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Device for Steaming Rovings.

This invention, an engraving of which accompanies the present article, has, in our opinion, great advantages over any other device yet made for the purpose of warming and moistening the strands of undressed wool or cotton while on their way from the rolls to the card cylinders. The advantages secured by the steaming process are well recognized, but as hitherto conducted it has been attended with inconveniences which it is the object of this invention to obviate.

The apparatus employed is extremely simple, and there is nothing about it at all liable to get out of repair, and it is readily applied to the cards.

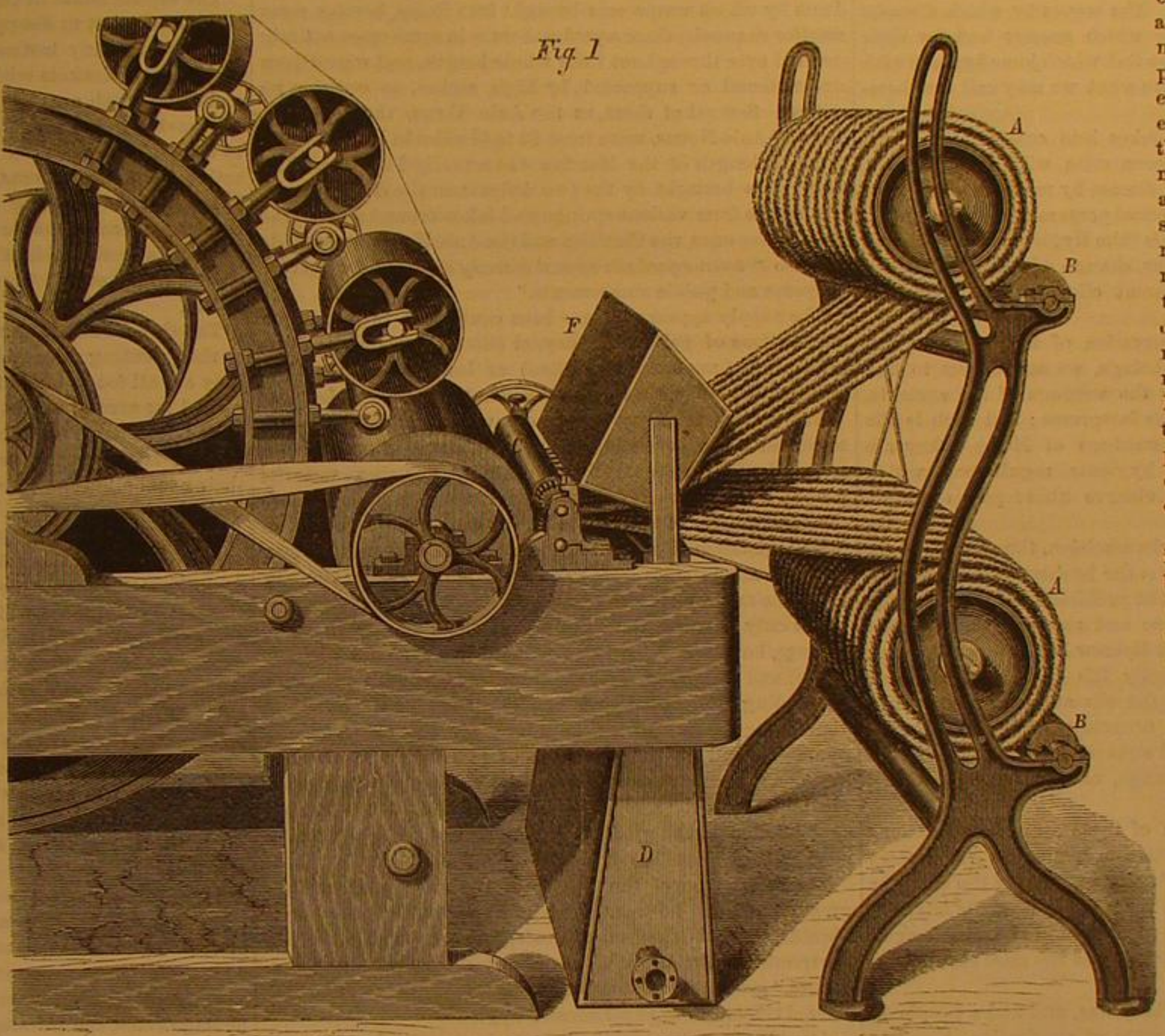
The engraving shows the apparatus attached to a carding machine, the sectional detail in Fig. 2 giving an interior view of the steam reservoir.

The rovings are wound on rolls, A, Fig. 1. These rolls rest upon wooden cylinders, B, which revolve the rolls, A, by friction merely, so that no tension is imparted to the rovings. The rolls, A, and cylinders, B, are mounted in a suitable frame as shown.

On their way to the cards the rovings pass through the rollers, C, Figs. 1 and 2, which feed the material to the card cylinder.

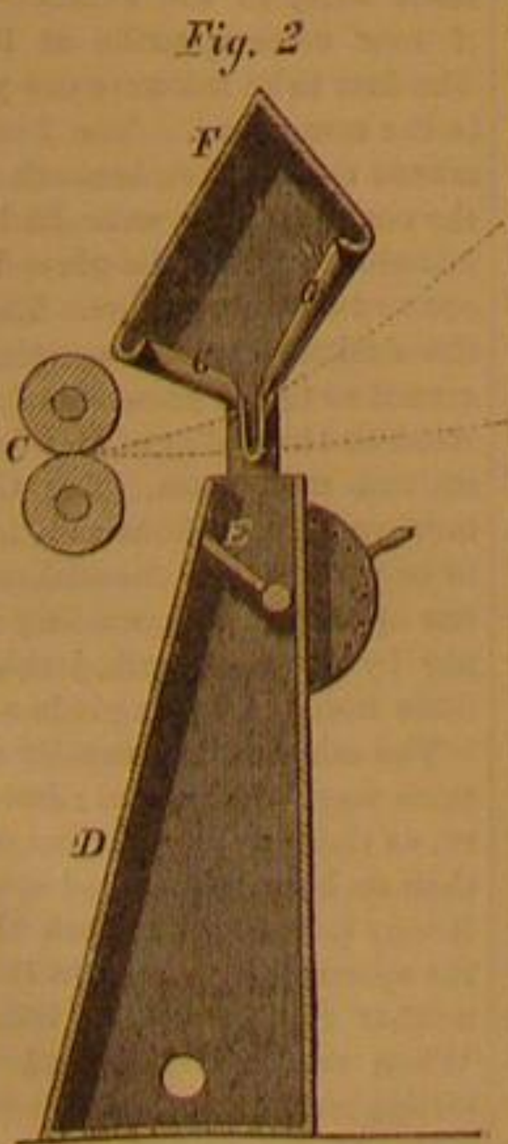
Between the feed rolls, C, and the rolls, A, is placed the steam reservoir, D, Figs. 1 and 2, the internal construction of which is shown in detail, Fig. 2.

This reservoir, made of tin, is the vital feature of the invention and deserves particular notice. Steam is admitted through a coupling or cock at the bottom of one of the vertical walls, and at once expanding in the open space becomes reduced to a vaporous condition. In this state it passes up through the rovings, gently moistening and warming the fibers, and the surplus collects in the cavity of the dome, F, Figs. 1 and 2. Here condensing upon the walls of the roof of the dome, F, the water of condensation trickles down and is caught and conducted away by the interior gutters, G, Fig. 2, to the lower part of the reservoir.



BARBER'S DEVICE FOR STEAMING ROVINGS.

This construction subserves two important objects. By converting the steam into vapor before it reaches the wool, it affords space for the harmless escape of any water which may have been produced in the steam pipe before starting; and by collecting the drip in the gutters, G, Fig. 2, all possibility of the water falling upon the rovings and injuring the work is avoided.



The general advantages secured by this device are, first, a large saving in oil. Wool may be worked, it is claimed, by the use of only one pint of oil to one hundred pounds, or even without any oil. The latter is deemed advisable where the goods are not to be scoured after weaving, as the fabric will then be much brighter and cleaner. The reader will, of course, see that the color of such textures must inevitably be impaired by the use of oil.

Second, the use of steam prevents the generation of frictional electricity, which in dry and cool weather is often a serious annoyance. By the use of this apparatus this annoyance is prevented, and wool can be worked as well in dry cold weather as on a warm, moist summer day. The amount of steam required to produce the required temperature and hygrometric state of the fiber and the surrounding air is regulated by the admission of steam to the reservoir, and further controlled by a damper, E, Fig. 2, which damper is held to any desired position by a handle and semi-circular plate with holes, into which a pin is placed to sustain the handle.

It is scarcely necessary to say the device may be used for mixed wool and cotton, as well as for either of these fibers separately.

It is claimed that the device moistens the roving with much greater uniformity than any other means hitherto employed for the purpose, rendering it extremely pliable, and capable of being drawn out very fine, and not leaving the upper side less moist than the under side, as was often the case in the well known method of steam jets from a perforated pipe.

Patented October 5, 1869, by Solomon Barber, of South Coventry, Connecticut, to whom refer for further information.

Pressure in Steam Boilers.

There has been much difference of opinion among engineers, says the *Locomotive*, as to whether the pressure in a steam boiler was greatest at the top or bottom. Many have contended that the pressure was several pounds less at the bottom, although no good reason could be given for this theory, while others have maintained that the pressure was greater at the bottom, from the fact that the weight of water must be added to the indicated pressure of steam. We had the pleasure of seeing this question definitely settled a few days since at the Print Works of Messrs. John and James Hunter, Hestonville, Pa. An elbow was put on the end of the blow-off pipe which entered the mud-drum. Into this elbow a plug was screwed, which was tapped to receive a half-inch pipe; to this pipe a steam gage was attached and the blow-off cock opened. On comparing the gages attached at the top of the boiler, and to the mud-drum as described above, it was found that the pressure was greatest at the bottom by about a pound and a half, thus proving the latter theory, that the pressure at the bottom is the indicated pressure plus the weight of the column of water.

Gold Diggers of Thibet.

The Thibetan gold-field of Thok-Jalung, in latitude 32° 24′ 26″ and longitude 81° 37′ 38″, has been visited by a corps of scientific English explorers, who have just published an account of their observations. The diggers prefer to work in the winter, when nearly six hundred tents are to be found there; the soil when frozen does not "cave in." They have no wood, but use dried dung for fuel, and the water is so brackish as to be undrinkable until frozen and remelted. They live well, taking three meals a day of boiled meat, barley cakes, and tea stewed with butter.

The gold is obtained from an excavation a mile long, twenty-five feet deep, and ten to two hundred paces wide, through which a small stream runs; the implements used are a long-handled kind of spade and an iron hoe.

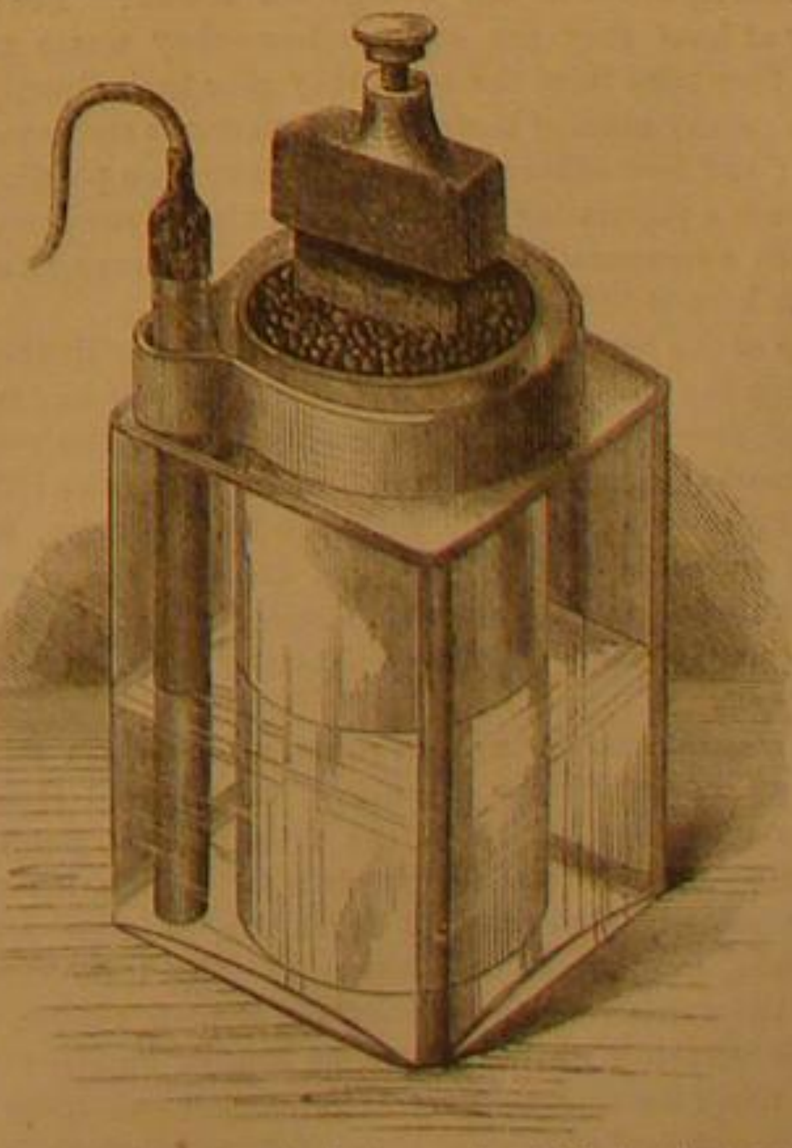
The water is dammed up, and a sloping channel left; at the bottom a cloth is spread, kept down by stones so as to make the bottom uneven; one man sprinkles the auriferous earth over the channel, and another flushes the channel by means of a leather bag, the pieces of gold fall into the inequalities and are easily collected in the cloth by lifting up the stones. The yield is large, nuggets of two pounds weight are found; the gold sells on the spot at rather less than thirty rupees per ounce. A gold commissioner or "sarpon" superintends all the gold-fields, a string of which extends along the northern watershed of the Brahmaputra, from Lhasa to Rudok. Each field has a chief or master, but any one may dig who pays the annual license fee of one sarapoo or two fifths of an ounce.

The curious posture for sleeping, universal among the Thibetans, was observed here. They invariably draw their knees close up to their heads, and rest on their knees and elbows, huddling every scrap of clothing they can muster on their backs; the richer rest thus on a mattress rising toward the head. The poorer avail themselves of a suitable slope on the hill side, or pile stones and earth to a convenient hight. This position is most probably adopted in order to secure as much warmth as possible for the abdomen, the thighs pressing against it and excluding the air.

The gold diggers recreate themselves with tobacco smoked in iron pipes, and, notwithstanding the hardships of their laborious toil, seem very merry, singing songs in chorus, in which the women and children join.

THE LECLANCHE BATTERY.

We give herewith an engraving of what is known as the



Leclanche cell, the main feature of which is, that peroxide of manganese is used with zinc (amalgamated) and an aqueous solution of chloride of ammonium.

The *Chemical News* recommends it as an excellent form of cell for telegraph batteries, etc. The zinc plate and peroxide of manganese are placed in a porous pot, as shown, and the opposite pole is a metallic pillar immersed in the solution at the outside of t e porous pot, as shown. The smallest size of this cell, with a porous pot 4·3 inches high, can accomplish an annual electric work which may be represented by 620 grains of copper reduced in the voltameter; the medium size, with a 6-inch porous pot, can reduce from 950 to 1000 grains, while the large size gives a work equal to 1,500 or 2,000 grains. The external jar is of glass or porcelain.

[From Nature.]

SCIENCE AND THE PUBLIC HEALTH.

"Hygiene is the art of preserving the health." But how can we preserve health? Plainly by doing our best to keep away disease. And how can we do this? By checking the causes of disease. To this end we must know these causes,—and here we have the grand object of hygiene; it is the science which studies the causes of disease, and points out means of avoiding them.

The knowledge of causes is the great aim of all science properly so called, and no study ought to be honored with that name which has not this end in view.

"Prevention is better than cure" is an old proverb, and, what is more, a very true one, and it is prevention that the hygienist studies—prevention of disease of whatsoever kind by the removal of its causes. The means by which diseases are prevented are often those which answer best for their cure; and here we perceive the link which joins hygiene with medicine, and which constitutes what we may call the therapeutical side of our science.

Thus we see that hygiene takes into consideration, incidentally as it were, and in connection with medicine, the treatment of many forms of disease by methods other than the employment of pharmaceutical preparations—these methods are what Fonssagrives calls "the Hygienic Modificators," and are such as exercise, baths, change of employment, sea voyages, residence in a different climate, and, above all, regimen.

As the methods for the preservation of health are of the first importance to all human beings, we may expect to find provisions to this end among the writings of the ancients, especially in the codes of the lawgivers; and such is the case; take for example the writings of Moses,—they are replete with most excellent hygienic regulations, which his followers were obliged to observe under pain of severe penalties.

Look at the institution of circumcision, the provisions for the separation of the lepers from the healthy people, the command not to eat swine's flesh, the prohibition of the marriage of near relations. Besides these and many other important generalities, we find the great Hebrew legislator descending to the inmost details of family life—giving a regimen admirable in its adaptation to the climate of the countries for which it was intended; directing the burial of excrementa and refuse matter of all sorts in the earth; fixing the laws of marriage, of concubinage, of servitude, and of all social relations.

It is to the strict observation of these sanitary regulations that one of the best known writers on hygiene of the present day, M. Michel Lévy, does not hesitate to ascribe the singular immunity of the Jewish race in the midst of fearfully fatal epidemics; which immunity was so marked in the middle ages, that it brought upon them "accusations the most absurd, persecutions the most atrocious."

We turn now for a moment to China, and find a people in many respects in a very high state of civilization, a people who had used the mariner's compass ages before it was known in Europe; but a people who, from want of communication with other nations, have made no advance at all, perhaps, for thousands of years, who have gone on increasing in numbers at such a rate that they now form one third of the population of the whole world, so that their country is crowded to an extent hardly conceivable. Surely we can learn something from them which will be of service to us in the management of our overgrown towns! Yes; in one thing at least they are our masters—they waste nothing; what they take from the earth they give back directly to the earth; every atom of their sewage matter is employed as manure; and how otherwise would it have been possible for so immense a population, without any external resources, to live on such a comparatively limited portion of the earth's surface, and to keep it fertile for so many centuries.

One of the best instances of the power of cultivation in improving the condition of a country is to be found in Lower Egypt, formerly the center of civilization of the world, now in a most abject condition; the inundations of the Nile, while the country was peopled with intelligent races, were the great source of its fertility, but are now the cause of the insalubrious marshes that generate the plague, and make that country one of the most unhealthy spots on the face of the globe.

To come nearer to our own country, let us see what were the hygienic conditions of ancient Greece and Rome. Had the practical application of the principles of public health anything to do with the high state of civilization to which those countries rose—a state which has, in some respects at any rate, never since been equaled? Had it anything to do with the success which attended the Roman armies, and led to the formation of that enormous Roman empire? Let the facts speak for themselves. What strikes one more in reading the classical authors of those countries than the continual mention of gymnasia and of baths? We find that a certain portion of time was set apart daily for bodily exercise, and thus a full development of the body was produced, and the greatest resistance given to those two great enemies of mankind, disease and death. It is true that all this training was part of a grand military system, that the youths were thus encouraged to compete for the prizes in the Olympic games and in the Roman gymnasia, that they might become good soldiers; but did this prevent the cultivation of mental acquirements? Again let the facts give the decision. Do you wish to see fine buildings, buildings so well constructed that they have lasted comparatively untouched by decay for centuries? Do you wish to study beautiful sculptures, statues anatomically perfect to the minutest details, and of unsurpassed artistic elegance? You go to Athens! You go to Rome! Do not fancy that we contend for bodily exercise as against mental studies; we merely maintain that a sufficient daily corporal exercise is absolutely necessary for the proper performance of the functions, both of mind and body.

But we have not yet done with Rome. We have mentioned the baths of that city; but how were they supplied with water? Ah! here we have need to hide our faces with shame. Surely we, with all the immense advantages of scientific engineering, manage to supply our cities with water as well as the people of two thousand years ago; at any rate, with all our steam engines and manufactories, we require at least as much as they did. When we turn to the pages of Frontinus, what do we find? That at the time at which he wrote, about A. D. 92, there were actually nine large aqueducts by which water was brought into Rome, besides some smaller channels; these aqueducts were in some cases entirely covered over throughout their whole length, and were driven underground or supported by high arches, as occasion required. Several of them, as the Anio Vetus, the Claudian, and the Anio Novus, were from 42 to 49 miles in length, while the total length of the Marcian was actually 54 miles. The water was brought by the two Anios from the river Anio, by the others from various springs and lakes around Rome; the two newest ones, the Claudian and the Anio Novus, were made because "*seven aqueducts seemed scarcely sufficient* for private purposes and public amusements."

The supply appears to have been equivalent to more than 332 millions of gallons per day, or (since the population was certainly not more than a million) at least 332 gallons per head per day—say, six times the amount now used in London.

But besides the aqueducts, there was a capital system of sewers at Rome, consisting of the "Cloaca Maxima" and a series of smaller channels flowing into it. The above remarks give an idea of the admirable manner in which the means for the conservation of the public health were made a subject of State legislation in ancient Rome, and of the determined way in which all obstacles were vanquished, in order that the city might be made as healthy as possible.

Not only have we the example of the ancients in these matters, but we have hygiene reduced to a system by Hippocrates) and associated, as it should always be, with medicine. In reading his Aphorisms, one is struck by the excellent dietetic regulations which he gives, for the observance of gymnasts, and for the guidance of physicians in treating acute and chronic diseases. His third section, which treats of the influence of the seasons of the year, and of the various ages of man in the production of diseases, is also very remarkable

The very names of the works of Hippocrates show how great a hygienist he was. "About Food," "About the Use of Liquids," "About the Diet of Healthy People," and especially his treatises on "Air, Water, and Localities," and on "Epidemics," are works which well entitle their author to be considered the father of experimental hygiene.

After Hippocrates comes Celsus, during the first century of our era, who devotes the first chapter of his first book "De Re Medica" to the exposition of rules concerning diet, and recommends the avoidance of too great regularity by healthy persons.

But we must not pass over the works of Galen, which were so numerous as to form a complete treatise of medicine, and which exercised so enormous an influence over the medical practice of the whole world during many centuries. Galen flourished during the latter part of the second century after Christ, and was for some time physician to the gymnasia at Rome. He revived the doctrines of Hippocrates, especially the celebrated one of the four humors (blood,. bile, phlegm, and atrabile), and considered that the different temperaments were produced by mixtures in various proportions of these humors with the four elements—earth, air, fire, and water, and with the four physical qualities—heat, cold, moisture, and dryness.

The Sicilian School sprang up in the eleventh century, and was the offspring of the ancient Greek and Arabian medical schools. Its practice is handed down to us in a quaint Latin poem, in which a great deal of truth is mixed up with a great deal of trash, and in which we find bad therapeutics based upon faulty pathology. It is from this school that the doctrines of Hippocrates and Galen, together with the fancies of later times, were spread abroad over Europe. Thus we find that the experimental methods of the fathers of medicine were confused with a host of traditions derived from the Arabian alchemists; so that the rational methods of treatment, adopted by Hippocrates and his more immediate successors, were neglected; and diseases were treated instead by host of supposed infallible remedies, of which the action was not at all investigated. And what do we find as the result of this change of practice? That epidemics raged with the most fearful intensity all over Europe, epidemics which were only known accidentally before, and which, finding favorable conditions for their spread in the utter neglect of hygienic observances, came from their natural seats in hot eastern countries, and committed unheard-of ravages in Europe. Look at the plague, that fearful epidemic of the eastern part of the Mediterranean! It is true that we have accounts of terrible visitations of it in Greece, and particularly of one which depopulated Athens in the second year of the Peloponnesian war, when the disease was introduced into that city (then fearfully overcrowded) by a ship from Egypt, that entered the Piræus; at various times also, and particularly in the years of the city 389 (before the building of the aqueducts), the Roman capital was visited with the same calamity; but this is nothing to the fearful visitations with which all Europe was afflicted during the fourteenth, fifteenth, sixteenth, and seventeenth centuries.

