the effect of which upon the world cannot be estimated by figures.

The Government Commissioners for the Union Pacific Railroad have reported to the Secretary of the Interior that they find the sixteenth section of thirty miles of said road, terminating 540 miles west from Omaha, well constructed and ready for immediate service, and recommend the acceptance of the section. The present terminus of the road is 7,535 feet above tide water.

A correspondent informs us that he has found gold in Swansbury, a place about three miles below Havre de Grace, Md. Speculators will take notice.

The Lebanon Springs and Bennington railroad, connecting with the Harlem road at Chatham Four Corners, is expected to be completed by July next. Among the advantages anticipated from this new link is the formation of a trunk line from New York to Montreal without change of cars.

A bill for facilitating the building of a short branch line from Albany to Stephentown, Rensselaer county, has been introduced by Senator Banks. This latter road will be eighteen miles long, and by its construction Albany will have a direct road to the Hoosac tunnel.

NEW PUBLICATIONS.

THE BROADWAY—London and New York: Geo. Routledge & Sons, 416 Broome street. Published monthly. The February number is out. Price, $3 00 a year.

MERCHANT AND BANKERS' ALMANAC—1868.

This is a handsome bound volume of 240 pages, devoted to statistical matters of interest and importance to bankers and merchants. It contains a list of 1,650 National banks, the names of bankers and brokers in the United States and principal foreign cities; also, monthly prices of cotton, wool, wheat, and other products, for the last forty years, and other statistical information useful to business men. Published at the office, "Bankers' Magazine," 46 Pine street. Price, $2.

NORTHERN MONTHLY. No. 4.—February.

Probably no magazine has ever sprung so early into extensive notoriety as the above. Its criticism on Dickens, in one of its first numbers, made the magazine popular at once. M. R. Dennis & Co., Newark, N. J., and 37 Park row, N. Y. $3 a year.

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GRAND LINE TO THE PACIFIC
WILL BE COMPLETED IN 1870,

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The United States also makes a donation of 12,800 acres of land to the mile, which will be a source of large revenue to the Company. Much of this land in the Platte Valley is among the most fertile in the world, and other large portions are covered with heavy pine forests and abound in coal of the best quality.

The Company is also authorized to issue its own First Mortgage Bonds to an amount equal to the issue of the Government and no more. Hon. E. D. Morgan and Hon. Oakes Ames are Trustees for the Bondholders, and deliver the Bonds to the Company only as the work progresses, so that they always represent an actual and productive value.

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New York, Jan. 8th, 1868. 5 tf

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