The last appearance of the plague in Europe was in 1719, when it was introduced into Marseilles by a ship that had been refused admittance into the port of Cagliari in Sardinia. Even then its course might probably have been stopped, had its malignant nature been recognized soon enough; but this was not the case, and more than 90,000 persons were killed by it. Here we have a clear proof of the value of preventive measures. Sardinia was saved because the king refused the admission of the ship into the port of Cagliari; Marseilles was ravaged because a like precaution was not taken.

THE REPTILES AT THE ZOOLOGICAL GARDENS.

From Naturalists' Note Book.

The reptile house in the Gardens at Regent's Park, London, is apt somewhat to disappoint the ordinary observer. Its occupants in many instances are stowed away comfortably beneath the blankets with which they are generally provided; and those which are visible are lying motionless on the gravel, or reposing in the branches of a tree. Very little motion is to be seen, unless it be among the lizards, which are more active than the serpents, but of whom the larger kinds are in the habit of standing in apparently the most uneasy attitudes for a considerable time. In this, and many other respects, they resemble the serpents, and there are indeed species which seem to form connecting links between the two orders.

The *Ophidia* are, however, seen to much greater advantage at their feeding time, which occurs once a week; not that they are all fed so often, for many will take sufficient food at a meal for several weeks, and some (in particular the pythons) have been known to fast for months together. Having been present lately on the occasion these of creatures receiving their usual allowance, we purpose to give a short account, from careful observation, of the manner in which they seized and killed their prey.

If we disregard the scientific divisions of the order which comprises these animals, we may divide them into three classes: firstly, those which seize their prey with their teeth, and crush it in their folds; secondly, those which seize and swallow it alive, after the manner of lizards; and thirdly, those which bite, or rather strike it with poisonous fangs. Of the first, the finest examples are the pythons and boas, besides which there are the yellow snakes of the West Indies, and others. Those of the second are fewer in number; they include the red snake of Bengal, viperine snake, English snake, etc. The present specimens of the third class include rattlesnakes, and Indian and Egyptian cobras, water vipers, etc.

These divisions are not strictly scientific, as some of the poisonous serpents have a structure closing resembling that of the boas, and are classed with them, but they will serve our present purpose better.

The constricting serpents, as we may term them, are kept in large cases, the entrance to which is either by a glass door in the front, which opens by a sliding up, or by a similar contrivance at the back, in the wooden partition. The colubrine snakes are in some of these cases generally, and indeed are so harmless that little precaution is needed. The venomous serpents have no opening but a small one on the lid of the case, about two or three inches square. Through this their food is introduced; and all necessary operations for the cleanliness and order of the interior are performed with a rod of stout wire, to the evident disgust of the occupants, who, if new comers, strike at it vigorously with their fangs. The first to be fed were the yellow snakes, and other species in the same case. The keeper, having unceremoniously removed the blanket, beneath which most of the occupants of the compartments were huddled together, as usual, quickly introduced under the glass door about a dozen sparrows, and one or two Guinea pigs. The former immediately retired to the darkest corners, seeming, however, to be quite unconcerned as to the presence of the snakes, as in some cases they stood on the bodies of the latter, which for the most part remained motionless. The Guinea pigs were more restless, moving slowly about as if in search of food. They seemed to be preferred by the snakes to the sparrows; and presently one of the reptiles, waiting his opportunity, seized a Guinea pig by the neck, and, jerking it nearer, threw two or three folds round it, killing it in a few seconds.

The other snakes rapidly dispatched the sparrows in the same way, when seized; but they were apparently in no hurry, as there were a number of the birds in one corner for more than an hour, which had not been touched during that time. It may be well to remark that there is nothing revolting in the spectacle of a serpent taking its food. Its victim suffers neither the mental or bodily torture ordinarily supposed. When seized, it is killed without delay, especially if it struggles to escape; and before its seizure it is never conscious of danger. Not only is this well known to those in charge of the creatures, but we can verify it from actual and careful observation. A rabbit will approach a snake out of mere curiosity, and, after sniffing at its head, and even being touched by its tongue, will start to another part of the inclosure, and resume its composure, returning again in the course of its explorations to the same snake without the least uneasiness, except what arises from a want of cabbage leaves, and the indigestibility of the gravel flooring. Guinea pigs show even less concern, and are not so easily startled by any moving object.

The snakes which had seized the sparrows, etc., waited till their prey was quite dead before they uncoiled and began slowly to prepare for swallowing it. The pythons, which occupy an adjoining case, and are the largest serpents in the collection, were next supplied with two or three ducks. The largest python instantly seized one, and threw one folded round it. He then remained perfectly motionless, appearing to be satisfied with having secured the bird, and did not at once kill it. The duck did not seem at first much concerned at such unusual treatment, but soon became restless, on which the python tightened the fold, and in about a minute had quite destroyed it. Having waited some minutes, as if to make sure that life was extinct, he slowly unwound his coil from the body, and touched it with his muzzle, moving it about till it had found the head. The idea of lubrication with saliva, now quite exploded, evidently arose from this habit of feeling over the body with the mouth. Having taken the head into his mouth, he began to swallow the carcass, his jaws stretching to an immense extent to allow of its passage. When he found any difficulty, he used the part of his body which lay nearest to it to push it gently, and considering the apparent difficulty, was not long in completing his meal. The supply of food is never stinted, and we believe that it not uncommon for a python to devour six or eight ducks and rabbits on one day. Of course a full meal takes a long period to digest, as is the case in all reptiles.

The colubrine snakes might with propriety be termed legless lizards, as, with the exception of the want of limbs, they are in most respects similar in structure to the saurians. A fine lively specimen of the Bengal rat-snake was fed with half a dozen frogs, which he pursued with great speed round the inclosure, and, driving them one by one into a corner, seized and swallowed them, in spite of their struggles.

We will now turn to the venomous serpents, and in particular the rattlesnakes. The keeper having put two young Guinea pigs into the case, one of the snakes instantly struck at that nearest to him. The action of a venomous serpent in wounding an animal cannot strictly be called a bite, as, though the fangs undoubtedly represent teeth, the jaws are not closed upon the object struck, which is simply punctured, the snake in most cases retiring immediately. The Guinea pig almost immediately showed signs of giddiness, but its body did not appear to swell; it seemed to be thrown into violent convulsions, and in about a minute fell helplessly on its side, with no other sign of life than occassional spasmodic motion of the jaws. A larger animal would not have been so soon killed; but as the snakes, being confined, have not often occasion to use their venom, it is probably more powerful than when they are in a wild state.

There are a large number of puff-adders in one case; and a Guinea pig being introduced began sniffing about as usual: but though he was touching one of the reptiles, it did not seemed disposed to strike, when suddenly another puff-adder darted at full length from an opposite corner, and, striking the creature, remained with its fangs apparently buried in its flesh, contrary, we believe, to the usual habit of the reptile. His intention was perhaps to prevent any of the others from devouring it.

There are specimens of the two species of cobras, the Indian and Egyptian: perhaps the most interesting of all serpents; but, on account of their excitable nature, it has been found necessary to hide them partially from view by filling the lower half of the case front with ground glass, so that it is not easy to observe them.

The appearance of the cobra when about to give the fatal stroke is graceful, and yet terrible to see. The inflated hood, the waving motion of the head, and the peculiar expression of the eye, combine to impress the observer of its consciousness of the deadly power which it possesses, and with which it threatens any living creature that dares appproach it. Venomous serpents can generally be distinguished by the broad head and stumpy tail which they possess; but this rule does not always hold good, some of them, for example the cobras, having a structure closely resembling that of the colubrines, with the exception of the fangs and organs pertaining to them. There are in this house some young alligators, which are kept with the water tortoises. They seem to pass their time generally in sleep, but when feeding time comes are extremely alert. On some mice being thrown into the water the alligators pursued them, swimming with the mouth raised out of the water. Having seized the unfortunate mice, they held them under the surface till drowned, and then tossing them into the gullet, bolted them whole. The tortoises are not fed with live animals, but with raw meat, which they tear in mouthfuls under the water. Considering the number of species which exist, the collection seems deficient in the *Chelonia*; but with regard to the *Sauria* and *Ophidia* it is probably unequaled.

RAIN AND RAIN DOCTORS.

There are rain doctors in all countries; some further removed than others from science, but doctors still. The looking out for omens (a habit more general than we are in the habit of supposing) is a residuum of a belief that was almost universal in old days. The signs or symptoms connected with the movements of animals may, in many instances, be worthy of attention; but they are mixed up with the strangest absurdities. Of the rain prognostics accepted two or three centuries ago, there was a pretty extensive variety. If ducks and drakes flutter their wings unusually when they rise; if young horses rub their backs against the ground; if sheep begin to bleat and skip about; if swine are seen to carry hay and straw to hiding places; if oxen lick themselves the wrong way of the hair; if a lamp or candle sputter; if a great deal of soot falls down the chimney; if frogs croak more than usual; if swallows fly low; if hogs run home loudly grunting and squeaking; if cattle and donkeys prick up their ears; if ants come out of their hills, and moles and worms out of the ground; if crows assemble in crowds and ravens croak; if water fowl come to land; if (as an old writer describes it) "beastes move here and there, makynge a noyse, and brethyng up the ayr with open nostrels;" if the down fly off from the dandelion and the thistle when there is no wind; if church bells be heard further than usual; in all such cases, we are told to expect rain. Gay, in his *Pastorals*, tells us that when a heifer sticks her tail bolt upright, or when our corns prick, it is an omen of approaching rain; whereas fine weather is foreshadowed by the high flying of swallows. *Poor Robin's Almanack*, about a century and a half ago, announced that when the hedgehog builds a nest with the opening in one direction, the next rain and wind will come from the opposite direction. Another writer asked:

Why doth a cow, about half an hour
Before there comes a hasty shower,
Clap her tail against a hedge?

The question is, does she? And the next question would be, is it one peculiarly constituted cow which does so, or do cows generally so conduct themselves?

Rain doctors and rain prophets are two different classes. The latter wish to know whence and when rain is coming, but with fair good sense lay aside any claim to the power of producing it. Not so the medicine men of North America, who (if the exceedingly troublesome Red Man still retain his ancient characteristics) are looked to as potent influences in times of unwonted dry weather. Arabia can say something of the same kind. When Karsten Niebuhr was in that country, he stopped sometimes in the province of Nedjeram, which was under the rule of a sheikh named Mecrami. Of this sheikh, Niebuhr said: "He honors Mohammed as the prophet of God, but looks with little respect upon his successors and commentators. Some of the more sensible Arabs say that the sheikh has found means to avail himself of heaven even in this life; for (to use their expression) he sells Paradise by the yard, and assigns more or less favorable places in that mansion according to the sums paid him. Simple superstitious persons actually purchase assignments upon heaven from him and his procurators, and hope to profit thereby. A Persian of the Province of Kerman, too, has lately begun to issue similar bills upon heaven, and has gained considerable by the traffic." Niebuhr dryly remarks upon this: "The people of the East appear to approach daily nearer to the ingenious inventions of the Europeans in these matters." He then proceeds: "The knowledge of many secrets, and among others of one for obtaining rain when he pleases, is likewise ascribed to the sheikh. When the country suffers from drought he appoints a fast, and thereafter a public procession, in which all must assist, with an air of humility, without their turbans, and in a garb suitably mean. Some Arabs of distinction assured me that this never fails to procure an immediate fall of rain."

The women in some parts of India adopt a peculiar method of their own to produce rain. The *Bengal Hurkaru*, a newspaper published in Calcutta, had the following paragraph, less than five years ago, in relation to a drought which affected a large portion of India: "The pundits and moulvies were called into the service, and muntras and beits (prayers) were read with intense but unavailing fervor. Finding the efforts of the priests fail them, the ryots (peasants) next had recourse to an ancient and somewhat singular custom. At night all the women of many of the villages walked naked to some neighboring tank or stream, and there, with song and invocations, sought to propitiate the offended heavens, and to induce the gods to send them rain. This device was also without immediate effect."

But while the medicine men and weather doctors try to bring rain where there is none, what are we to say of a semi, or demi-semi, scientific man who attempts to drive away rain when he doesn't want it, and make it fall somewhere else?

One M. Otto, of Leipzic, has not only broached this problem, but has actually had his scheme brought before the Academie des Sciences at Paris. He proposes a machine, called a pluvifuge, or rain expeller, to be hoisted on a very elevated platform. The machine is to consist of an enormous pair of bellows worked by steam power; and its purpose is to blow away any rainy clouds that may be accumulating. If many of these were placed at equal intervals in a large city, they might perchance insure a continuance of fair weather. What the learned Academie thougat of this is not recorded; perhaps they preserved a polite silence; but a very knotty question presents itself. If (an enormous mouthful to swallow, in all conscience) the pluvifuge could really do this work, how about other localities? As dirty little boys when driven away by a policeman from one place, will certainly re-assemble in another, so would the rain, driven away by the pluvifuge from one locality, make its presence sensibly felt in another. And suppose that other locality does not want it? It has been very cogently asked: "Would not an action for damages lie against the workers of the machine in town A, in case of towns B and C suffering from the undue quantity of rain which would be liable to fall to their share, if town A succeeded in puffing it all away from itself? For the vapor blown from some place must needs be blown to some other place. Or say that towns B and C, and even D and E, were as sharp-witted as town A, and were to set up equally efficacious machines, there surely ought to be some redress for town F, in case of its being altogether submerged as might very possibly happen under such circumstances." A case is supposed of an open-air fete at Smithville, to celebrate the coming of age of the heir of the Smiths. At Brownsville a pluvifuge happens unluckily to be at work, and blows the rain to the very lawn at which the fete champetre is being held. If a case (Smith *vs.* Brown) were instituted, would not the plaintiff be entitled to damages for the injury done by the rain to the ladies' dresses, and for doctors' bills arising out of colds and catarrhs caught on the occasion?

There are sometimes real showers of very unreal rain. It is stated by an old writer that in Lapland and Finmark, about a century ago, mice of a particular kind were known to fall from the sky, and that such an event was sure to be followed by a good year for foxes. A shower of frogs fell near Toulouse in 1804. A prodigious number of black insects, about an inch in length, descended in a snow storm at Pakroff, in Russia, in 1827. On one occasion, in Norway peasants were astonished to find a shower of rats pelting down on their heads. Showers of fishes have been numerous. At Stanstead, in Kent, in 1666, a pasture field was found one morning covered plentifully with fish, although there is neither sea nor river, lake nor fish-pond near. At Allahabad, in 1839, an English officer saw a good smart downpour of fish; and soon afterward thousands of small dead fish were found upon the ground. Scotland has had many of these showers of fish; as in Ross-shire, in 1828, when quantities of herring-fry covered the ground; at Islay, in 1830, when a large number of herrings were found strewed over a field after a heavy gusty rain; at Wick, much more recently, when herrings were found in large quantities in a field half a mile from the beach. In all these, and numerous other cases, when a liberal allowance has been made for exaggeration, the remainder can be explained by well understood causes. Stray wind blowing from a sea or river; a water-spout licking up the fish out of the water; a whirlwind sending them hither and thither; all these are intelligible. The rat-shower in Norway was an extraordinary one; thousands of rats were taking their annual excursion from a hilly region to the lowlands, when a whirlwind overtook them, whisked them up, and deposited them in a field at some distance; doubtless much to the astonishment of such of the rats as came down alive.

The so-called showers of blood have had their day of terror and marvel, and have disappeared. Not that any one ever saw such a shower actually fall; but red spots have occasionally been seen on walls and stones, much to the popular dismay. Swammerdam, the naturalist, told the people of the Hague two centuries ago that these red spots were connected with some phenomena of insect life; but they would not believe him, and insisted that the spots were real blood, and were portents of evil times to come. Other naturalists have since confirmed the scientific opinion.—*"All the Year Round."*

Forms for Telegraphic Messages.

The British Post Office authorities have prepared for the use of the public forms for telegraphic messages, to be used when the whole system of inland telegraphs is acquired by the government. The form is very simple and complete, and differs in one or two important respects from those hitherto employed by the companies—the novelties, it may be added, being decided improvements. The principal of these refers to the arrangement of the words that make up the message. A separate space in lines is allotted to each word, and the corresponding charge is printed clearly on the margin, so that the sender can see at a glance how much he has to pay, and the receiving clerk need be at no trouble in calculating how much he has to charge. Each of the forms thus divided into spaces is prepared for a message of fifty words, which is assumed to be sufficient in the majority of instances. In the right hand upper corner of the page, a blank space is left for the stamps, which will probably be almost exclusively used to cover the charges of transmission. Attached to the form are directions for the guidance of the sender, with a tariff of charges, and full information as to the arrangements for porterage.

MOTION.—"There is a definite store of energy in the universe, and every natural change or technical work is produced by a part only of this store, the store itself being eternal and unchangeable." What the learned Helmholtz teaches by these few words is important for us all to know, and it is this: Every force or power, that is, energy, that man exerts himself, or that he sees exerted by other animals, or any power or force exerted by natural phenomena—such as by the wind, the waves, or falling water, or what we may term artificial power or force, as exhibited in a steam engine, or a wound-up clock—is derived from the store of force-energy already existing in things of the earth. There is, in fact, never at any time any new creation of force, but merely a release of it, for the time being, from a state of rest. Hence, force, or energy, merely passes from one thing to another, and it is during this transmission that it becomes apparent under the form of motion.—*Septimus Piesse.*

NEW WAY OF MAKING TIN-LINED LEAD PIPES.—A new method of making tin-lined lead pipes recently invented in England, is as follows: A "muff" is formed, coated with tin on the inside, by pouring in the tin while the lead is still in a state of fusion. In order to prevent the metals from mixing the mold is rapidly revolved, the centrifugal force generated keeping the heavier metal—lead—on the exterior after the mass is cooled the pipes are drawn in the usual way. A perfect junction of the metal is thus attained. The method is an ingenious application of the well known principle of centrifugal action in the separation of bodies of different densities.

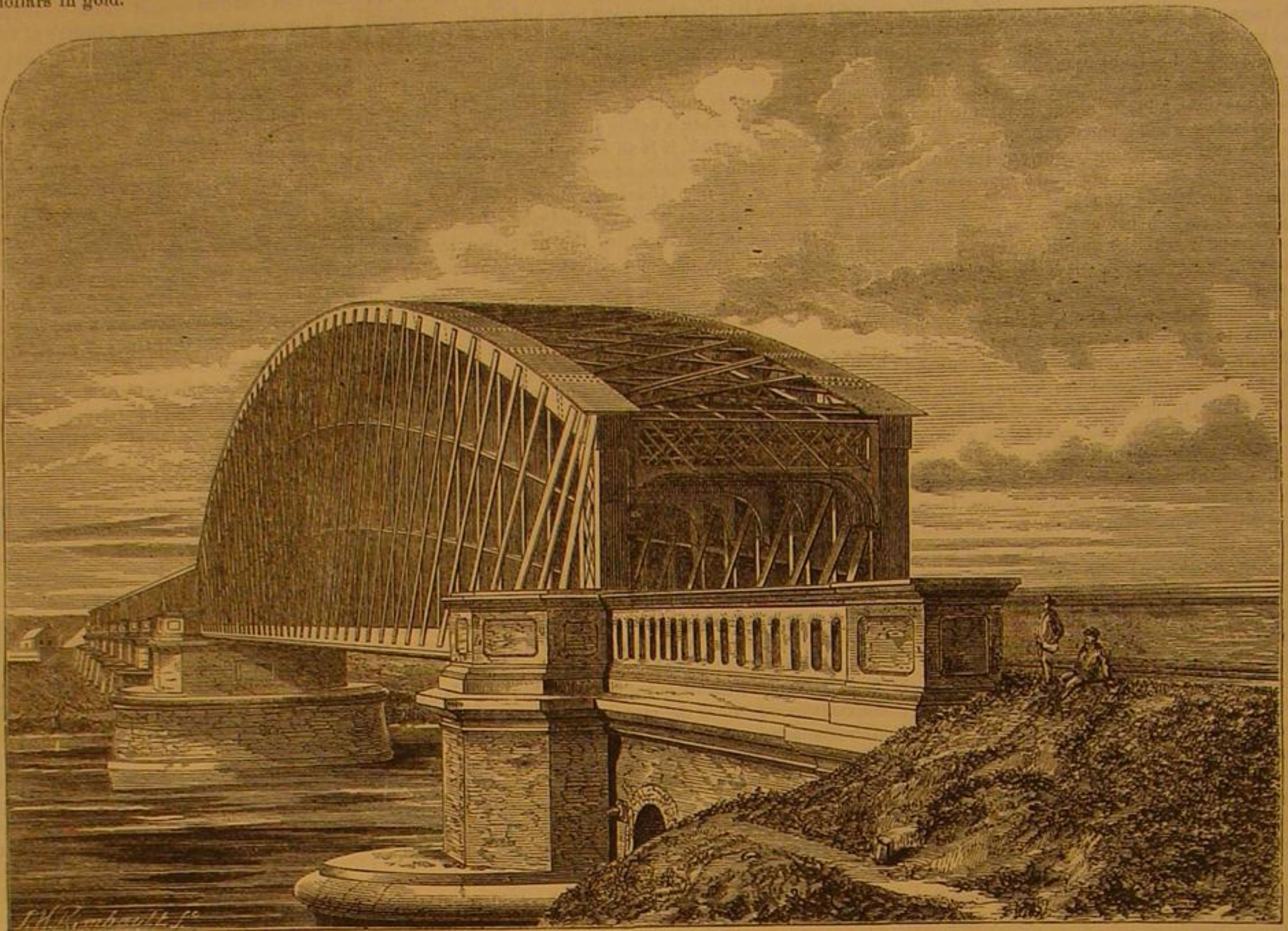
The Kuilemberg Viaduct.

The great railway viaduct in Holland, crossing the Lek, one of the branches of the Rhine, which empties itself into the North Sea, has just been completed under the superintendence of the engineer-in-chief, Mr. N. T. Michaëlis. Messrs. Harkort & Co., a well-known Dutch firm, obtained the contract early in 1866, for the sum of one hundred and fifty-three thousand pounds sterling, or about seven hundred and sixty-five thousand dollars in gold.

We illustrate, this week, from the *Building News*, the main span, which has a clear opening of 492 ft. Besides this, there are eight other spans, one of 262 ft. 6 in., and seven of 187 ft. each. Of the stone piers the largest is 23 feet wide, one is 16·40 ft. in width, and the remaining six are each 13ft. wide. The total length of the viaduct between the end abutments is 2,181 ft. The main opening of 492 ft. is spanned by a girder with a parabolic upper member.

The depth in the center is 35·6 ft., and at the end 26·24 feet. The girders are placed 30 ft. 4 in. apart from center to center, leaving a clear width of roadway of 26 ft. 3 in. The vertical struts in this girder are placed 13 feet 1½ inches apart, from center to center, and are braced with wrought-iron diagonal bracing. The cross girders are 26 feet 10½ in. long and 2 ft. 11½ in. deep.

The total amount of iron and steel which has been employed in the construction of the Kuilemburg viaduct is as follows: The 492 ft. opening, 2,123·94 tuns; the 262 ft. 6 in. span, 673·80 tuns; the seven smaller bridges, 2,192·4 tuns: total 4,990·14



VIADUCT OVER THE RIVER LEK, AT KUILEMBERG, HOLLAND.

Siamese Paper.

The material employed, according to the *Journal of Applied Chemistry*, in the manufacture of this paper, is the root of a tree called the ton koy, four or five feet in length, and sold in bundles of 10,000 pieces for 25 cents. The roots are first soaked in fresh water and then transferred to tanks with lime water, where they are left for several days. They are then boiled in peculiarly constructed pans, the lower part of which, exposed to the fire, is made of sheet iron, while the upper part is of basket work. After being well steamed in these vessels it is taken out in small quantities and thoroughly hammered on a table. After this process a bundle of the fiber is thoroughly agitated in water until small feathery clumps swim about in the tub. The contents of the tub are poured through a sieve, and the fiber caught on the meshes in tolerably uniform thickness. This uniformity is further aided by rolling bamboo over it, and the sieve is then exposed to the sun until the mass is thoroughly dry. The sheets of paper prepared in this way depend in size upon the sieves. They are sometime half a yard wide and two and a half yards long. Two workmen can make twenty sheets in a day. No sizing is used, as the gelatin of the root is sufficient for that purpose.

A better sort of paper is sold in sheets twelve to eighteen inches long and four to five inches wide. Writing is done with charcoal or with pencils prepared of coal and lime.

The manufacture of paper is usually conducted in canals that empty into rivers, and is chiefly carried on by women.

Road Steamers in Paris.

A trial of a road steamer, with rubber tires, has recently been made in Paris. The tractile power was sufficient to draw a heavy omnibus with fifty passengers.

Engineering states that on the report of the French Government engineers, leave has been granted to the road steamer to ply over two routes, several miles in length, and including some busy parts of Paris. The engineers report it more handy and manageable than horses, and in no way dangerous to the public. The huge india-rubber tires save the machinery from jolting and the roads from ruts. The speed is that of a fast omnibus; it went up the paved street beside the Trocadero, of which the gradients are 1 in 11, and even 1 in 9, without the least difficulty, and came down again without any brake. In a wet grass field it was curious to observe how little the wheels sank into the saturated soil; in fact, it obliterated, on retracing its circle, the deep ruts of the omnibus wheels. This circumstance has drawn the attention of artillery officers present at the experiment, suggesting to them an inquiry whether the system might not be advantageously applied to military transport in campaigning.

Utilizing Solar Heat--New Safety-apparatus for Mines.

This method is due to Mr. Delaurier, of Paris: A truncated cone, open at both ends, is silver-plated on the inner surface, and highly polished. The solar rays enter the large end, and, because of the equality of the angles of incidence and reflection, converge at the small end. As the length of the cone is increased, the area of the smaller opening may be diminished, and the concentration of heat becomes greater. This simple contrivance, in the opinion of the inventor, may work out an industrial revolution, especially in Africa. We quote from the inventor's description:

"Heretofore we have made use of concave mirrors and lenses to concentrate solar rays. Everybody knows the difficulties attendant upon the use of large metallic mirrors having but one focus, and the great loss of heat caused by reflection.

"Lenses are not only a very bad means for concentrating radiant heat, being but little diathermic when thick, and, moreover, impossible of construction when one attempts to make them in sections.

"The process described has a further advantage in the fact that rays incident upon the surface at a small angle lose little by reflection; so that in this case almost all substances can be made good reflectors. But the chief advantage is cheapness and facility of construction. A common wooden box of the right shape, lined with tin, will be sufficient. If it is wished to get a greater concentration of rays let this pyramid be made long.

"Is it not possible, by this means, to obtain heat enough for ordinary purposes, especially for irrigation, by furnishing steam to engines suitably modified?"

M. Delaurier has also devised a means to prevent explosion of fire-damp, by a continual firing of the gas as soon as it is generated in small quantities in different parts of the mine. A wire runs through the mine from a Ruhmkorff coil which is kept constantly charged. This wire is cut at intervals deemed sufficient, and the ends are separated about four tenths of an inch. With a coil giving a spark of two and four tenths inches in length, he cuts the wire in say 10 places in the highest parts of the mine, where the gas first collects. There is no need of a return-wire, the earth serving as well. By this means the explosive compound of air and gas is set on fire as fast as the gas is generated, and the consequence is nothing more dangerous than a series of slight explosions. This is not very expensive; and the expense can be reduced by applying the process for a few minutes each day before the miners begin their work.—*Van Nostrand's Magazine.*

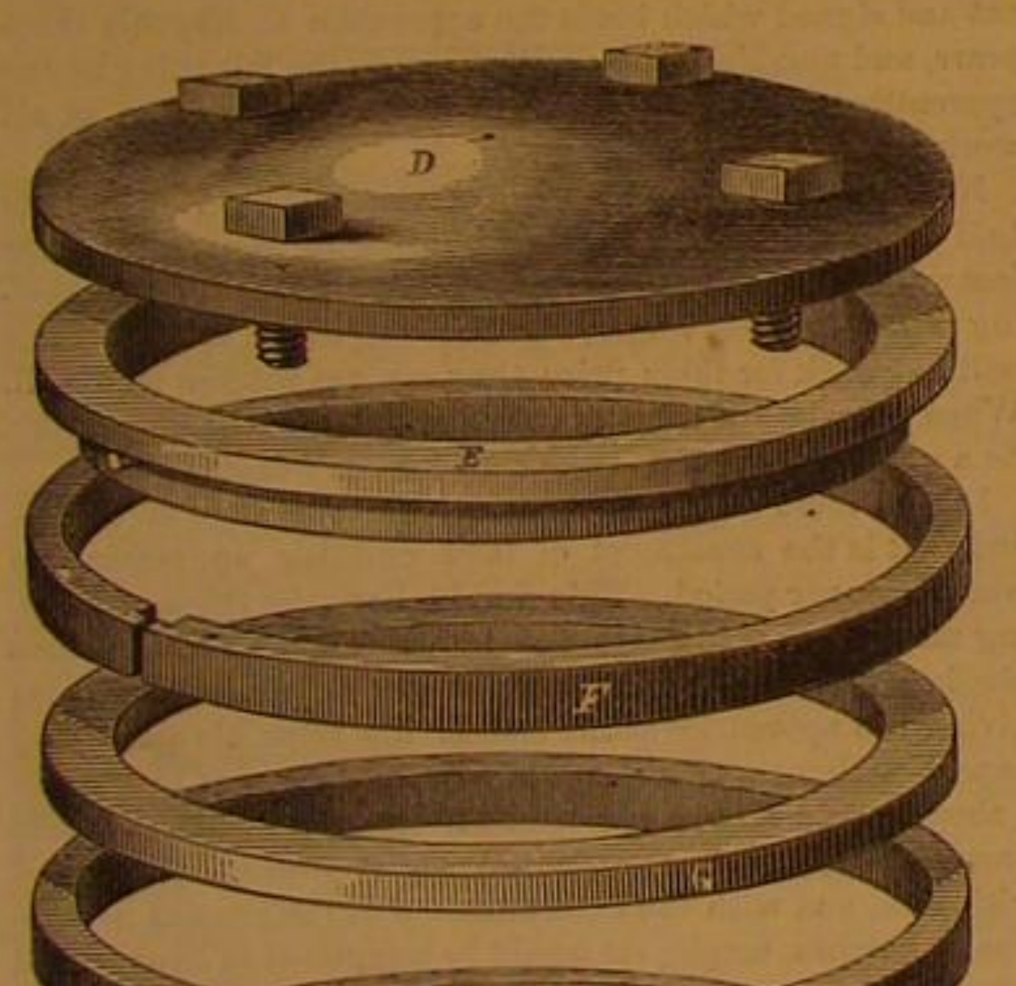
IMPROVED PACKING FOR THE PISTONS OF STEAM ENGINES.

It would be a waste of ink to go into a discussion of the importance of well fitted pistons in steam engines, and in the present state of engineering knowledge, it is almost superfluous to remark that a well fitted piston means something more than a piston which does not leak. A large number of devices, among which may be included the class which depends upon the expansive force of steam, absorb too much power in friction, are liable to wear and cut, and therefore are not favored in good practice.

The packing, the details of which are shown in our engraving, gives a tight-fitting piston with minimum friction and wear, and it is claimed, is very much more durable than any form of packing hitherto used; while the wear is distributed equally on all parts of the cylinder, thus tending to keep it true. The parts of the device will be understood by reference to the engraving. The piston rod, A, is attached to a plate, B, upon which is cast a spider, C. To this spider is bolted a counter plate, D. The ends of the four radial arms of the spider, B, are turned to a true circle, the center of which is in the axis of the piston rod. Between the plate, B, and the counter plate, D, and over the ends of the spider arms are placed the rings, E, F, G, in the order shown. The rings, E, have an L-shaped section, and over their vertical projections the cut rings, F, fit, a pin on each of the rings, E, fitting into a recess in each of the cut rings, F, so as to keep the cuts in a constant position to break joints.

The rings and plates fit so tightly together that no steam enters the spider, and the cut rings being elastic, expand to fit the surface of the cylinder without exciting so great force thereon as to give rise to friction and cutting.

We are informed that this packing is in use on the Delaware, Lackawanna and Western Railroad, Cayuga division, where it has been tried for three years with the most satisfactory results. It is stated that it has been put to the severest tests, ascending grades of 100 feet to the mile with 120 pounds pressure of steam, and has never shown any leakage. Of course it is as well adapted to stationary engines as to locomotives, and it seems worthy the attention of practical engine builders. It can be applied to any engine without alteration of the piston head.



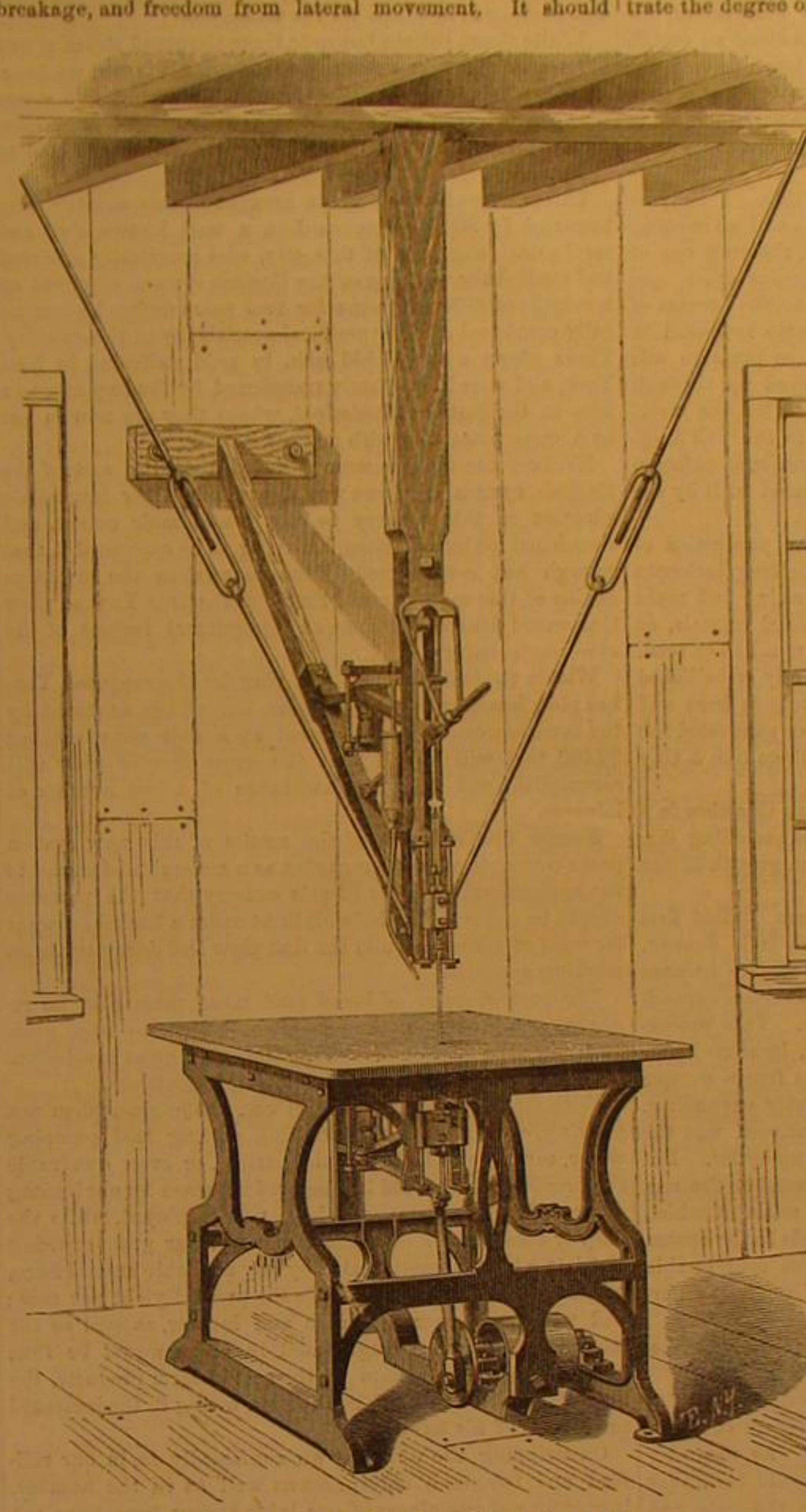
The inventor will sell railroad, State, or shop rights.

Patented through the Scientific American Patent Agency, Jan. 5, 1869, by Francis A. Brown, of Ithaca, N. Y. (P.O. Box 484), who may be addressed for further information.

CUTTING AND POLISHING AGATES.—We are in receipt of numerous letters asking for instructions in the art of cutting and polishing agates and other stones. This art can never be learned from written directions. It is one eminently requiring manual skill and artistic feeling. It can no more be learned from books than landscape painting. We must henceforth leave these inquiries unanswered.

Improved Scroll Saw.

Undoubtedly one of the chief essentials to a perfect working scroll saw is perfect and uniform tension at all points of the stroke. Other important essentials are a table free from incumbrances to impede the free movement in any desired direction of the wood (or technically the "stuff") by the operator, durability and stability, lightness of the moving parts so that high speed is attainable with immunity from breakage, and freedom from lateral movement. It should also be capable of adjustment for different lengths of stroke and various lengths of saws.



MOYERS' PATENT SCROLL SAW.

In the saw herewith illustrated these desirable qualities are fully secured as we can personally vouch, having seen it in full operation.

It will be observed that the table is perfectly clear and that the work may be turned in any way required. The saw is guided by hardwood cross-heads running in steel rods and, it is stated, may be run with a five inch stroke at the rate of one thousand revolutions per minute without jar or noise. The speed recommended is six hundred revolutions, at which the best quality as well as the greatest quantity of work is performed.

The distinguishing characteristic of this saw is the method of hanging. The saw is hooked to the cross-heads in the usual manner and each crosshead is connected by a link or rod to the end of a lever which is so adjusted as to compress a powerful hard rubber spring. The two springs acting against each other of course neutralize the resistance either would separately exert to a reciprocating motion while they give the required tension to the saw.

The table is adjustable to the "rake" of the saw, and a lever is provided which receiving the force of the springs enables the saw to be unhooked or hooked on in an instant. The fast and loose pulleys are seven and one half inches by three inches face.

The saw is capable of doing good work and a great deal of it. The manufacturers offer to guarantee it to do double the amount of ordinary work performed by ordinary scroll saws, and of a better quality.

This invention was patented April 21, 1868, and is now manufactured by C. Edward Copeland, successor to Hampson & Copeland, 42 Cortlandt Street, New York, whom address for further particulars.

Prints and Their Production.

An interesting collection of prints, produced by various processes, and recently brought together at the house of the Society of Arts, in London, is of an historical character. In arranging it, the object has been to illustrate the results attained by each of the processes employed, rather than to point attention to the works of any particular masters of schools of art. The series begins with examples of prints from wood or metal blocks, either simple or compound, and of plain as well as colored impressions obtained by their means, but by a single operation of the printing press.

A London paper, noticing this collection says:

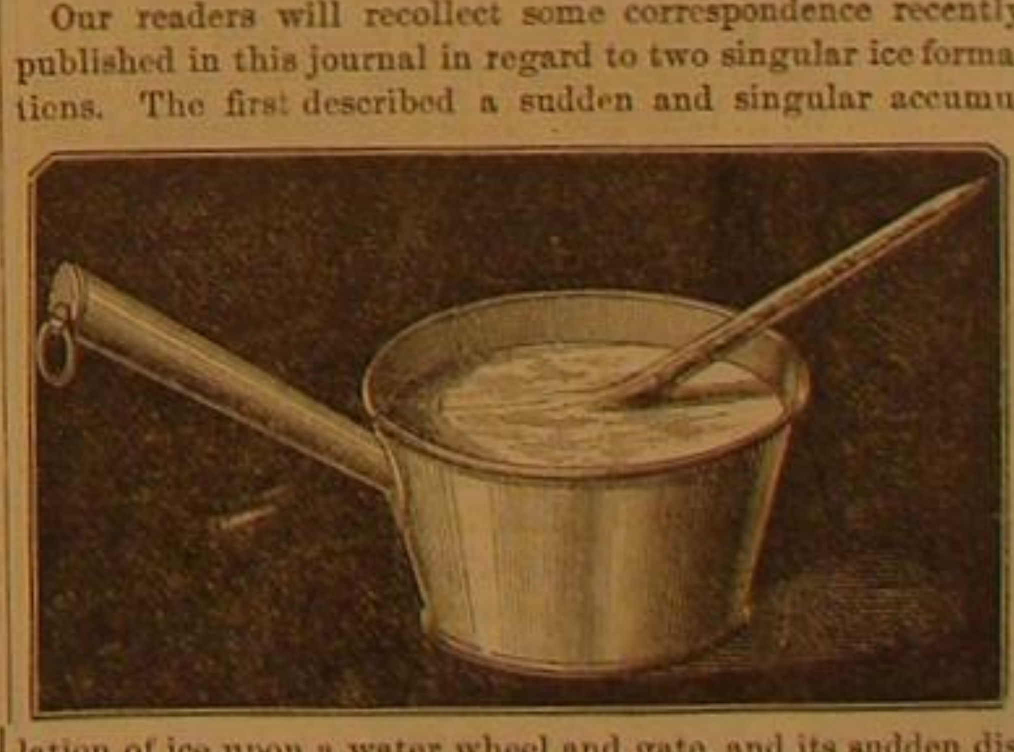
"A set of impressions from the blocks cut by Bewick illustrate the degree of perfection to which wood engravings was advanced at the close of the last century, and examples of split prints from the pages of the *Illustrated News* show the means which have been employed to aid collectors in completing their series from the pages of periodicals and the literature of our own times. Prints from engraved copper plates follow, and they illustrate the results attained by simply cutting away portions of the surface of the metal plate by the graver; the action of acids, as applied in the production of etchings; and the result of a combination of etching and engraving, as those arts were practiced at the period when Hogarth begun his career.

"The next set illustrates engraving upon steel and lithography. Following the lithographic example is a large series of prints in carbon obtained by a variety of photographic processes. It is curious to remark that the past, the present, and the future of our print-producing powers have each been based upon entirely distinct principles. As greater facilities for producing prints have been demanded, a weaker and apparently less durable source of production has been, and appears, in the future, to be still more resorted to. Thus, in the past period, engravings were executed and prints obtained from copper and steel plates. At present wood blocks and lithographic stones are employed; but the future of our art producing power appears likely to rest on what are apparently still less durable, viz.: gums, resins, and gelatin.

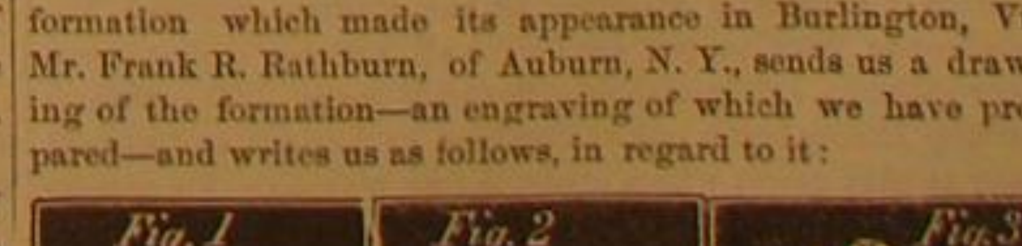
"The series is brought to a close by juxtaposing the works of Doo, Cousins, Landseer, and others, engravers of our own times, as published by Mr. Graves, with the series of carbon prints obtained by means of gelatin, as in the photo-galvanographic process of Herr Paul Pretsch; prints in gelatin by Mr. Swan, of Newcastle, the Autotype Company, of London, and Woodbury's process; and prints from gelatin as seen in the examples by M. Tessie du Motay, of Paris, and Herr Albert, of Munich. The collection consists of about three hundred examples, and presents a sort of panoramic view of prints and reproductive art during the past century and a half, and it is interesting as showing the direction in which we must look in the future."

CURIOUS ICE FORMATIONS.

Our readers will recollect some correspondence recently published in this journal in regard to two singular ice formations. The first described a sudden and singular accumulation of ice upon a water wheel and gate, and its sudden disappearance under peculiar circumstances; the second gave an account of a singular prismatic column of ice forming in a bucket of water which had frozen over night, an engraving of which, prepared from a photograph, we laid before our readers.



We this week give an engraving of a still more singular formation which made its appearance in Burlington, Vt. Mr. Frank R. Rathburn, of Auburn, N. Y., sends us a drawing of the formation—an engraving of which we have prepared—and writes us as follows, in regard to it:



"Upon the night of Jan. 23d-24th, 1858, the thermometer ranged from 10° to 15°; and a dipper having been carelessly left nearly filled with water, upon a table, was discovered in the morning, solidly frozen, with this icicle projecting from the ice surface, as seen in the sketch. A drawing was immediately made of the same, to exhibit more as a curiosity than for any other purpose, of which I submit for your consideration a correct copy."

W. Woodbridge, M. D., of Brooklyn, Conn., writes in regard to these formations that hehas three or four times seen similar phenomena. He says:

"In every instance that came under my observation, the ice-prism was triangular, hollow, with walls about an eighth of an inch thick, filled with water to the top, of about the same dimensions as your correspondent describes, but always at an angle(I should say about 60°) with the surface of ice in the pail. The production of the formation was every time in severely cold weather.

"My explanation of the occurrence is this. I suppose that when the sheet of ice first formed in the pail, an opening was left bounded by the ice crystals, which, shooting out at their normal angle of 60°, inclosed a triangular space, and thus determined the shape of the prism. As the process of freezing went on, the ice in the pail of course increased in bulk faster than the water diminished; and so pressure was made upon the water which was thereby forced up through the commencing prism, and supplied materials for the structure; the continuing pressure on the water in the pail keeping the tube full as it grew. Some water remained unfrozen in the prism because of the heat communicated to it by the freezing process which was forming the tube.

"Some of the necessary conditions for the production of these curious formations seem to be an unyielding inclosure of moderate dimensions for the water to freeze in; and rapid freezing, which produces large and well defined crystals, as I noticed in the instances of prism-formation that I have seen. The whole ice surface in the pail was beautifully embellished with the outlines of crystals; and the triangles here and there formed by the intersection of these lines suggested the shape of the little ice pillar that rose above them like a tiny Tower of Pisa."

H. Wiegand, a chemist of this city, confirms this view in a letter upon this subject, accompanied by the preceding diagrams, numbered in the order of the supposed growth of the formation. He writes as follows:

"Before the water in the pail began to freeze, it had first to be cooled down to 4° C, the point at which it is densest. Then a thin film of ice began to form on the surface because now by becoming colder still the water on the surface expanded and could remain on the top until it froze. This process goes on whenever water freezes. But now, by some cause there must have been left a small hole in the frozen surface from which the water was driven by constantly expanding. This constant pressure and the motion it produced was the cause that this little hole could not be filled up by ice. But as soon as the water which was forced out spread on the surface it froze and formed a kind of crater the walls of which grow by a supply of water through the hole in the center. This, I think, is an explanation which is most conformable with the laws of nature and the properties of water at different temperatures."

In regard to the second phenomena mentioned, Mr. Wiegand remarks:

"Water may be cooled down below the freezing point if it is kept in motion all the time. (The temperature of water in the channel should have been ascertained.) As soon now as this motion is diminished by friction with solid bodies (as was the case in the contact of the water with the gate and sides of the channel) it crystallizes all at once."

Mr. Floyd Hamilton writes in regard to this phenomenon that "similar occurrences are very frequent on the St. Lawrence, attributable to 'anchor ice,' which forms on the rocks in the bottom of the stream where the water runs swift and presents the appearance described by your correspondent from Maine, Rev. W. H. Littlefield. It is sometimes detached and rises as fast as it forms, making the water thick and sluggish and often retarding powerful wheels and sometimes stopping them altogether, although very little ice is perceptible in the water. At other times the ice does not rise until it has accumulated to a considerable depth, when it appears to loose its hold and rise in large masses, sometimes damming up large channels as well as 'flumes.' This ice always forms on the bottom of the stream hence its name "anchor ice."

We have no doubt the explanations given by Dr. Woodbridge and Mr. Wiegand are correct; if so it seems possible to verify their opinions by experiment. Should any of our readers act upon this hint we shall be pleased to learn whether these formations can be induced by the formation of artificial openings in, or by the formation of a bubble underneath a sheet of growing ice.

A CORRECTION.—The *Chicago Railway Review* calls our attention to the fact that an article of great value, published on page 26, current volume, entitled "A Step in the Right Direction," was wrongly credited to another cotemporary, whereas it originally appeared in the *Railway Review*. We endeavor to give proper credit for all articles copied from other journals, but mistakes sometimes occur. The *Chicago Railway Review* being one of our best exchanges and always ready to give credit where credit is due, we make this *amende* all the more cheerfully.

HOISTING PULLEY.—Since the publication of the diagram of the "hoisting pulley wanted," on page 2, we have had several answers, accompanied by diagrams. Unfortunately we did not publish the writer's name and address, to whom all communications should be referred. If he will call upon us we shall be happy to show him the plans which have been submitted.

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

Steam Plowing and the Bread Supply.

MESSRS. EDITORS:—It is a proposition confidently asserted and believed by all men of observation, especially those who have given some attention to agricultural engineering, that this country is now ripe for the steam plow.

While Great Britain has over three thousand steam plows successfully at work on comparatively small farms, we have, in the whole extent of the United States, but five steam plows in use, four of which have been imported from England, while one is the Standish plow now being tested in California.

The first two English plows brought to this country were imported by Mr. Wellington Lee, a well known civil and mechanical engineer of this city, who practically observed and studied the working of the English system of plows on hundreds of different farms for two years before he became fully convinced of their practical availability in this country. These plows cost $10,000 each, in gold, delivered in New York, and were immediately transferred by the importer to a firm in the State of Mississippi, where they are now in use on a sugar plantation with marked success.

Mr. Lee, however, became satisfied that the cost of the English system of plows would preclude their immediate adoption in this country to any considerable extent, and abandoned his importations, believing, as he expressed it, that enough had been already done to awaken the inventive genius of this country and bring out the true Yankee plow that would doubtless become an agricultural feature of the nineteenth century.

Within the last few months a plan for the supposed Yankee plow has been submitted to Mr. Lee, which, as stated by the inventor, can be manufactured at a cost not exceeding $2,000, that will do all that the great Fowler plow will accomplish, and with the assistance of a less number of laborers.

Should this estimate of the merits of this new system prove correct it must be regarded as a general misfortune to the agricultural interests of this country that the patentee should be compelled to hide his light under a bushel for want for want of means to build the first plow and demonstrate its working qualities.

The present price of bread (and meat must also be regarded as a product of the plow), would seem to urge upon capitalists the wisdom of looking into this great revolutionary project as an enterprise of inviting importance.

With steam plows in general use, the engine, when not plowing, can be used for thrashing, cutting feed, pumping water, sawing wood, etc., double, triple, or even quadruple the breadth of soil could be prepared in season for our leading crops with the same manual help now employed, while the deep or subsoil work of steam in most of our grain-growing districts which is unattainable by any available animal force, would almost, if not quite double the present yield per acre; and while the poor mechanic and laborer, as well as the masses of humanity congregated in cities, would be thus benefited by the reduction in the cost of farm products, the farmer himself would not be the loser owing to the increased production of his farm.

Outstripping the world, as we confessedly do, in our railroad and telegraph enterprises as well as in the number, ingenuity and usefulness of our labor-saving inventions, yet we quietly allow England to distance us in the great work of agriculture—the very science that gives bread and life to our people—owing partly to the indifference and short-sighted policy of capitalists in that direction, and partly to the skeptical tendency of the press as to the necessity and possible success of steam cultivation in this country.

I am glad to see the subject revived in your columns, and attention called to the fact that the country is now ready for this great agricultural revolution; for it is a fact that cannot be gainsaid that our wheat, or at least the bulk of it, comes every year further from the westward as it seeks new soil that has not been impoverished by the "skinning" process so unavoidable with animal force. The farms in New York and Pennsylvannia which, twenty-five years ago, yielded thirty-five and forty bushels of wheat to the acre have, every average year, yielded less and less, till now fifteen bushels are considered a good turnout, and the farmer many times considers himself fairly paid if he gets ten; while the English farms, almost abandoned for their unproductiveness under the old system, are yielding, under steam cultivation, twenty to thirty bushels of wheat to the acre and with a regular increase, both in quantity and quality.

If these are facts—and they are clearly demonstrable—it is painful to see the impoverishing process go on when the remedy is so palpable and self-evident. Let inventors hurry forward the Yankee plow. A. W. HALL.

New York city.

A Physiological Problem.

MESSRS. EDITORS:—Will some of your scientific correspondents please philosophize upon and give the causes of this—to me—strange phenomena?

During last March I became paralyzed—wholly—at the age of 19. I was not stricken, but taken gradually. When my arms became so weak that I could not raise either of them separately to my face, by connecting or joining them, I could raise them very easily for a day, until I became too badly paralyzed. And when I began to mend I could raised my hands, joined, many days before I could raise either separately. Why was this? SILAS M. HISSEM.

Shiloh, W. Va.

Filing and Setting Mill Saws.

MESSRS. EDITORS:—Your recent Alabama correspondent on the dress of sash and rotary saws seems to think the bevel or shear dress the best without swaging or upsetting, and gives as a reason in part the economy in dressing when there is no upsetting.

In my twenty years' practice and extensive observations, I find the square and upset dress the best on the sash, muley, and circular mill, and give as a reason that such dressed saw can be run and not touch, except when it can and will cut; and it will present an edge that will cut at the same time with as little, if not less power than the shear dress or bevel tooth. The upset tooth will carry more feed than the non-upset tooth, for the reason that the cross-grained wood that makes the side of the kerf rough in proportion to the feed or amount of wood cut by each tooth, cannot touch the side of the tooth to drive it out of line and cause friction on the side of the tooth when there is no cutting edge, as is the case with the shear dress or non-upset tooth.

While I set or bend the tooth a little to regulate the set, I upset or swage every day. I file the under or inside of the tooth altogether, never changing the back of the teeth by filing if they have the proper clearance. I keep circular saws strictly round, file square, and all from one side, and can saw any kind of wood with such teeth without any trouble. The inserted tooth saw is being introduced where the sawyers are in favor of shear dress, yet they can't use any other than square dress, and have to upset for a clearance, as they cannot bend the teeth at all. I believe the dress has much to do with their introduction, but I am not in favor of swaging for clearance altogether with the common saw.

I have seen and practiced much between the Allegheny Mountains and the Gulf of Mexico, and I have always found the square and upset dress doing the best work, and the same kind of dress for sash and muley saws.

Hopkinsville, Ky. WASHINGTON MILLER.

A Primary Cause of Strikes.

MESSRS. EDITORS:—I would like to give you my opinion in regard to strikes. I wish to discuss the subject only as related to my own trade—that of machinist. I consider the lax manner in which apprentices are taken into shops as the primary cause of strikes. Let me explain.

It is the custom of shops at the present time to keep a large number of apprentices. They are taken for three years, and, at the end of that time, are turned out finished mechanics, or supposed to be. As a general thing the first year they are kept doing the drudgery of the shop, and sometimes longer. Their time for learning the trade is therefore reduced to two years. Again, when they go into a shop, no papers are made out and signed which binds the apprentice to stay his three years, and also binds the employer to do the fair thing by the apprentice, who is just hired in like a helper or man of all work; in fact he is nothing else.

Now what is the consequence of this method? The boys half learn the trade, and when hunting for work engage for less wages than a first class mechanic will. Employers, knowing this, reduce the wages, also knowing that if first class men will not work for their price they can get botches who will. When this state of things become unbearable the men strike. As a general thing the strike ends for the worse.

I think there is only one remedy for this state of things, and that is the enactment of laws obliging apprentices to work a longer period. This would have the effect of deterring many from going into the trade. Papers or indentures binding the employer as well as the apprentice, and also giving the apprentice at the end of his term his qualifying papers, without which it would be a misdemeanor to work in a shop, should also be required. If this were done it would prevent many from entering a trade at present overstocked with men, and with the extermination of the present generation of botches, employers would be compelled to treat skilled labor more fairly. MECHANIC.

Titusville, Pa.

Preservation of Iron.

MESSRS. EDITORS:—In the SCIENTIFIC AMERICAN, of Jan. 1, I noticed an article with the above title. Few things would be of more importance to the business of the country than the discovery of some method for the preservation of iron from oxidation under the ordinary circumstances of daily use. Is it not possible that this may be done by-and-by?

Some time ago I had occasion to call at a foundery, the superintendent of which was curious in all matters of mechanics; and knowing my taste in the same direction, he spoke of this subject—the preservation of iron from oxidation—to which his attention had been recently called. This was in the winter, and his little boat, used in the summer for recreation and exercise, was laid up for the season.

He took down from its resting place an oar, the blade of which, being split, was wound with a narrow strip of sheet zinc, and secured in its place with carpet tacks. These were as brightas they were when taken from the paper. He showed me also the rudder, one of the pintles of which was a little too large for the thickness of the rudder. This had been remedied by putting over its edge two or three thicknesses of sheet zinc, and then the rudder iron was driven on and secured through all with three rivets of iron, the ends of which had been finished by the file. The surfaces made bright in that way were untouched by oxidation, though they had been in salt water through the spring, summer, and fall.

NEAL DOW.

[The preservation of iron by placing small pieces of zinc in contact with it, has long been well known. Sir Humphry Davy proposed to protect copper bottoms of ships in this way, and it was tried with success so far as preservation from oxidation was concerned; but bottoms thus protected speedily became loaded with barnacles, and this caused the abandonment of the method. Small iron implements liable to rust may be protected by zinc rivets.—Eds.

Standard Time.

Messrs. Editors:—About a year ago you published an article entitled "Standard Time," suggesting that the local time of some point, say Greenwich, be fixed as the standard for the whole world.

I have meditated upon the idea sufficiently to convince myself that it would be a capital thing for everybody in a hundred ways. It would be a constant regulator for the local time for every town or city, whereas we have at present an institution here and there which occasionally takes true time from some fixed star; but from one taking to another the clock may vary considerably. There is scarcely one place in a hundred which is governed by its own true local time, or anything near it. The "regulators" of the different railways not only govern the business of such railways, but for considerable distances they govern the watches and clocks of the people. For instance, the clock at Altoona, Pa., governs the trains for a hundred miles or so east or west of it, leaving a discrepancy of about 6 minutes for every 100 miles of east and west lines to be gotten over in a very queer manner, yet it is done, and matters seem to get along somehow, something like this: Suppose a train running on Altoona time reaches the westward limit governed by that time at twelve o'clock, noon, 100 miles west from the clock. The true time (local) at that point would be about 11·54 A.M. Locomotives are changed, and in a moment that train is running under a regulator which pointed at 11·48 when the Altoona hands stood at 12 noon. Passengers cannot tell whether the train is on time or not unless they regulate their watches as they go along; and if they scan the matter closely they will be surprised to find their train leaving a station 12 minutes before it arrived there.

Now that we have trains constantly threading their way from New York to San Francisco and back, how satisfactory it would be to have but one clock to go by; doing away with three or four hours' discrepancy in time between these points.

The telegraph could furnish the exact time every day, first by cable and thence throughout the country. All men would soon know the difference between standard and their own local time, and as a matter of necessity everybody's clock and everyone's watch would always be right; for every jeweler would take a pride in taking and keeping the standard time of the world; and the local astronomers would have a fine opportunity to show their learning by informing the public how much ahead or behind their local time should stand.

Old Fogy.

Oil City, Pa.

Prevention of Boiler Explosions.

Messrs. Editors:—My attention was called a few days ago to an account of an explosion of a locomotive on the Baltimore Railroad, while the engine was at rest, which killed the engineer. Paticulars of the accident (?) state that locomotives carry from 90 to 120 pounds of steam, and that this one had never been fully tested before being used.

Leaving it to those "who know" to reprimand, I send the annexed Regulations as enforced in France, and recommend their application in this country.

No boiler is to be used unless it has been proved by an hydraulic press, worked under a pressure of at least three times the effective pressure, n-1. The same applies to cylinders.

No boiler is to be delivered from any shop unless it has been fully tried by the maker, according to Regulations made by the Ingénieurs des Mines. There are three circumstances under which a boiler may be proved a second time, at the place of delivery, namely: 1st. On the requisition of the owner. 2d. If any damage has occurred to it during transportation from shop to destination. 3d. If any change has been made in it since leaving the shop.

If these regulations were enforced in this country, there were would be fewer accidents and consequently less loss of life.

Ernest Turner, C. E.

Germantown, Pa.

Oil in Steam Boilers.

Messrs. Editors:—In your answer to J. H. G., of Tenn., you say oil put in a boiler will cause much foaming. I have seen it repeatedly stated in the Scientific American that oil in a steam boiler will cause forming; to prove this is not always the case, I will give you my experience. I own two seven-horse upright hoisting engines, they are precisely alike, and by the same makers, one never foams and the other does. I tried a great many expedients to stop the foaming; none did any good.

A boiler maker of this city advised me to put a little oil in the boiler, which I did, and it proved a complete cure. Now when there are signs of foaming one tablespoonful of oil pumped in with the water will stop it; doing this twice a day is sufficient. I will add that the boiler alluded to was a very bad case, so much so that I got no work out of the engine until after oil had been pumped into the boiler.

J. McClay.

Hartford, Conn.

Latent Heat of Metals.

Messrs. Editors:—If the author of an article with this heading, in the Scientific American of Jan. 8, signed J. P., containing some animadversions upon the old theory of latent heat, as stated in "Pynchon's Chemical Forces," had had an opportunity to read that book, he would have discovered that the new theory was also fully explained a little further on, in language very similar to that which he has himself employed. The old theory is stated first, as being easier to understand, and as preparing the way for the more intelligent comprehension of the new.

* * *.

ON THE NATURE OF THE INTERPLANETARY MEDIUM.

BY PROF. VANDER WEYDE, M. D.

The latest investigations with the spectroscope have revealed to us not only the nature of the matter constituting sun, stars, and celestial nebulæ, but promise also to teach us something about the nature of that much-spoken-of, contested, mysterious, hypothetical, and, withal, surely existing medium, which fills the interplanetary and interstellar spaces.

The observations of Angström, in Europe, corroborated by Winder, of Toronto, Canada, and by Peirce, of Cambridge, Mass.—show that at the hight of from ten to four hundred miles a medium exists not identical with any of the known simple or compound gases, while Angström recognized the same medium to exist in the zone of the zodiacal light, which, as is well known, occupies the space of a belt around the sun in the plane of the ecliptic, inside the earth's orbit. It is probable that this material medium fills the whole planetary space, but becomes only visible if illuminated by some cause, such as electric currents in the case of the aurora polaris, an unknown agency as in the case of the zodiacal light, or chemical action as in the case of the comets' tails—according to Tyndall's theory.

The nucleus of some comets have been proved to consist chiefly of carbon—a fact as startling as the other, also revealed by the spectroscope, that many nebulæ consist of incandescent hydrogen. And, by the way, let us here correct a common error committed by many scientific papers, which, when speaking of this fact, call it *burning hydrogen*. The hydrogen in the nebulæ is *not burning*, but simply in an incandescent state, which means at a temperature so high that it becomes luminous like a piece of red-hot, or white-hot, metal, undergoing no other change but that of a slow cooling process, which, in the case of the nebulæ in question, is probably more than counteracted by the mutual gravitation of its mass, and its consequent contraction and condensation.

I am not aware that the tails of comets have already been submitted to spectroscopic investigation; it will be indeed an interesting point to compare the spectral lines of these tails with those of the aurora and zodiacal light, because—if Tyndall's theory of the formation of these tails be correct—we will have a third way in which this interplanetary material medium is made visible. Tyndall supposes it to be a chemical action of the sunlight (after it has passed through the head of the comet) on the interplanetary matter, separating from it particles like a fog, which become temporarily visible, and afterward are dissipated again by the direct sunbeam. Spectral analysis will show the lines peculiar to the material particles deposited, which form this fog, and so teach us more concerning the chemical nature of the interplanetary substance.

To imagine such a very attenuated ponderable matter as fills the interplanetary space, takes no larger stretch of the imagination than conceiving a difference in density with the lightest bodies we know on the surface of our earth, just as we know these to differ from the heaviest. Hydrogen gas is 250,000 times lighter than iridium, the heaviest body known, and we may easily rarety hydrogen some 400 times, so as to make it 100,000,000 times lighter than iridium and still be sure that we have hydrogen in the vessel, and prove its presence by recondensation or otherwise. If now we imagine a medium 100,000,000 times lighter than such hydrogen it is all we want, it may be beyond our actual verification; but so is the existence of hydrogen for uncivilized man, and was even to our race before Cavendish had described it only one century ago. It is, indeed, difficult to conceive the existence of hydrogen without having seen the experiments proving its properties; and undoubtedly we labor under a similar difficulty in regard to the clear conception of the interplanetary substance, as the ignorant do in regard to the conception of hydrogen gas.

For several reasons I avoid giving this substance a peculiar name, as nothing is gained by this. I consider it as ponderable, but of so light a weight that its expansive elasticity is far greater than its gravitating power.

Prof. W. A Norton, of New Haven, according to the latest number of the *London and Edinburgh Philosophical Magazine*, in a defense of his "Principles of Molecular Physics," maintains still the simultaneous existence of two mediums, which he calls electric and luminiferous ether; the first for the explanation of electric, the second for that of the luminous and electric phenomena. The first hypothesis of an electric ether has become entirely unnecessary and must be considered obsolete, since it has lately been practically proved that electricity cannot possibly be transmitted through a real vacuum, and therefore is a mode of motion of ponderable matter. The doctrine of heat cannot exhibit such a striking and conclusive experiment against the hypothesis of a caloric fluid, as this. We cannot possibly make a vacuum through which heat and light will not pass. Notwithstanding this, heat is now considered as a mere mode of motion of matter, and only its transmission through space necessitates the conception of a transmitting medium which fills that space. We have much more reason to abandon the hypothesis of an electric fluid or ether, than that of a caloric fluid.

It is not a little remarkable that it appears that we are able with our modern contrivances to make here below, on the surface of our earth, a vacuum more perfect than that existing in the super-atmospheric space—in which a medium appears to exist, which transmits electricity—namely, in case the luminosity produced in this medium during the aurora borealis is caused by electricity; this appears really to be the fact, and the only rational explanation, by reason of its action on the compass needle, which is perfectly identical with that of an electric current.

As the aurora extends from the upper strata of our atmosphere to a hight of some 400 or 500 miles, it appears that this—the electricity-conducting and ponderable medium—extends to that hight, and that above this the rest of the planetary space is filled with the same substance still more rarefied and less ponderable, so that it no more conducts the electricity, but only light and heat, and is there similar to our perfect vacuum, which also conducts only the latter, but not the electric currents; that this medium is, however, still dense and material enough to become visible under certain circumstances, is probable from the comets' tails and the zodiacal light.

Perhaps the atmosphere in which we move is the type of a more extended and more subtile atmosphere around the sun, extending through the planetary space and in which the planets move; this atmosphere must be more rarefied at its limits, and rotate with the planets, as our terrestrial atmosphere rotates with the earth; this planetary medium, more condensed in the interplanetary space, is less so beyond; but still as a medium in the interstellar space, adapted to the transmission of light and heat, as these agents reach us, even from the fixed stars, of which the distances surpass that of the sun many million times. As the amount of heat reaching us from the stars has even been measured, and as the so-called radiating heat is simply the result of the transmission of vibrations by means of an elastic medium (like as air transmits sounds), we are compelled to admit that, at least as far as we can penetrate, there exists no empty space anywhere, and that matter is diffused through the whole universe not only in a very variable degree in regard to quality, but much more still in regard to quantity.

To recapitulate. I deny the existence of so-called imponderable matter, and sustain the definition that all which has weight is matter, and *vice versa*, that the so-called imponderable forces have no separate existence, but are simply different modes of molecular motions of ponderable matter, which fills the whole universe, only very much rarefied in the supposed empty spaces, and that this exceedingly rarefied ponderable matter is the medium which transmits heat, light, and electricity, like as air transmits sound; I maintain that it is as absurd to accept the existence of a separate caloric or electric fluid, to explain the caloric and electric phenomena, as it would be, to accept a separate sonorous fluid in order to explain the acoustic phenomena; and, finally, that as the extremely light but still ponderable air is a sufficient vehicle for sound, without recourse to any other hypothesis so the more extremely light but still ponderable matter in the universe, is the sufficient vehicle for light, heat, electricity, etc., without recourse to any other hypothesis of inconceivable imponderable agencies.

MANUFACTURE OF THE POINTS OF NEEDLES AND PINS BY ELECTRICITY.

BY C. WIDEMANN.

A recent discovery has been made by M. Caudery, telegraph inspector on the Western Swiss railroad, and is now applied with success at Aix la Chapelle (Belgium), whence needles and pins are shipped to all parts of the world.

In establishing an electrical current by means of a small Bunsen battery, and by passing a metallic wire (brass, copper, iron, or steel), corresponding with the negative pole, through the bottom of a glass tube, closed in such a way as to contain an acidulated liquid, in leading the other wire of the positive pole through the superior opening of the glass tube, closed in such a way as to allow the positive wire to plunge into this acidulated liquid, taking care to leave a small interval between the extremities of the wires; the electric current thus established through the acidulated fluid as a conductor, produces the following phenomena.

Very soon the extremity of the positive wire takes a conical point of more or less sharpness, depending on the free distance existing between the two wires plunging into the acidulated liquid.

During this phenomenon, which takes from 5 to 15 minutes, according to the acid used, its strength, the composition of the wire, its degree of thickness, and also the intensity of the electric current, very fine sections of the wire are seen to separate from the wire.

Water, acidulated with sulphuric acid, appears to be more efficacious, especially for iron and steel wires.

Nitric acid is used in preference for brass and copper wires.

The same effect will take place if to the positive pole (superior) an indefinite number of wires are tied together and dipped in the acidulated water, instead of the single wire, care being always taken to keep this positive wire at a little distance from the negative wire.

I have seen a hundred brass wires after having been submitted to this operation, present points as sharp as the best English pins, although the electric current was produced by a very small Bunsen battery.

It appears to me very desirable that this new method should receive proper encouragement, and every thing should be tried to bring it into general use. The operation of making the point of needles and pins in their manufacture is a dangerous and costly one. Medical men in large manufacturing cities have long recognized the dangerous effects produced by the fine metallic dust resulting from it, on the health of the workmen.

The remedies for this evil are very imperfect, little used, and very impracticable; inhaling apparatus communicating with the outside air has been tried, but every danger would be suppressed by the method above described.

Improved Laundry Machinery.

In no department of domestic work, is the labor more severe than in the laundry, when washing of clothing is made a purely manual operation, in conjunction with the detergent action of soap and water. There has, therefore, been a great demand for devices calculated to lessen such labor. Most of the inventions made to meet this want have been mechanical, and many chemical compositions have also been employed to advantage, but many kinds are objectionable as they injure the fabric. There is still room for the application of chemicals in many kinds of laundry work where machinery cannot supply the place of manual labor; but the upshot of the numerous experiments in this field is the conclusion, that with the aid of good machinery, good soap and soft water kept hot by steam, are ample for all ordinary laundry purposes. Other chemical substances may be necessary in the cleansing of clothing soiled by paint, tar, and other substances not readily soluble in soap suds; but soap and water in conjunction with super-heated steam will cleanse and even disinfect articles used as dressings for wounds in hospitals, or which have been worn by diseased persons; and where a proper temperature can be maintained, there are few substances with which clothing is likely to be soiled that these simple means will not thoroughly remove from textile fabrics.

Of mechanical inventions designed to lessen the labor of washing there have been no end, and, though many have failed to secure popularity, some have been very successful.

Much cause of failure has arisen from the fact that the most of these mechanical appliances have been designed to employ manual labor, and as this was only a substitution of one kind of manual labor for another, it is plain that unless such machines demonstrate on trial that the work necessary to propel them is less, for a given amount of clothing cleansed, than hand rubbing, they stand no chance of permanent success, though the general desire on the part of the public to secure such an aid in the laundry, is sufficient to secure a sale for almost any machine of this kind that can make a plausible showing of results. We have in mind a man who now rides in his carriage, goes clothed in purple and fine linen, and fares sumptuously every day on the profits of the sale of a washing-machine, which, if it can be now found in existence, lies among old lumber in back garrets.

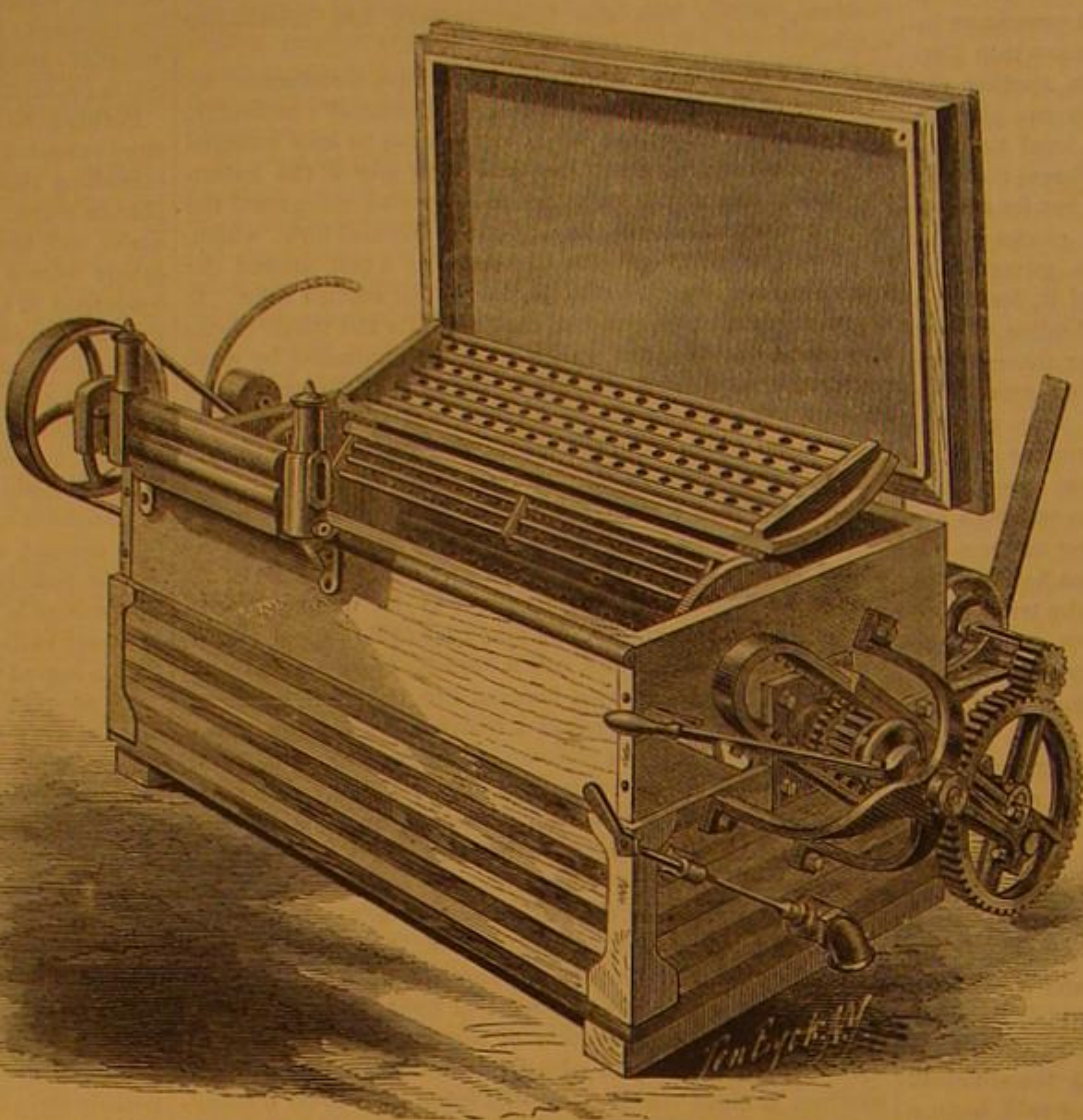
Many machines now abandoned as failures would have given economical results on a large scale when driven by some cheap motive power, other than human. Their fault was, not that washing could not by their use be satisfactorily performed, but that they rather added to, than diminished the amount of work. Such a slight increase of labor as they entailed, would have been of no consequence in case this labor had been thrown upon a steam engine. Hence the adoption of machinery in large laundries is becoming more and more general. Many small machines designed for general use in families have also shown themselves truly worthy of adoption, and have therefore secured large sales solely on their merits.

We this week illustrate an excellent power laundry washing machine and mangle, which combine many advantages.

In the washing machine the principle of rubbing has been rejected as injurious to fabrics and unnecessary. Reliance is placed upon the power of very hot suds to loosen and dissolve the various extraneous matters which it is desired to remove, and their discharge from the fiber of the tissues is effected by the mechanical action of the hot suds flowing through and through the texture.

A large perforated cylinder placed within a tight steam chest receives the soiled goods. On the interior of this cylinder are placed at frequent intervals longitudinal ribs, the object of which is to keep the goods from hugging the shell. Three wings, one of which is shown in the engraving, also project from the interior of the cylinder and divide the inner surface into segments, which alternately receive the clothing when the machine is in motion. These wings are made of a system of rods not attached rigidly to the cylinder, but with springs, so that they yield somewhat under the weight of the goods, as they fall from one division to another while the cylinder is revolving, and also by their action completely turn over the mass so as to constantly expose all portions to detergent action.

In operation the hinged segment of the perforated cylinder is closed and fastened. The external chest being filled to the proper hight with hot suds, and its lid, which closes steam-tight, being shut, the contents may be, when necessary, kept at a boiling temperature by the admission of steam. Motion is then imparted to the inner cylinder by a double rack actuating two pinions, which act upon the cylinder shaft through ratchets and pawls. The double rack has a reciprocating motion imparted to it through a crank actuated by a system of gearing. By these means the cylinder is alternately rotated in opposite directions, and its contents violently agitated, but without severe friction upon the textures, so that the finest lace curtains, and most delicate textures are uninjured by its operation while they are thoroughly cleansed.

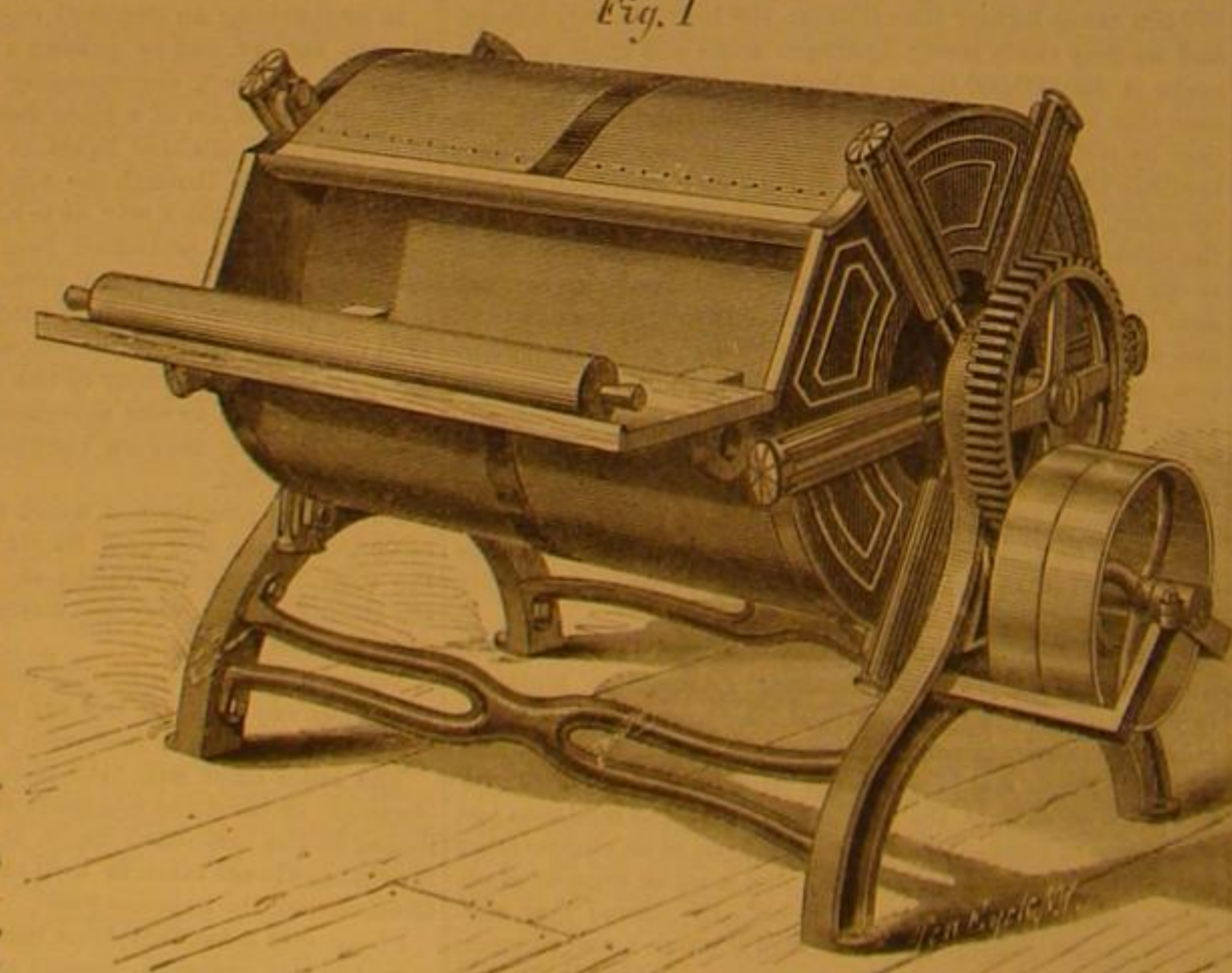


SMITH'S POWER WASHING MACHINE.

A power wringer is attached to the machine, the rubber rollers of which are made to act when wanted by tightening a loose belt.

This machine, besides being well adapted to use in all large laundries for hotels, hospitals, barracks, prisons, alms-houses, etc., is also well adapted to cleansing wools, and general cleansing purposes in bleacheries, dye-houses, and manufactories.

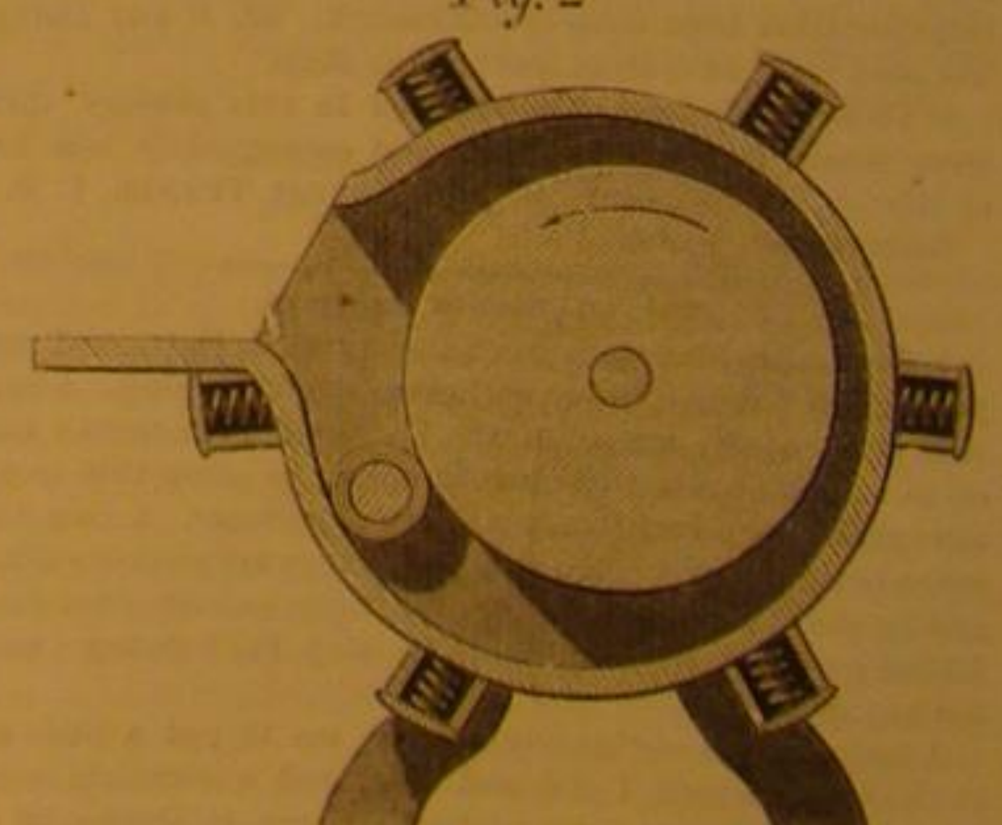
Fig. 1



SMITH'S ROTARY POWER MANGLE.

The mangle is constructed on an entirely new principle, developed by the results of long experience in the construction of such machinery. It consists of a revolving cylinder, rotated by a wheel and pinion, surrounded by a drum, which, when the machine is not at work, stands concentric to the revolving cylinder. The external drum does not revolve, but acts in a manner which will be understood by reference to the diagram, Fig. 2. A series of radial standards and springs permit the external drum to recede from the revolving cylinder, at the same time exerting through it a powerful pressure upon the roll of goods. This roll is formed by rolling the goods upon a wooden roller upon the feed table of the machine, Fig. 1, which is then fed into the machine, the angle of the feed table being rounded at the entrance, as shown in Fig. 2.

Fig. 2



A constant parallelism being maintained between the revolving cylinder and the external drum, compels a corresponding parallelism in the roll of goods as it passes around between the cylinder and the drum, and subjects all portions of it to an equal pressure. Thus wrinkled parts are gently extended to smoothness, and a uniform and beautiful appearance is imparted to the textures. The roll after having made the circuit of the cylinder and drum, drops out upon the feed table, and another, prepared while the first was making its circuit, is fed in, and so the work proceeds.

This washing machine is the result of a great variety of inventions for which patents have been taken through the Scientific American Patent Agency. The mangle is the subject of a patent granted through the same Agency, October, 1869. All of these are the inventions of Hamilton E. Smith, the inventor of the well-known hydraulic clothes washer, who has secured patents in foreign countries through this office. These machines were awarded the first premium—medal and diploma—at the recent Fair of the American Institute. A large number of the best hotels and public institutions in the country have these power machines in successful operation. The inventor has made arrangements with the firm of Bolen & Crane, whose manufactory is located at 29 Plane street, near the Morris & Essex Railroad depot, at Newark, N. J., to furnish these improved washing machines and mangles adapted for both dwellings and laundries. An office is also located in the north-east corner of the American Express Building, Nos. 55 to 61 Hudson street, New York, where any communications or orders may be addressed.

Another California Flying Machine.

According to the San Francisco *Bulletin*, one G. M. Montandon has invented a new aerial machine, which he is confident can be made to navigate the air successfully against all currents of air, taking as its guide the compass and sun. There are two chambers for gas, conformable in size and shape with that of the main body or passenger saloon. It has an oblong shape, each end sharp, to offer as little resistance as possible to the air. It is to be propelled by a continuous blast of compressed air. Openings are left for the air, which, after having forced ahead, can escape without causing any counter force.

In the center of the apparatus stands a sort of capstan, which holds in the grooves of a top and lower wheel, the transversal and longitudinal beams of the center of this capstan being forced from right to left, or left to right, will steer the apparatus, causing it to pivot on its center. It can be helped or done away with by applying compressed air to the fore and rear, on the two opposite sides. That is to say, on the right side forward lift, backward, and *vice versa*; in this manner, the forces being opposed, the apparatus must naturally pivot on its center. The cap or gas chamber, being inflated, causes the ascension, and moderates and lets it down, when the gas is allowed to escape by the valves placed at the two extremities. It is supplied with gas by two tubes placed forward, which receive it from the generator, which is placed in a room forward of the apparatus, in the top of the instrument, by which the compressed air is applied, and which overreaches the apparatus, and so keeps the top chambers from head winds. A tube starts from the lower gas chamber, through the passenger room, meets the top chamber, from which another pipe starts and meets the cap, giving thus the power in case of dilation, to diminish the expansive strength of the gas, and by that the top chamber is the receiver and dispenser of the force of ascent and descent.

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Contents:

(Illustrated articles are marked with an asterisk.)

PROGRESS IN MECHANICAL AND ENGINEERING SCIENCE AND INVENTION IN 1869.

While, without any very conspicuous or startling discoveries, progress in the physical sciences during the past year has been steady and marked, the mechanical arts and engineering science have been no whit behind in their onward march, and, in these fields, some very brilliant achievements have been accomplished.

CIVIL ENGINEERING.

Much progress has been made in the art of concrete building, and its applicability to large and heavy structures has been demonstrated by the erection of large warehouses in Southwark, England. It has, also, been employed to a great extent in the construction of docks, piers, etc., and the method is, without doubt, destined to be more extensively employed in the future. Ransome's artificial stone, and induration process, are worthy of mention in this connection. They have achieved a great success in England, and, although an attempt, made by licensees, to introduce them into this country, has not been so successful, it is, doubtless, the fact, that whatever of failure has been met with, is the result of too meager knowledge. As soon as the proper skill is attained, we feel assured the Ransome process will repeat its successes in America.

Shaw's gunpowder pile driver has been introduced and received with marked favor. Its operation is based upon sound scientific principles, and the results attained have shown it to be more efficient than any method of pile driving heretofore devised, while it is, at the same time, economical.

The construction, in England, and the successful towing of an iron floating dock, of unprecedented size to the Bermudas form one of the triumphs of the year.

The commencement of the enormous suspension bridge, which will cross the East River between New York and Brooklyn, is also an event of great engineering importance. When completed it will be a fitting monument to the extraordinary genius of its gifted projector, John A. Roebling, who, in his devotion to the work, exposed himself to injuries resulting in his death.

The Broadway Tunnel, for Pneumatic Transit, has been commenced under Broadway, New York, and, when completed, will be the largest experiment of the kind yet undertaken. Everything in the natural qualities of the earth penetrated is favorable to the rapid progress of the work, and those familiar with the success which has attended similar works in London, predict a triumphant success for the New York Tunnel. The advantages of this system are too important not to merit more specific remark in this connection. It is well known that the running of heavy locomotives and tenders underneath the surface, in the proximity of buildings upon the surface, entails an enormous expense in construction, in order that safety for the superimposed structures may be secured. What pneumatic transit proposes to secure is perfect immunity from all danger to buildings underneath or near to which it passes, and to provide at once the lightest possible motive power in the smallest space, thereby decreasing the expense of construction until it bears no comparison to the vast outlay required for steam transit; and at the same time, eliminating from the problem all necessity for the consideration of the evils of smoke or impure air. The system fully developed would not only enhance the price of real estate in the city, but, by providing a quick, comfortable passage to the suburbs, or to the neighboring cities, by tubes passing underneath the rivers, remove the greatest inconveniences of metropolitan life, namely, forced dependence upon horse cars and ferries.

But the crowning triumphs of the year, in civil engineering, are three. One of these may be claimed exclusively by the New World. One has shed its luster upon the Old World, and the other serves to bind the Continents in closer union. The Pacific Railway, the Suez Canal, the French Atlantic Cable. Surely if nothing else had been accomplished, here were glory enough for one year.

Yet in ocean telegraphy there has been enormous growth. Numerous shorter cables have been laid or projected, and even now the *Great Eastern*, which, like an enormous silk worm has spun out so many threads, is on her way from England around the Cape of Good Hope with two thousand miles of cable in her belly to be paid out from Bombay to Aden and Suez, preparatory to a direct communication between England and her great empire in the East.

STEAM ENGINEERING.

In this department of engineering the two most prominent features of progress for the year are the extended use of the Chatelier Compression Brake, and Morton's Ejector Condenser. Although the invention of the improvement of M. Chatelier does not bear date in the year 1869, yet, within this year, its use has been not only greatly extended, but the peculiar features of the system, with their advantages, have become widely known and appreciated through the publication of M. Chatelier's treatise upon the subject.

Morton's Ejector Condenser does not properly belong to the year under review; but, although previously introduced, it has been made the subject of careful study by the most able engineering talent of Europe and America, the results of which study and experiment sufficiently demonstrate the importance of the improvement.

Warsop's experiments in Aero-steam Engines have been announced this year, but their value has not yet been so fully demonstrated as to warrant final judgment upon their merits.

INVENTIONS.

There have been no inventions during the year which are are calculated to produce any great and marked change in the character of the industries of the period; but the year has been prolific in minor improvements, and much gradual progress has been made. A great many useful improvements have been made, and many of them have secured a well-deserved popularity. The year has also witnessed the extensive introduction of some important inventions, the most prominent of which, as well as the most unique and revolutionary in character is the Positive Motion Loom, first brought to public notice in the latter part of 1868, but which has, during the past year, achieved a world-wide reputation, ranking it among the most remarkable inventions of the period.

The number of applications for patents filed in the U. S. Patent Office, for 1869, have been 19,271. The number of patents issued have been 13,986. The number of caveats filed have been 3,624. There has, therefore, been a decrease of 1,174 in the number of applications as compared with those of 1868, while there has been an increase of 1,027 in the number of patents issued.

There is nothing to be ashamed of in this record of progress. It would be difficult to select any year in the history of the world in which more solid and enduring work has been done. Years there have been, made illustrious by great and even startling discoveries, rendered of supreme importance to mankind by subsequent developments; but it has been reserved for the year 1869, to witness the time for circumnavigating the earth reduced to two months by the connecting iron link between the Atlantic and Pacific Ocean, and the joining of the Mediterranean and Red Seas by the Suez Canal.

With such a retrospect, we may look forward hopefully to the events of the year which lies before us.

NATURE OF DESIGN PATENTS.

It is evident on referring to the Statute that the distinguishing feature in this class of patents is merely one of ornament or of form or configuration of a specific thing either useful, ornamental in itself, or both combined. Hence a new improvement might be the subject matter of two quite distinct classes of patents, one being for the ornament or form or configuration, and the other for the thing containing such ornament, new shape, or configuration, as the specific thing itself may be a new article of manufacture or a number of elements or members never before combined or arranged together in a particular way.

A trade mark is ornamental, and in a certain sense useful in itself, and comes within the statute clearly, as it is necessarily attached to or indicates some article of manufacture, when use is made of it.

Such supplemental patents also, it may be stated, add to the security of invention by shutting out more avenues of infringement. Be it understood that "designs" do not cover the article or things themselves. An impression that they do tends to confusion, and arises from their nature being more abstract than that of any other class of patents. Such may also lead us into the error of supposing that the "design" may not only be ornamental but may partake of the useful, forgetting that in itself it can have neither attribute of the thing or article to which it is attached, or ornaments, or gives form to; while the article bearing the ornament, or form, or configuration may have either, and when it is of the latter can be patented, as is usual with inventions combining both novelty and utility.

The law requires the "design" *to be* originated for a manufacture, etc.; or to be a 'design *for a* bust, statue, *bas-relief*, composition in alto or basso relievo; or to be of any new and original impression or ornament; or such design *to be placed* on an article of manufacture, etc., same being formed in marble or other material; or to be any new and useful pattern or print or picture to be either worked into or worked on, or printed, or painted, or cast, or otherwise fixed on any article of manufacture; or any new and original shape or configuration of any article of manufacture.

The above may be considered a fair analysis of the statute referring to the subject. In nearly every one of the cases will appear the distinction made as respects the "design" or abstract thing itself and the article of manufacture or thing to which the "design" is to be added in some known way.

As to whether there can be "claims" to such patents which will be broad enough to cover all but substantial or radical changes, like other classes of patents, appears to be settled, so far as the Courts have gone, in the affirmative.

No doubt but the application of a certain ornament, configuration or form to anything either of ornament or utility, ought at least to be protected in all colorable evasions, as are trade marks at present in our Courts, namely: to the extent where people of fair or ordinary judgment might be deceived by the attempted colorable change. Anything that would appear to be in substance the same ornament, form, or configuration, and by reason of which persons in the community would purchase the articles to which the "design" patented is intended to have more direct reference, ought to be held as an infringement. To treat these patents as patents of inventions, by invoking the state of the art to show formal or substantial changes, would open up a vast field of litigation wholly unnecessary in this class of patents; which were no doubt intended for but simple and practical purposes, namely, for more effectually securing the makers and venders of articles of manufacture in their specific originality as respects ornament or form.

Let us at least preserve this class of patents in their simplicity and entirety; and they should be granted freely, as they were designed mainly to protect more effectually what the law did not at once *prima facie* protect, namely, the use of a trade mark. Then the burden was on the party owning the trade mark to show a title, that is, to aver and prove an exclusive right, *now* under the statute, by a patent the trade mark is a *prima facie* title and it is for the infringer to displace it.

It also very clearly appears by the statute that "designs" ornamental of or controlling the form of an article of manufacture are to be protected as well as trade marks; and whether this extend to the outline or contour of a particular combination of machinery is a question. This may be answered in the negative if it is considered that nearly every clause of the section of the statute under consideration has reference to a "design" in connection with an "article of manufacture;" and such phrase in other portions of the patent acts is spoken of as different from and not in any sense as a machine.

THE CARELESS USE OF LUCIFER MATCHES.

We believe that many of the fires announced in the journals as believed to be the work of an incendiary, have their real cause in the careless use of matches; and we propose to point out some of the ways in which property is thus endangered. We feel quite confident that in many instances risk is incurred from want of knowledge.

There are several kinds of matches in popular use. Of these probably the safest are those in which sulphur forms a considerable portion of the compound used for tipping. Such matches require considerable friction to ignite them, and unless some deflagrating substance like chlorate of potash, and kindred salts, is used, they do not detonate when ignited.

Some matches in quite popular use are so explosive that they detonate almost like a percussion cap; and when they chance to be tipped too profusely, the burning material will scatter to some distance by the sheer force of the explosion. We have seen the fused burning compound from such a match fly from one to two feet. The material thus scattered, would, in many cases, do no harm; but in a comparatively few instances it might kindle a disastrous conflagration. Falling into loose cotton, inflammable liquids, fine shavings, etc., it would be quite likely to ignite them, but as in such cases the fire is generally at once discovered, and is smothered out by the hand or the foot, the cases in which fires thus caused now become disastrous, are still fewer than those in which they might become so were the persons who use matches always heedless, or worse, intoxicated. Unfortunately, there are occasionally heedless and tipsy people, and so far as we are aware, they are not prohibited the use of matches; hence it may be fairly inferred that occasional fires do occur by the use of matches which violently detonate, when with a safer kind of match no harm would accrue.

In the hands of such people, the fuses used for cigar lighting, and which hold fire for a considerable time, are exceedingly dangerous. Thrown down often before the fire is extinguished, a glowing hot coal, they are, of course, liable to ignite almost any highly combustible substance with which they come in contact.

The writer once extinguished a fire in a wooden box of saw dust, used as a spittoon, caused by a fusee cast away by an intoxicated person, and which would, doubtless, but for its timely discovery, have done immense damage.

The dropping of a book once ignited a bunch of detonating matches lying on our table. Such an accident occurring at night, through the agency of some inquisitive cat, might well pass into the papers as the work of an incendiary.

Such matches are often dropped upon floors by persons too careless to pick them up, and are subsequently ignited by stepping upon them. Others who would stoop to pick up a whole match, would not think it worth their while to attend to a broken piece, although the latter, perhaps, is the tipped end, and just as dangerous as the whole match would be should it chance to be stepped upon.

We have tried some experiments to ascertain the liability of such matches to set fire to buildings, and have found that shavings, cotton waste, and even carpet with cotton warp may be ignited in this way.

Not to dwell too long upon what may seem to some a simple matter, we may sum up as follows:

The careless use of matches, is, in our opinion, the most fruitful of all the causes of fires of mysterious origin.

There are kinds of matches extensively used in offices, factories, and dwellings, which ignite so easily as to be dangerous, and which the insurance companies ought to include in the list of prohibitions in buildings insured by them, and which proprietors should refuse to allow on their premises.

Those matches are safest which require considerable friction to light them, and which, when lighted, only furnish sufficient heat to ignite the small dry splints which constitute their bulk.

Finally, all matches ought to be kept in a tightly closed box or safe, the best material for a match safe being tinplate; and a wholesome appreciation of the danger of carelessness in their use, should be early instilled into the minds of children. Servants, proverbially careless, will probably continue careless in spite of instruction and reproof; and the only thing that can be done with them is to allow them only the use of matches as safe as can be purchased.

THE MILD WINTER.

Where be those prophets now who warned us last autumn of the coming "cold term?" Shade of the departed Meriam, what a mess those prophets have made of it! What premature shiverings they caused us by their statements about the extraordinary thickness of the new bark on trees; the voluminous wrappings provided by sagacious nature to prevent the ears of maize from being touched with the inevitable hard frosts; and the vast stores of provisions the squirrels—supposed to know all about the weather beforehand—had put in to meet the impending emergency. How disappointed the squirrels must be, and how they must regret that they had not played instead of working during the brief beauties of the last Indian Summer!

We trust no one will suspect us of attempting a pun when we say that all attempts to prophecy what kind of weather may be expected for any particular time longer than a day or two, are unprofitable, and likely to bring discredit upon those who attempt it.

We are not very sanguine of the existence of any law or combination of laws which acts with sufficient uniformity to enable predictions to be made, even if all the elements which influence weather were perfectly known to us.

We may count the bits of glass in a kaleidoscope and may compute mathematically the number of possible figures they can combine to form, but we never can tell which of the possible figures will show itself at the next turn of the instrument. There appears to us to be about the same difficulty in foretelling the state of the weather. The elements of variation are so many in number and so variable in time and degree, that their combinations are infinitely various, and follow no regular order of succession.

Such signs as we have alluded to above we regard as utterly unreliable; we have seen them all fail oftener than they have coincided with the conditions they are supposed to indicate.

But while we deem it impossible to predict with even tolerable accuracy future states of weather, at specified times, we believe the modern idea of giving warning to distant localities of approaching storms by means of electric telegraphs is destined eventually to prove of immense benefit to the world; and the suggestion that announcements be made to large agricultural districts by artillery signals prearranged to indicate the intensity, rapidity and direction, as well as the other peculiarities of approaching storms, seems to us to be very practical and promising. This system would save crops from destruction, vessels from shipwreck, and much sacrifice of human life.

SCIENTIFIC INTELLIGENCE.

A French chemist, M. Nadie, has been making a thorough examination of the salt water of different oceans, especially in reference to the amount of chloride of sodium contained in them. He obtained the following results:

The Mediterranean Sea contains of salt, 2·719 per cent; the Atlantic Ocean, 2·789 per cent; the English Channel, 2·595 per cent; the Pacific Ocean, 2·587 per cent; the Lake Ormiah Persia), 19·05 per cent.

The specific gravity of the water was found to range from 1·029 to 1·030 per cent.

A NEW CHLORIDE OF GOLD.

M. Debray announces the discovery of a new chloride of gold that is not decomposed by heat but is volatile at 572°, about the boiling point of mercury. Its other properties are not defined.

ACTION OF LIGHT ON GLASS.

The famous optical glass manufacturer, Bontemps, attributes the greenish yellow coloration of glass to the free sulphur resulting from the decomposition of the sulphate of soda used in the frit. The researches in this direction have become so refined that the constituents of glass will soon be determined by the uses to which it is proposed to be applied. Manganese will have to be omitted from glass designed for the sky-lights of photographers, as it turns red and thus cuts off chemical light, and the sulphate of soda must be dispensed with for the same reason. We shall presently have glass made to order and exactly adapted to its proposed uses.

HYDRATE OF CHLORAL.

This new sedative can be prepared by passing dry chlorine gas through absolute alcohol, but the actual manipulation is attended with a good deal of difficulty. M. Thomsen, of Copenhagen suggests that the alcohol should be put into a roomy flask, and that the Liebig's condenser should be arranged perpendicularly over it so that the condensed vapors can run back into the flask. Chlorine gas is passed through the absolute alcohol until the liquid becomes yellow and absorbs no more gas. The content of the flask is then boiled to expel all the free hydrochloric acid, and is neutralized with chalk. The neutralized liquid is transferred to a retort and subjected to a fractional distillation. The portion going over between 230° and 240° Fah., is kept by itself. The more volatile portions must be redistilled. All traces of water can be removed by further distillation from chloride of calcium.

The boiling point of hydrate of chloral is 240° Fah.; it solidifies at 104° Fah. A slight amount of water will vary the degree of solification considerably.

By employing absolute alcohol and observing all the above precautions, a perfectly pure crystalline hydrate of chloral can be obtained.

This new medicine is employed to produce sleep. It is given in solution in sweetened water, is agreeable to the taste, and produces gentle sleep with no nausea or bad after consequences. It has been successfully tried in cases of delirium tremens, in insanity, in acute gout, and bids fair to become a most valuable contribution to the pharmacopœia. It can hardly be called an anæsthetic agent, although it does produce insensibility, and is not likely to come into competition with chloroform or ether. As an hypnotic agent it appears to exceed any of the narcotics, and bids fair to be largely employed, hence the necessity for great caution in its preparation.

ON COTTON SEED AND COTTON SEED OIL.

BY C. WIDEMANN, CHEMIST, PARIS, FRANCE.

No. I.

This series of papers is intended as a resume of nearly all that has been said or written on cotton seed and cotton seed oil, with the addition of what I have been able to learn of it through my own experience in analyzing cotton seed oil, and examining the different processes now used in its production from the seed, and in refining and bleaching the same.

In Europe, as long ago as 1785, a prize was offered by the London Society for the Encouragement of Arts and Commerce, for the manufacture of cotton seed oil from the Egyptian seed.

The first sample that was ever produced of refined cotton seed oil was made by De Geminy, of Marseilles (France), exhibited at the Great Exhibition of Edinburgh, but in the United States this industry is more recent, and I shall only speak of its manufacture with reference to this country and its interests.

It is not long since the cotton seed was left to decay in large heaps on plantations. It was sometimes used as manure, and found to be very beneficial to the soil, and it is still hard to induce old farmers to sell their seed and deprive themselves of this fertilizer.

THE SEED.

The seed comes principally from Texas, Alabama, and Louisiana; and the yield of cotton is about one third of the seed. It has been found necessary to manufacture oils from it here, as many trials made to ship the seed from this country to France or England have failed on account of the great tendency of the seed to ferment, and as on this account when worked abroad it produces but very inferior qualities of oil. Many unsuccessful trials have been made, but to prevent this alteration of the seed and stop the fermentation, it was first attempted to decorticate the seed and send the kernels; second, to grind them, and heat the meal to coagulate the albumen and legumin contained in the seed, but all this proved of no avail.

The cotton seed is mostly manufactured in this country from the seed of the Gossypium Barbadense, or upland seed, though some mills have tried to use the Sea Island seed as yielding a larger quantity of oil, and also as not requiring to be decorticated, this seed being clean and free from cotton fibers; but at first these manufacturers found some difficulty in selling their cakes in England, where nearly all this article goes, as for a short period there was a prejudice in that country against the black cakes as being injurious to cattle, but this prejudice is dying out, as it has been proved to have been entirely unfounded.

The only way that has been found at present to prevent the fermentation of the seed is due to M. Robert, of Marseilles, France, who uses immense iron air-tight cases, into which the seed is introduced, the air exhausted, and sulphurous gas introduced. In this way the seed may be shipped any distance without alteration.

It has been observed that the first seed of the season, being green, is very watery, and hence is ginned and decorticated with great difficulty, as it packs in the gins and hullers. The oil obtained contains a large quantity of water and resinous substance, is cloudy, settles slowly, and is more apt to become rancid. The more the season advances the better the seed is, and the cold weather also stops the fermentation. The seed needs great care in shipping, as the dampness and heat of the southern climates tend greatly to cause fermentation.

It is shipped from the plantations in gunny bags sent for this purpose by the oil manufacturers to the planter. The purchase of these bags necessitates the use of a large part of the capital invested in the oil business, as sometimes 400,000 bags are required, and the loss yearly in carelessness, fire, decay, and robbery is enormous. In France they boil the bags in tannin water, as the fishermen do with their nets, to prevent their decay.

The seed is sold in New Orleans at about $15 per tun; the average freight, per steamer, to New York, is $10 per tun, which increases the price to $25, and reckoning the bags, insurance, wear and tear, at $3, the average price of seed at New York is $28. It is thought, however, that the price of seed at New Orleans will not be maintained higher than $13 per tun.

The bags contain, on an average, 92 pounds; one bushel of seed weighing 43 to 45 pounds; so it requires nearly 22 bags to a tun of seed.

The relative proportion of shell or husk in 100 parts is 37·45 husks to 62·55 kernels.

The cotton seed arriving at New Orleans from all parts of the Mississippi is not very well ginned, and parties have found it very profitable to gin it again there with very perfect machines before they send it to the mills, the yield of cotton per bag being from 1½ to 2 pounds, worth from 18 to 23 cents per pound, or 21 pounds of cotton per tun. In this way the oil manufacturers are deprived of an important source of profit.

THE HUSKS.

The husks of the carefully-ginned and decorticated seeds do not sensibly yield any thing soluble in alcohol, ether, sulphide of carbon, benzene, benzole, or water; and they are mostly used in the oil mills as fuel, the fire under the boilers being first made with wood or coal and then kept up with the husks or hulls; but in New Orleans the husks are sold to dairy men for their cows, as they eat it with great avidity mixed with cotton seed meal, and the quantity of milk is largely increased by this food.

A full load of these husks sells for $10 or $12, and I think it would replace, with great advantages, the slops from distilleries as food for milch cows. The husks have been also used as manure, containing, according to Liebig's analysis, 1 per cent of ammonia, some gardeners buy them to protect their strawberry beds from the cold. They are also used to pack glassware, porcelain, and other fragile objects; and quite lately a Philadelphia paper house has used them very successfully in the manufacture of paper. The negroes in in Virginia make tea of it as a preventive of the fever and ague.

THE KERNELS.

The seed to be sound must be hard and dry, and crack under the teeth when pressed. The almond, or kernel, must be well shaped, of a fine white color, on the surface, and of a light yellow in the interior, and have a sweet flavor. In examining a section of the kernel, small, dark-colored specks are seen dispersed over and through the yellowish white mass of the kernel, which specks impart to the oil its peculiar color. In examining these specks under a powerful microscope they are observed to be filled with a dark, pink colored, resino-fatty substance, soluble in ether, benzine, sulphide of carbon, and also in weak alkalies, and undergoing a change with the latter solvents.

In crushing the carefully-decorticated kernels in a mortar, a light, yellow green fluid is at once observed; this is the oil. But very soon the atmospheric air changes the original green to a color reddish brown. To convince myself of this I have placed some carefully-decorticated husks in alcohol in a closed vial, which I placed under the receiver of an air pump, over sulphuric acid, and after having exhausted the air and alcohol, I obtained the oil with its original color, which is yellowish green.

Peculiar Appearance Shown by the Flame of Burning Hydrogen.

Dr. Seelhorst has repeated Barett's well-known experiments of holding in the flame of burning hydrogen gas very well cleaned glass rods, metals recently cleaned by filing them just previous to the holding in the flame, and has observed the same blue coloration as M. Barett did. But the author is not at all inclined to ascribe this coloration to the effect of burning sulphur, which should be so generally spread about in the shape of some sulphate, as to produce this coloration. The author, though abstaining from stating any precise cause at all, inclines to the belief that the cooling effect of the cold body held in the flame has something to do with this phenomenon. Perfectly pure hydrogen, burning from a platinum burner, as well as from iron or glass burners, exhibited the phenomenon, when cold bodies, just after having been cleansed by scraping or filing, were held in that flame. These experiments were conducted in a laboratory, repeated in a lecture hall, and in the tap-room of a *café* with the same result.—*Chem. News.*

California Silk.

The *Journal of the Franklin Institute* has received from Mr William J. Horstman a beautiful specimen of raw silk raised in California by Mr. D. Provost, of San José, and reeled on a machine invented by Mr. Joseph Neuman, of the same place.

This material is of an excellent character and in perfect condition, forming a solid hank of the beautiful golden color peculiar to the best raw silk. We learn that much is being done in California by the gentleman on whose estate this sample was produced, as well as by others, and it will evidently be of great advantage, if an industry which represents, yearly, a sum of $214,900,000 can receive such encouragement that it may be fairly established in our country, where so large a demand for its products does and always must exist.

The same journal states that the removal of gum from silk may be more easily and cheaply obtained by the use of ammonia than by the usual method of boiling with soap.

MICHAEL FARADAY.

BY PROFESSOR JOSEPH LOVERING IN "OLD AND NEW."

Michael Faraday was born September 20, 1791; the son of a blacksmith in Newington Butts, Surrey, England. He died in the apartments in Hampton Court Palace, which the Queen had assigned to him, on August 25, 1867; and with him went out the brightest light which had radiated through the chemical and physical sciences for forty years.

In 1804, at the age of thirteen, and with a scanty education, Faraday was sent to a bookbinder, with whom he served an apprenticeship of eight years. But he was not toiling these many years merely upon the *outside* of books. He felt through his whole life his indebtedness to the works of Mrs. Marcet, and he says: "Whenever I presented her with a copy of my memoirs, I took care to add that I sent them to her as a testimony of my gratitude to my first instructress." A copy of the "Encyclopedia Britannica," sent to be bound, riveted Faraday's attention; particularly the article on electricity. Out of an old bottle he constructed his first electrical machine, and out of a medicine phial a Leyden jar, and, thus equipped, he began to experiment. It is to be observed, however, that a great many other boys have done the same thing without growing up to be Faradays. But with them it was play, with him it was work. Faraday, himself, in later years, attached considerable importance to the habit which he acquired in early life of repeating, as far as he was able, the experiments of which he read in chemistry and electricity. And when, afterwards, the brilliant lecturer enchanted both young and old, he treated his audiences as he had treated himself. He did not suppose them to know, or require them to believe in any physical law, however familiar, unless he had shown it to them; not even that a stone would drop to the earth, without dropping it first before their eyes on to the floor of the lecture-room.

In 1812 Faraday was invited to the Royal Institution, to hear Sir Humphry Davy lecture. He took notes at these lectures which he afterwards sent to Davy, asking at the same time his assistance to escape from trade and dedicate himself to science. Davy, who was then at the zenith of his transcendent popularity, had the time and the disposition to encourage the youthful aspirant, and in March, 1813, Faraday became chemical assistant in the laboratory of the Royal Institution. Mr. Gilbert Davies, who had himself detected the genius of Davy in the obscure home of a Cornish carver at Penzance, has said of the illustrious Davy that the greatest of all his discoveries was the discovery of Faraday. In a few months after Faraday's installation at the Royal Institution, Davy started upon his prolonged visit to the Continent, and Faraday accompanied him as secretary and chemical assistant. His own modest merits were not altogether overshadowed by the shining fame of his companion, and he formed friendships in Paris, Geneva, and Italy which were only broken by death.

Faraday began his career of original investigation in 1816, with a successful analysis of a specimen of caustic lime from Tuscany. Since that time, his contributions to science flowed on in a steady stream, so broad and so deep that every province in chemistry and physics has felt the reviving influence. In acoustics, we recall his researches on the sand figures and lycopodium heaps of vibrating plates, on musical flames and Trevelyan's experiment with a heated metal; in optics, we are reminded of his papers on aërial perspective, on ocular deceptions produced by rotating wheels, on the relation of gold and other metals to light, on the borosilicate of lead or heavy glass; and of his services on the committee to which he was appointed in 1824, with Herschel and Dolland, by the Royal Society, to suggest improvements in the manufacture of glass for telescopes, and his valuable report upon the methods of manufacturing glass; in general and molecular physics, we remember his labors and discoveries on the limit to evaporation, on the temperature of vapors, and their solidification, on their passage through capillary tubes, on the pneumatic paradox of Clement Desormes, on vegetation; in practical science, we are indebted to him for suggestions, experiments, inventions, or discoveries on ventilation, illumination, fumigation, gunnery, on india-rubber and the alloys of steel, on the prevention of explosions in collieries, on the extinguishment of blazing houses, on sustaining a prolonged breath in a dangerous atmosphere, and on the false pretensions of spirit-rappings and table-turnings.

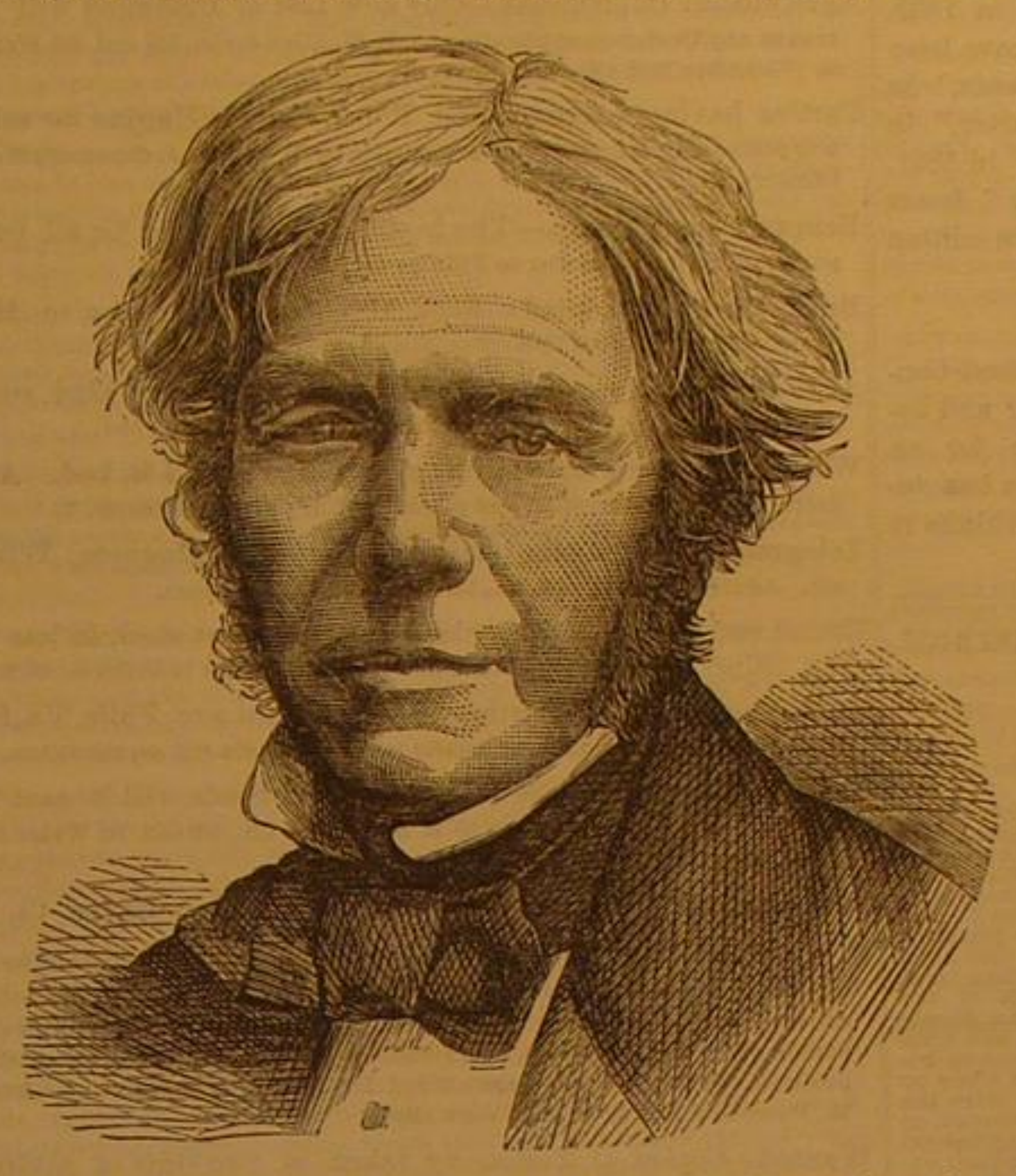
This meager enumeration, in which years of intellectual activity are registered in as many lines, indicates the exceeding great versatility of Faraday's genius. Nevertheless, chemistry and electricity were his favorite if not his absorbing pursuits, from the beginning to the end of the half century which his discoveries have made so brilliant. And of these two chemistry served him, but electricity commanded him. It is impossible in this place to specify, much less to analyze, the varied researches of Faraday in chemistry and electricity.

In 1820 he described two new compounds of chlorine and carbon. "The discovery of these two compounds," to adopt the words of De la Rive, "filled up an important gap in the history of chemistry." In 1825 Faraday discovered benzole, to which, says Hoffman, "we virtually owe our supply of aniline, with all its magnificent progeny of colors."

In 1820 Oersted set up one of those milestones, which stand forever in the history of science, by his inauguration of electro-magnetism. Many pressed into the ranks to pursue the new discovery to its consequences, and Faraday among the foremost. He adapted the reaction between the current of electricity in the conductor and the magnet to the production of a continuous revolution—a stupendous novelty then, without a parallel in mechanics nearer than the heavenly bodies. Even Ampére's sweeping generalization of the electro-dynamic action had not anticipated such a result, although it was afterwards able to explain it.

In 1831 the scientific interest which had been monopolized by electro-magnetism was transferred to a younger sister, magneto-electricity. Magneto-electricity was a corollary from Faraday's new discovery of voltaic induction, when the latter was viewed in the light of Ampére's theory of magnetism. Science had been in possession of voltaic electricity for forty years, its most powerful instruments had been wielded by Davy, Hare, and Silliman, statical induction was a familiar fact; but it was reserved for Faraday first to see with his own eyes the external influence of current electricity. Henry's induced currents of the higher orders; Page's devices for exalting the intensity of induced currents, and their application to therapeutics; Ruhmkorff's coil, and its various adaptations to blasting, lighting, etc.—all these had their origin in Faraday's discovery of voltaic induction.

On the 20th of November, 1845, Faraday read to the Royal Society of London, his startling discovery of the "Magnetization of Light and the Illumination of Magnetic Lines of Force." This discovery, from its delicacy and novelty, deserves to take rank as Faraday's greatest, standing, as Tyndall describes it, among his other discoveries, and overtopping them all, like the "Weisshorn among mountains—high, beautiful, and alone."



It really means, however, less than the language in which it was announced would convey to most minds. More than thirty years before, Seebeck and Brewster had succeeded in imparting to common glass, by pressure or heat, the depolarizing structure of crystals. It was reserved for Faraday to imitate, partially, the quartz-like structure of oil of turpentine, and its strange power of circular polarization, by subjecting his heavy glass, and even water, to the influence of strong magnets. This discovery was followed by others, in rapid succession, extending over a period of five years; all of which are included in his comprehensive classification of substances into magnetics and diamagnetics. A compass needle made out of a diamagnetic would point east and west, where an ordinary compass needle would point north and south. As oxygen is powerfully magnetic, Faraday labored hard to show that it was superfluous to seek for the cause of terrestrial magnetism, or at least of its fluctuations, outside of the earth's atmosphere. The antagonistic properties of magnetism and diamagnetism are influenced by crystallization. Faraday proved this for bismuth, antimony, and arsenic, as Plücker did for the optical axes of crystals. Faraday could have had little expectation in 1825, when he was melting the borosilicate of lead, that this heavy glass, which proved a failure for optical purposes, on account of its deep color, would, after standing on the shelf for thirty years, become the instrument of his grandest discovery.

Nor should we forget how much Faraday did to establish the identity of electricity, from whatever source it is derived, to prove the definiteness of its action, to unveil the process of electrolysis, to bring under one general law conduction and insulation, to assert the dependence of electrical and magnetic induction on the molecular agency of intervening media, and to deal a vigorous and mortal blow to the contact-theory of galvanism. Faraday was not destined, either by early associations, education, or mental constitution, to discuss successfully high schemes of speculative philosophy or mathematical science, such as the nature and conservation of force, or the essence of matter, though he has written a few papers upon these subjects. Nevertheless, he contributed more largely, perhaps, than any of his cotemporaries to that vast scientific capital, from which Grove has freely borrowed in the establishment of his theory of the Correlation of the Physical Forces, and the convertibility of one manifestation of force into another, as so many varieties of motion.

In 1854, as Faraday was approaching the close of his long period of active service, he delivered a lecture at the Royal Institution, under extraordinary circumstances, on Mental Education. This lecture deserves special commemoration, inasmuch as Faraday regarded the views expressed in it both as cause and consequence of his own experimental life. We here see that faith, humility, patience, labor of thought, mental discipline, well-educated senses, had all conspired to make him a fit high-priest of science. But he says that "this education has, for its first and its last step, humility."

After Faraday returned from his tour with Davy upon the Continent, he pursued the even tenor of his way at the laboratory of the Royal Institution with little interruption; not allowing himself to be distracted from the chosen work of his life by pleasure or profit or applause. Though by following out his researches to their practical application he might have amassed a large fortune, Faraday rejected the glittering bribe when it was already within his grasp, saying, "I felt I was not sent into the world for this purpose." If Faraday was sent into the world for the discovery of truth, then most certainly he accomplished his destiny. For was he not what Tyndall calls him, "the greatest experimental philosopher the world has ever seen"? Though Faraday would not desert his high vocation for emolument, he often did it at the call of his government, of humanity, of civilization, of science. Nothing could have been more distasteful to him than to leave, even for one hour, his quiet walk with Nature, which never cheated however she might elude him, and sit with table-movers and other pretended interpreters of her secrets. After describing the apparatus, which, with great experimental tact, he had devised for exposing the trickery or self-deception of his associates, he writes, "I am a little ashamed of it, for I think, in the present age, and in this part of the world, it ought not to have been required." And again he says, "I think the system of education that could leave the mental condition of the public body in the state in which this subject has found it must have been greatly deficient in some very important principle."

Many scientific men in Great Britain have surpassed Faraday in the clearness, elegance, and eloquence of their writings. But no one, unless it were Davy, possessed to such a degree Faraday's gift of imparting to others, in the lecture-room, what he had discovered for himself. If, as De la Rive said of him, he was never caught in a mistake in his laboratory, "the hand marvelously seconding the resolves of the brain," we may add that he seldom disheartened his audience by the miscarriage of an experiment, destroying the spell by which he had hitherto bound them. Though he was less dramatic, we might almost say less theatrical, in his style of address than Davy, he never failed to attract an admiring crowd, not only of the thoughtful and the educated, but of the gay and the high-born. He was equally at home with the juvenile audiences which listened to him during the Christmas holidays.

For fifty years Davy and Faraday together had sustained the glory of the Royal Institution as with the brightness of a whole Academy; each of them of unchallenged greatness, not only as discoverers of physical truths, but as expositors also. In Davy was found a rare combination of poetry and science. Coleridge, it was said, frequented his lectures "to increase his stock of metaphors." Davy preferred the blazing battery of the Royal Institution to the chemist's balance. His generalizations were bold and dazzling. Quality and not quantity excited his mind. In ten years he stood on the pinnacle of fame. He was knighted; he was courted; and then his position at the Royal Institution was almost honorary. Faraday relied less on his imagination and more on his experiments. Brilliant as were his triumphs, they were won by hard work. His whole scientific life was one protracted campaign, and that was a war of posts and not a succession of brilliant charges. He prized the recognition of academies and universities, but not the insignia of rank. Without leisure for fashionable society, he enjoyed preaching to the humble sect of Christians to which he belonged as much as lecturing before princes and nobles, either of birth or of intellect, at the Royal Institution.

It is little to say of such a man that he was made a Fellow of the Royal Society of London in 1824, a Corresponding Member of the French Academy of Sciences in 1823, a Foreign Associate of the American Academy in 1844; that his name was eagerly sought to adorn the list of honor of all other Academies in Europe and America; that he received from the Royal Society of London the Rumford, Copley, and Royal medals; that his simple life was made independent by a pension of £300, conferred upon him in 1835; that Napoleon the exile was instructed by his lectures, and Napoleon the Emperor acknowledged the obligation by naming him Commander of the Legion of Honor.

It is much to say of him that he declined all honors and rewards which were foreign to his scientific character; that, when he might have amassed a fortune of £150,000 by applying old discoveries to commercial uses, he preferred to concentrate his whole mind on the discovery of new truth, dying poor and leaving a widow dependent on a small pension, which, in noble imitation of his example, she refused to have increased; that he ruled a strong nature so as to be always gentle, and only impatient of those who unnecessarily wasted his time; that he was as much exalted above others in modesty as in intellectual greatness; that he made science honorable and attractive; that he ruled with imperial sway the hearts no less than the intellects of his generation, and that his final departure from the laboratory in the Royal Institution of Great Britain on the 20th of June, 1862, was followed by one universal pang of grief throughout the world of science. Long and loudly and perseveringly had Faraday knocked at the secret gates of nature, and most encouraging were the responses which, from time to time, he had received. Nevertheless, he finds it in his heart to say, "I have never seen anything incompatible between those things of man which can be known by the spirit of man which is within him and those higher things concerning his future which he cannot know by that spirit."

Faraday, with a wise precaution which consulted the convenience of others no less than his own reputation, made a timely collection of his scattered publications, and placed them in a compact and permanent form suited to the private library of the student of science. His "Series of Experimental Researches upon Electricity," amounted to thirty; all but one of which are now contained in three volumes, published successively in 1839, 1844, and 1855. These Researches are illustrated by other papers upon the same subject originally printed in the "Philosophical Magazine," or in the "Journal and Proceedings of the Royal Institution," as the Researches themselves were in the "Philosophical Transactions." Faraday's "Experimental Researches in Chemistry and Physics" fill a fourth volume which appeared in 1859. Also, under his sanction and partly from his notes, have been printed, "Six Lectures on the Non-metallic Elements," in 1852; "Six Lectures on the Various Forces of Matter," in 1860; and "Six Lectures on the History of a Candle," in 1861.

The first edition of the "Chemical Manipulation" bears the date of 1827. This was followed by an American edition in 1831, and a second English edition in 1842.

PRESIDENT Grant has vetoed the bill which passed Congress allowing the Commissioner of Patents to hear and decide upon the merits of the case of Rollin S. White for an extension of his patent on revolvers. The patentee has received a royalty of $71,000, which the President thinks is enough. This is his first veto.

UNITED STATES CIRCUIT COURT---SOUTHERN DISTRICT. BEFORE JUDGE BLATCHFORD.

RIVAL SEWING MACHINES—INJUNCTION.

The Florence Sewing Machine Company vs. *The Singer Manufacturing Company*.—BLATCHFORD, J.—Without passing, in a plenary manner, upon any of the various questions of law and fact raised and discussed on the motion for an injunction made in this case, I am of a opinion that a due regard for the rights and interests of both parties demands that the injunction, asked for in the bill, should be issued provisionally, subject to conditions—conditions which, in substance, are self-imposed by the plaintiffs in their bill.

An order will therefore be entered, directing that an injunction issue restraining the defendants from giving notice to the plaintiffs of the option, or purpose, or election of the defendants to terminate the license to the plaintiffs, dated February 20, 1868, referred to in the bill, and from attempting to collect from the plaintiff's license fees or patent rent to become due or accrue thereunder, such injunction to continue in force so long, and only so long as the plaintiffs shall continue to deposit with the clerk of this Court all such sums as the patent rent under said license, at the rate of $5 for each machine not exported, and $2 for each machine exported would amount to, for each and every quarter year which shall expire during the continuance of said license and the pendency of this suit, at the several times when the same would fall due by the terms of said license: and further directing that the said clerk shall deposit all sums which shall be so received by him with the United States Trust Company in the city of New York on interest to the credit of this suit, and that such sums shall be subject to the order of the Court to be made in this suit.

E. R. Hoar and A. L. Soule for the plaintiffs; E. W. Stoughton and G. Gifford for the defendants.

NEW BOOKS AND PUBLICATIONS.

A PRACTICAL TREATISE ON METALLURGY. Adapted from the last German Edition of Professor Kerl's Metallurgy. By William Crookes, F. R. S., etc., and Ernst Rohrig, Ph.D., M. E. In three volumes. Vol. III. Steel, Fuel, Supplement. Illustrated with Wood Engravings. New York: John Wiley & Son, 2 Clinton Hall, Astor Place.

This is the third volume of the most extensive and complete work on metallurgy now existing in the English language, previous volumes of which have been noticed in these columns as they have appeared. To give even a list of the subjects treated would make too great demands upon our space. The three large octavo volumes which compose the entire work, contain a mass of practical information upon metallurgical subjects which entitle the work to be called literally an exhaustive treatise. The volume before us contains one hundred and forty-five wood engravings, and the work is brought down to the most recent processes, which are described with a profuseness of detail and thoroughness of treatment never excelled in any work of a similar character ever brought to our notice

THE ARCHITECTURAL REVIEW AND AMERICAN BUILDERS' JOURNAL. Edited by Samuel Sloan, Architect, and published by Claxton Remsen & Haffelfinger, 819 and 821 Market street, Philadelphia.

This is the leading American periodical devoted to architecture. It is beautifully printed, and edited with singular ability. Every number contains, besides able editorials and art miscellany, original designs for buildings of various styles, and engravings of beautiful structures, which cannot fail to elevate the architectural and artistic taste of the country.

THE WORKSHOP

Is one of the most beautifully illustrated journals devoted to industrial art published in Europe or America. The publisher, E. Steiger, 22 and 24 Frankfort street, New York, has prepared and published "The Workshop Album," being a selection of engravings from the back volumes of "The Workshop," for the years 1863 to 1867 inclusive, containing the cream of the designs published during three years and forming a valuable addition to any art collection. Price of "Album," $9·00; to yearly subscribers to "The Workshop," $2·00.

GOOD WORDS, for January.

This magazine opens with the first two chapters of a new story, entitled 'Carlino." Rev. Charles Kingsley contributes a short sketch under the title of "The Air-Mothers," and Dr. McLeod the editor, the first of a series of papers on "Days in North India." The latter article is profusely illustrated, as also is "A Visit to the Country of the Vaudois," by Samuel Smiles. The most noticeable article in the present number is that by Dean Alford, on 'The Christianity of the Present and of the Future. "Good Words" is, in our judgment, the best magazine now published for the home circle. J. B. Lippincott & Co., Philadelphia, publisher. Terms, $2·75 a year.

THE SCIENTIFIC PRESS,

Published by Dewey & Co., San Francisco, Cal., is an eminently popular and useful weekly, devoted to the interests of mining, farming, and the mechanic arts. Its contents are always varied and interesting.

WE are in receipt of the Report of the Department of Agriculture from the Hon. Horace Capron, United States Commissioner of Agriculture. It is replete with valuable statistics and information, upon which we shall draw liberally for the benefit of our readers. Commissioner Capron will please accept our thanks.

A NEW candidate for public favor to which the publishers, H. O. Houghton & Co., 135 Washington street, New York, and Hurd & Houghton, 459 Broome street, New York, have given the name of "Old and New," ranks among the first of American monthlies in point of literary excellence, and must, we think, inevitably secure a large share of popular favor. The contents of the first number are diversified, and contributed by eminent authors. One of them, a biographical sketch of Michael Faraday, by Prof. Joseph Lovering, we republish in another column, accompanied by a life-like portrait of that eminent physicist.

BY the courtesy of Mr. William H. Clarke, Principal Assistant City Engineer, Chicago, who will please accept our thanks, we are in receipt of the Eighth Annual Report of the Board of Public Works of that city, which is a very interesting and instructive document.

"THE NATION" as a critical, political, and literary journal, stands at the head of the weekly press. We consider it in all respects one of the most high-toned and able journals on our exchange list.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

The paper that meets the eye of manufacturers throughout the United States—Boston Bulletin, $4·00 a year. Advertisements 17c. a line.

Agricultural Implements.—Our new List of Discounts will be sent to any Dealer on application to R. H. Allen & Co., 189 and 191 Water st. (Postoffice Box 376), New York.

Parties having a second-hand Roper Caloric Engine for sale, will please address, with price and particulars. George J. Capewell, West Cheshire, Conn.

Eclipse Steam Pump.—The best Pump in use for for all purposes. Send for a circular to Phillips & Cluleys.

Brick Machine Wanted.—Send Circular, with prices, to McPherson Wright, Lott's Postoffice, Edgefield county, S. C.

All Editors of Newspapers and Periodicals of every kind, send specimen copy to L. W. Frederick, Gosport, Owen county, Ind.

Wanted—A Screw-cutting Engine Lathe, 8 or 4 ft. bed. Address, with full description and price, H. M. H., Prickly Pear, M. T.

Telegraph Instruments, Galvanic Batteries, Magnets, Wire, etc. Address C. Williams, Jr., 109 Court st., Boston, Mass.

Round and Square decarbonized bar and sheet steel, in lots to suit, 11c. per pound. Philip S. Justice, 42 Cliff st., N.Y.; 14 N. 5th st., Phil's.

G. W. Lord's Boiler Powder, 107 W. Girard ave. Phila, Pa., for the removal of scale in steam boilers is reliable. We sell on condition.

Reliable Seeds.—Our New Trade List of Seeds will be sent to the Trade only on application to R. H. Allen & Co., 189 and 191 Water st., (Postoffice Box 376), New York.

Peck's patent drop press. Milo Peck & Co., New Haven, Ct.

A Profitable Investment—For a Company to Manufacture a well-known material now manifoldly applied in the arts. The Factory, consisting of several lots of ground, situated opposite this city, with steam engine and other apparatus, all in full operation. Also, goodwill of the business connected with it, are offered for sale on cash terms. Address M., Postoffice Box 3,948, New York city.

Wanted—Copies of Testimony taken in two suits of equity, brought by the American Wood Paper Co., in 1867. 1st. Against Heft & Co., in the Eastern District of Pa. 2d. Against the Fiber Disintegrating Co., in the Eastern District of New York. Address, stating price, Compiler, 423 Main st., Cincinnati, Ohio.

For Sale—A valuable Patent. J. G. Redline, Lanark, Ill.

Manufacturers, Attention.—Responsible Manufacturers about to remove to the vicinity of New York, would do well to address George S. Bell, South Norwalk, Conn.

Henry F. Piaget, author of "The Watch," dealer in fine watches, watch repairer, etc., late of 119 Fulton st., has removed to 86 Nassau st.

Reliable Seeds.—Our new Seed Catalogue, with descriptions, illustrations, and prices, will soon be issued. Send for one to R. H. Allen & Co., 189 and 191 Water st., (Postoffice Box 376), New York.

For Sale—Or exchange for Western Lands, the whole or one half interest in a 1-set Woolen Mill. Address O. Barnard, Bloomington, Ill.

Aneroid Barometers made to order, repaired, rated, for sale and exchange, by C. Grieshaber, 107 Clinton st., New York.

The Babcock & Wilcox Steam Engine received the First Premium for the Most Perfect Automatic Expansion Valve Gear, at the late Exhibition of the American Institute. Babcock, Wilcox & Co., 44 Cortlandt st., New York.

For best quality Gray Iron Small Castings, plain and fancy Apply to the Whitneyville Foundery, near New Haven, Conn.

Keuffel & Esser, 71 Nassau st., N.Y., the best place to get 1st-class Drawing Materials, Swiss Instruments, and Rubber Triangles and Curves

Foot Lathes—E. P. Ryder's improved—220 Center st., N. Y.

Those wanting latest improved Hub and Spoke Machinery, address Kettenring, Strong & Lauster, Defiance, Ohio.

For tinmans' tools, presses, etc., apply to Mays & Bliss, Brooklyn, N. Y.

Mill-stone dressing diamond machine, simple, effective, durable. Also, Glazier's diamonds. John Dickinson, 64 Nassau st., New York.

Send 3-cent stamp for a circular on the uses of Soluble Glass, or Silicates of Soda and Potash. Manufactured by L. & J. W. Feuchtwanger, Chemists and Drug Importers, 55 Cedar st., New York.

Glynn's Anti-Incrustator for Steam Boiler—The only reliable preventative. No foaming, and does not attack metals of boiler. Liberal terms to Agents. C. D. Fredricks, 587 Broadway, New York.

For solid wrought-iron beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Machinists, boiler makers, tinners, and workers of sheet metals read advertisement of the Parker Power Presses.

Diamond carbon, formed into wedge or other shapes for pointing and edging tools or cutters for drilling and working stone, etc. Send stamp for circular. John Dickinson, 64 Nassau st., New York.

To ascertain where there will be a demand for new machinery or manufacturers' supplies read Boston Commercial Bulletin's manufacturing news of the United States. Terms $4·00 a year.

Agricultural Implements—Descriptive and Priced Circulars of any Implement, Machine, or Small Tool needed on a Farm, Garden, or Plantation; will be sent on application, accompanied by stamp, to R. H. Allen & Co., 189 and 191 Water st., (Postoffice Box 376), New York.

Winans' boiler powder, 11 Wall st., N. Y., removes Incrustations without injury, or foaming; 12 years in use. Beware of Imitations.

The Architectural Review

And Builder's Journal—the First and Best Periodical of the kind in the country, with practical details to the Builder and Architect, and much useful information to the general public. Profusely illustrated. Terms $6 per annum. SLOAN & GOODRICH, Editors, etc., Philadelphia. Sold by publishers and news agents everywhere.

THE NEW YORK TIMES has some severe but true remarks, from which we quote: "Another illustration of the indifference to improvement is shown in the practice of Gas Companies in lighting street lamps. The lamps of European cities are lighted by a Torch, the operation being, literally, quick as a flash. Here labor is far dearer than in Europe, and yet the Manhattan Co. has but recently begun to use the Torch. Other Companies still send round a man with a ladder, with which he climbs the posts, turns on the gas, then takes a match from his pocket, scratches it upon the post and lights the gas, the process taking about three times as long as the new one, carrying all who see it back almost to the middle ages." "This improved method of lighting street lamps, referred to by the *Times*, is the same to which we have called the attention of those interested in lighting street lamps, as being not only a great improvement, but the best, of which the full particulars may be obtained from Mr. J. W. Bartlett, of 569 Broadway, New York, who is proprietor of the Patents."—[EDS. GAS LIGHT JOURNAL.

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 correspondents 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.

J. W. S., of Miss.—All other things being equal, the power of a screw is increased or lessened as the pitch is increased or lessened and in the same proportion. The ordinary formula given in text books for computing the powers of screws does not take friction into account. Friction in a screw is, however, greatly influenced by the abruptness of the incline of the thread, and this, of course, depends upon the ratio of the pitch to the diameter. Screws, to work well, should have their diameters properly proportioned to their pitch, but this subject can not be discussed in the limits of an answer to a query.

J. G. E., of N. Y.—You may give a gold color to cast iron by gilding, bronzing, or—first coating with tin—by the use of a suitable lacker. The cheapest way for large articles is to use bronze or mosaic gold. The castings are first to be heated hotter than the hand can bear but not so hot as to burn the varnish, and coated with German gold (Mosaic gold) mixed with a small quantity of alcohol varnish. If the iron is polished, it must first be heated and rubbed over with a rag dipped in vinegar.

H. B. R., of Ill.—If a boiler makes dry steam, there is, in our opinion, no economy in superheating. To construct a brick flue over a horizontal boiler of the kind you describe, with a view to superheating the steam thereby, would, in our opinion, result only in loss. If the boiler is exposed so that the loss by radiation is great, you will find it economy to clothe it with felt. Bricking-in a boiler will, of course, prevent radiation to a considerable extent, but to attempt to superheat steam in that way proposed would prove unprofitable.

L. W. E., of Pa.—The explosion of the oil still which you describe as occurring five hours after the still had been stopped running and the manhole opened, is without doubt correctly attributed by you to the firing of gas generated therein mixed with air. The cause of ignition seems involved in mystery, and with the data you furnish we are unable to come to a conclusion in regard to it.

G. A., of Ind.—There should be no difficulty in making a good, practically water-tight cellar by the use of good water cement, and any mason worthy of the name ought to know how to do it. Of course if water gets under a cement bottom, it may break it up by its upward pressure, but this could not occur in ordinary cases.

J. W. W., of Conn.—The coloring of oak timber steamed in iron tanks, is probably due, as you suppose, to the formation of tannate or gallate of iron. A remedy would be to coat the interior thoroughly with asphaltum, or to substitute wooden steam boxes for the iron.

H. K. B., of Va.—Soapstone is valuable and useful for lining stoves and furnaces, and stoves are made composed almost wholly of it. It is also employed for making certain cooking utensils, slate pencils, etc. A quarry of good soapstone is good property if easily accessible.

W. S., of Wis.—The power on your windlass being exactly one half the weight (not taking into account the weight of suspending chain), the length of lever required to balance power and weight will be twice the distance from the center of the windlass to the circumference.

G. W. Clarke.—We do not know of any thing we can recommend for general use better than good oil paint for external application to brick walls of buildings, to obviate the ill effects of moisture upon them.

A. D., of Ind.—We do not desire at present to renew the discussion upon force and resistance. We must be the judges of what will best suit our readers.

H. M. R., of N. Y.—The reason why your article was not published, was that we did not wish to continue an unprofitable discussion.

W. M. H., of Ohio.—The recipe for recutting old files with acids may be found on page 122, volume XVIII, of the SCIENTIFIC AMERICAN.

J. C. G., of Pa.—Scrap steel may be melted over in crucibles and recast into ingots without alteration.

Recent American and Foreign Patents.

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

WATCH.—S. D. Engle, Hazleton, Pa.—This invention consists in a protecting ring or band around the watch movement, and attached thereto.

BITSTOCK.—R. S. Hildreth, South Adams, Mass.—This invention relates to new and useful improvements in bitstocks or braces, for holding and operating boring bits.

SASH AND DOOR CLAMP.—G. H. Hall and Lorenzo D. Farra, Germantown, Pa.—This invention relates to a new and useful improvement in clamps for putting together sashes and doors, and for other purposes, whereby the operation is greatly facilitated.

CAR-AXLE LUBRICATOR.—T. J. Mooers, Blossburg, Pa.—This invention relates to improvements in devices for lubricating the axles whereon the wheels run loosely, and consists of a valve arrangement applied within the reservoir on the wheel hub, for keeping the supply passage always closed by action of a spring, and under an arrangement whereby it may be readily opened to fill the reservoir. The invention also consists in an arrangement of the absorbent material for supplying oil between the ends of the whee and the collars, as well as to the axle.

Velocipede Sleigh.—D. M. Anderson, Twinsburg, Ohio.—This invention relates to improvements in means for propelling and guiding sleighs by the rider, and consists in the application of a spike wheel, foot crank shaft, driving wheels, and belts, for propelling, and guiding shoes, under an improved arrangement whereby the rider may propel the spike wheel with his feet, and thereby draw the sleigh along over the ice, or swerve and guide it at the same time with his hands.

Feather Duster.—M. A. Goodenough, New York city.—This invention consists in the manner in which the flexible connection between the center and the base of the brush is formed.

Washing Machine.—A. J. Wilcox, Fall River, Mass.—This invention relates to a new and useful improvement in mashines for washing clothes.

Card Holder.—Charles F. Wilson, Brooklyn, N. Y.—This invention relates to a new and useful improvement in a device for holding cards, whereby durability, cheapness, and simplicity are combined, while the position of the card is secured in the most effective manner.

Rotary Engine.—S. M. Snyder, Brady, Pa.—This invention consists in combining with the hollow revolving piston of a rotary steam engine two or more diametrical sliding valves, placed at right angles to each other said valves being made bulging at the central parts which are within the cylinder.

Gun Lock.—N. C. Lock, Salem, Mass.—This invention relates to a new and useful improvement in locks for firearms, whereby they are made safer to carry and to handle than when furnished with the ordinary lock.

Locomotive Water Pipe.—Frank Gerrard, Kansas City, Mo.—This invention relates to a new and useful improvement in the construction and arrangement of feed water pipes for locomotives at railroad watering stations.

Clay Crusher.—Alfred Hall, Perth Amboy, N.J.—This invention relates to a new and useful improvement in machines for crushing clay and other similar substances, and consists in two cogged and grooved cylinders which are rotated so as to engage with each other, and in combination therewith a series of cleaning bars or scrapers.

Car Coupling.—Jerome B. Vedder, Gloversville, N. Y.—This invention relates to a new car coupling, which is so constructed that it will be readily operated without being liable of becoming spontaneously disengaged.

Meat Chopper.—Leopold Steigert, Cincinnati, Ohio.—This invention relates to improvements in that class of meat choppers, wherein a meat-chopping block, revolving on a vertical axis, and reciprocating cutters working in vertical planes, upon the top of the said block are used, and it consists in an improved arrangement in connection with the same of guard plates, to prevent the knives from scattering the meat which adheres to them more or less about the floor or table whereon the machine rests.

Seat Cushion.—Richard A. Kendall, Mineral Point, Wis.—This invention relates to improvements in seat cushions for churches, halls, and other places, and consists in providing the same with spring hooks for attachment to the benches in a simple way, and so that they may be readily detached, the said spring hooks being attached to the under, or back sides of the cushions, so as to hook over the front edge of the seat or the top of the back.

Screws and Screwdrivers.—Peter Nelson Jacobus, Flatbrookville, N. J.—This invention relates to an improved screwdriver and screw, whereby a screw may be attached to and held by the screwdriver by means of jaws or clamps, so that the screw may be screwed into a piece of wood, without being held by the hand, or having the hand applied directly to it. The screwdriver is also provided with a countersink cutter, so that the countersink to receive the screw head will be made in the wood simultaneously with the screwing in of the screw. The head of the screw is also made with notches or their equivalents, so that the screwdriver may grasp or hold the screw head firmly while the screw is being screwed into the wood.

Folding Chair.—C. O. Collignon and N. Collignon, Closter, N. J.—This invention relates to a new method of constructing folding chairs for domestic use, and for other purposes, the object being to so arrange the parts of which the chair is composed that while the structural strength is secured, the chair will admit of being folded up into a very small compass when not in use.

Water Closet.—J. Keane, New York city, and G. H. Brown, Washington Hollow, N. Y.—This invention relates to an improved automatic apparatus for regulating the flow of water to the basins of water closets. The invention consists in adapting to the supply cock a pinion which is caused to turn and open the cock by means of a sector rack on one end of a lever, which has its fulcrum on a central standard.

Fermenting Substances and Germinating Grain and Seeds.—Rudolph d'Heureuse, San Francisco, Cal.—This invention relates to a mode of improving fermentation and germination, by the introduction of air of proper temperature and moisture into the substance to be acted on, at or near the bottom of the vessel containing the same.

Washing Machine.—H. E. Smith, New York city.—This invention relates to a new washing machine in which the articles to be washed are thoroughly stirred or kept in motion in hot water or steam, without requiring the use of friction, so as to preserve the articles to be washed in good order and condition.

Gearing for Multiplying the Motion on a Single Shaft.—L. S. Fithian, Brooklyn, N. Y.—This invention relates to a new and useful combination of cog wheels, whereby motion may be increased on a single shaft, thereby greatly simplifying the methods in common use for that purpose.

Manufacture of Sirup and Sugar.—Narcisse Pigeon, Brooklyn, N. Y.—This invention relates to a new process of making a pure syrup and crystallizable sugar sirup from substances whether extracted from indian corn, cereals, or other analogous vegetable product having a chemical formula of C^{12}, H^{10}, O^{10}, or closely allied thereto. It also relates to a process for making a hard crystallized sugar from such sirups. Starch and cellulose in a nearly solid state are the ordinary substances from which it is proposed to make the pure sirup and the crystallizable sugar sirup.

Steam Generators and Furnaces.—S. Lloyd Wiegand, Philadelphia, Pa. This invention consists in forming boilers with double tubes in several separable sections, and in combining with boilers so formed, certain devices for promoting the activity of the circulation of water therein contained, and thus promoting the cleanliness, efficiency, and durability thereof, and further in the improvement of the furnace, which is so adapted and applied to said boilers that very great economy of fuel together with perfect facility of inspection and repairs are cheaply secured.

Self-acting Spinning Needle.—S. D. Paul and S. S. Cook, Woonsocket R. I.—These improvements are mainly designed for spinning woolen yarn, but some of them are applicable to spinning cotton, and the invention consists in the general construction and arrangement of a self-actor spinning mule, to produce the movements common to such machines by new arrangements of the operating parts.

Machinery for Rubbing and Mixing Paints, Chemicals, Fertilizers, and Other Substances.—Robert Poole, Baltimore, Md.—The machine which is the subject of this invention has for its object mainly the mixing of paints and chemicals, but may be used for mixing or rubbing any soft, pasty, gummy, glutinous, or resinous substances; and the invention consists, first, in combining with a pan, tub, or other suitable holding vessel revolving horizontally on its support a rubbing or mixing apparatus that turns about its support within or over said pan, tub, or other holder, so that the united movements of the pan or holder, and of the rubbers or mixers shall form or resemble a series of circular lines that cut or cross each other after the manner of "chased" or "lathework," as it is termed. And the invention further consists in combining with a revolving pan, tub, or other suitable revolving holding vessel, and the rubbing or mixing apparatus, a guide or scraper for turning and directing the material that is being rubbed or mixed out of the path of the rubbers or mixers when desired.

Steam Governors and Valves.—Francis Johnston Nutz, Philip Estes' De Forrest Fairchild, and Edward Payson Willson, Leavenworth City, Kansas.—These improvements relate to centrifugal ball governors for regulating the motion of steam engines, water wheels, and otherwise, and they consist, first, in a device for controlling the action of ordinary ball governors, so that they shall more perfectly perform their function as regulators of machinery to make the motion uniform and steady; secondly, in a device to be applied to governors for the purpose of preventing the joints and valves from gumming or becoming rough and dirty with scale and oil, causing them to work stiff. This improvement consists in stepping the governor spindle in the valve stem in such manner as to produce a "bobbing" or saltatory motion which keeps all the parts moving continuously, and thereby always in good working condition.

Compound for Tanning Leather.—Louis Henry Dennis and Otho Richard Brown, Stafford Springs, Conn.—The object of this invention is to produce a tanning compound by which the leather can be completely and satisfactorily tanned without requiring the use of the ordinary bark extract now used. The invention consists in a combination of catechu, commonly known under the name of cutch, with common lye, in various proportions.

Submarine Telescopic Lantern.—Henry Thompson, Mobile, Ala.—This invention relates to improvements in submarine lanterns, the object of which is to provide a more useful lantern than any now employed for the same purpose. It consists in the application to a lantern of an improved means for supplying air for the support of combustion, and also for the protection of the lamp. Also of an improved means for supplying the lamp with gas from a reservoir above the surface of the water. Also in the application of a telescopic attachment for the better observance of the objects to be inspected.

Stereoscope.—John Francis Adams, New York city.—This invention relates to new and important improvements in instruments used in viewing stereoscopic or photographic pictures, and consists mainly in the use of magnets for receiving and holding the pictures in the proper position for being viewed.

Corn Planter and Cultivator.—Nathan Breed, Jeffersonville, Ind.—This invention has for its object to improve the construction of the improved corn planter, patented by the same inventor, April 6, 1869, and numbered 88,604, so as to make it more convenient, satisfactory, and effective in use.

Organ.—John R. Mortimer, New York city.—This invention has for its object to improve the construction of the action mechanism of organs, so that the palate may be operated to make the pipes speak by the pressure of the wind in the wind chest, thus greatly lessening the labor of playing the organ.

Door Rest.—Frederick W. Gammell, Spring Valley, Iowa.—This invention has for its object to support the door when closed, and also when swinging open and shut, so as to prevent the hinges from being worn and the door from sagging or warping, and which shall be simple in construction and easily applied to the door.

Potato Planter.—S. T. Godfrey, Seaville, N. J.—This invention has for its object to furnish a simple, convenient, and effective machine for planting potatoes, and which shall be so constructed and arranged as to drop a portion of some suitable fertilizer upon the seed before it is covered.

Spoke Tenoning Machine.—J. P. Crutchfield and C. T. Whitten, Longmire's Store, S. C.—This invention has for its object to furnish a simple and convenient machine, by means of which the spokes of wheels may have the tenons formed upon their outer ends easily and accurately.

Time Register for Velocipedes, etc.—Auguste Courvoisier, Denver, Colorado.—This invention has for its object to furnish an improved time register, for use in velocipede schools, livery stables, pleasure boats, billiard rooms, and other places where articles are rented by the hour, and which shall be so constructed and arranged that the party holding the key can easily know by reference to the register how long it has been in his possession.

Portable Fence.—Jacob Fox, Bucyrus, Ohio.—This invention has for its object to furnish an improved portable fence, which shall be so constructed and arranged that it may be easily erected, taken down, and moved from place to place, which will stand equally firm upon uneven or hilly or level ground, and which may be easily adjusted for use as a flood gate.

Railroad Car Truck.—Isaac Dripps, Fort Wayne, Ind.—This invention has for its object to furnish an improved railroad car truck, which shall be simple in construction, strong, and durable, cannot be knocked out of square, and will be sufficiently flexible to allow each side of the truck frame to accommodate itself to inequalities of track, thereby relieving the wheels from any undue shocks from bad joints, or other unevenness of the rails.

Water Wheel.—Edward M. Buckley, Amenia Union, N. Y.—This invention has for its object to furnish an improved water wheel, simple in construction and effective in operation, utilizing a larger per cent of the power of the water and running with a less head of water than the wheels constructed in the ordinary manner.

Chair.—Charles R. Long, Louisville, Ky.—This invention has for its object to furnish a simple, strong, durable, and cheap chair, which shall be so constructed and arranged that it may be transported by any conveyance in the "knock-down state," and to which the detached seats can be easily and conveniently attached when desired.

Coal Scuttle.—Frank L. Blair, Allegheny, Pa.—This invention has for its object to improve the construction of coal scuttles, hods, or buckets, so as to make them much more durable without materially increasing the cost of manufacture.

Grass and Grain Harvester.—J. F. Crawford, New York Mills, N. Y. This improvement relates to a new method of connecting a finger bar with the main frame of a harvester, with the the object of admitting of its being turned from one side of the machine to the other, so that it will mow equally well on either side of the machine.

Umbrella Lock.—Hiram Plumb, Frankford, Pa.—The object of this invention is to devise a simple lock by which the runner of an umbrella, when the same is closed can be locked to the handle, so that unauthorized persons may be prevented from using the umbrella. A simple key will readily open the umbrella and admit of its removal.

Wire Cradle.—L. Chevallier, Williamsburgh, N. Y., and R. Brass, Waterbury, Conn.—This invention relates to a new cradle, which is made of wire netting, for the purpose of being at all times well ventilated, light, strong, and not very costly. The wire basket, or body of the cradle, is placed upon a rocker frame which can be of suitable material.

Crystal Grinder.—J. S. Warner, Ogdensburgh, N. Y.—This invention relates to an improved chuck, to be used for grinding crystals for watches, either on the edges to reduce the diameters, or on the sides of the edges, and consists of a cup-shaped chuck, fitted to be attached to the lathe mandrel at the base, and provided with a face plate capable of being readily attached to the edge or the part resembling the top of the cup, or detached therefrom. The face of the crystal is ground against the side of this plate, using emery and oil, and holding it by first attaching it to a stick by sealing wax or otherwise, and when the face is sufficiently ground the plate is removed and the edge finished inside the cup-shaped part.

Lettering Block.—Edward J. Griffin, Hart's Falls, N. Y.—This invention relates to improvements in "blocks" used by marble cutters and others in laying out letters previous to cutting or painting them, and consists in the combination with such blocks of certain devices, by which to guide the pencil in marking all the different straight lines required, whether horizontal, vertical, or inclined, and adapted for pyramidal, rectangular, or other formed stones; also adapted for spacing and for adjustment readily to the different conditions required.

Barrel Stave Clamp.—Edmund Doremus, Rondout, N. Y.—This invention relates to a new device for holding barrel staves while the same are being cut for jointing, and has for its object to make the apparatus adjustable for barrels of various shapes and sizes.

Paper Engine.—Ebenezer Hawkins, Islip, N. Y.—This invention relates to certain improvements in the "beating engine" used for the treatment of "half stuff," and has for its object to provide more rapid and continuous action than could be obtained in the ordinary oval vat single cylinder The invention consists in the arrangement and use of an annular vat or cistern, together with two or more beating cylinders, all arranged so as to produce continuous and rapid action.

Loom.—Rudolph Webendorfer, New York city.—This invention has for its object to construct a positive motion loom in which the shuttle is not pushed ahead, and at the same time to do away with the belt, chain, or other constant connection with the shuttle.

Revolver-Cylinder.—B. R. Hill, Cranston, R. I.—The object of this invention is to so construct the cylinders of revolving fire-arms, that the same may be placed with either end against the stock, so that they can be fired from either end. The invention consists chiefly in providing ratchets or their equivalents on both ends of the cylinders, so that the rotating mechanism may act upon them at either end. The invention consists also in the arrangement of conical apertures through such cylinders, which are so distributed that the cylinder may at once contain two sets of cartridges, one set being put in from either end.

Safety Valve.—T. S. La France, Elmira, N. Y.—This invention relates to a new safety valve for steam boilers, and has for its object to adapt the valve to any desired degree of steam pressure, so that it will be opened by the steam whenever the same will reach the said degree of pressure, and that it can also be raised off the seat by a separate apparatus whenever steam is to be blown off.

Perambulator.—J. A. Crandall, Brooklyn, N. Y.—This invention has for its object to so improve the children's carriages, known as perampulators, that the same can be readily steered by the person pushing the same forward. Heretofore these vehicles had the front axles fixed or hung so that they could not be swung for steering, and the hubs of the front wheels were consequently chafed and injured, whenever curves were described. In order to overcome this inconvenience, the front axle is pivoted at the middle to the frame, and connected with the rear handle, so that by means of such rear handle the vehicle may be readily steered.

Apparatus for Producing Motive Power.—Wm. C. Stiles, Nevada City, Cal.—This invention consists in arranging a series of hydraulic bellows around the perimeter of a vertical wheel, and operating them by means of cams on the spindle upon which the wheel runs, so as to force the water from one bellows into another at certain points of the wheel's revolution. The weight of the water thus transferred from one point of the perimeter to another rotates the wheel and furnishes the motive power.

Hotel Communicator.—N. A. Patterson, Nashville, Tenn.—This invention relates to improvements in apparatus for use in hotels, business houses, steamboats, depots and the like, for communicating the wants of the occupants of the rooms to the clerk, at headquarters, in a way to save the time and labor now required, in answer to the bell calls from the rooms, of a journey to the rooms by the servants afterwards, to be told by the occupants what is wanted.

Bridge.—H. S. McDowell, Columbus, Texas.—The object of this invention is to provide certain improvements in the construction of bridges, whereby the parts thereof of wood may be readily removed for the substitution of others when decayed or broken, without interfering with the use of the bridge or weakening it. The invention also has for its object to provide certain improved arrangements of the parts calculated to simplify the construction and increase the efficiency of the same.

Official List of Patents.

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FOR THE WEEK ENDING JAN. 11, 1870.

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98,656.—Screw and Nut for Clamps, etc.—John Adt (assignor to the Judd Manufacturing Company), New Haven, Conn.

98,657.—Velocipede-Sleigh.—D. M. Anderson, Twinsburg, Ohio.

98,658.—Process of Cleaning Cotton Waste and other Fibers from Oil, etc.—H. M. Baker, Washington, D. C.

98,659.—Stovepipe Elbow.—P. J. Biesenbach, Rochester, N. Y.

98,660.—Retainer for Necktie.—J. B. Bishop, New Haven, Conn.

98,661.—Coal-Scuttle.—F. L. Blair, Allegheny, Pa.

98,662.—Reflector.—E. C. Blakeslee (assignor to the Benedict & Burnham Manufacturing Company), Waterbury, Conn.

98,663.—Corn Planter and Corn Cultivator.—Nathan Breed, Jeffersonville, Ind.

98,664.—Cane and Whip Combined.—C. L. Bushnell, Jefferson, Ohio.

98,665.—Turbine Water-Wheel.—H. A. Chadwick, Burnet, Texas. Antedated Dec. 29, 1869.

98,666.—Machinery for Cutting Barrel Heads.—Philander Chase, Peoria, Ill.

98,667.—Liquor Meter.—W. F. Class and Wilhelm Napp, Cleveland, Ohio.

98,668.—Ice Creeper.—W. B. Coates (assignor, for one half, to Joseph Leeds), Philadelphia, Pa.

98,669.—Time Register for Hiring Purposes.—Auguste Courvoisier, Denver, Colorado Territory.

98,670.—Children's Carriage.—J. A. Crandall, Brooklyn, N. Y.

98,671.—Harvester.—J. F. Crawford, New York Mills, N. Y.

98,672.—Railway Car Spring.—D. G. Daniels, Chicago, Ill.

98,673.—Mold for Casting Metals.—Henry Davies, Covington, Ky.

98,674.—Adjustable Attachment of Pump Barrels to their Bases.—J. W. Douglas (assignor to W. & B. Douglas), Middletown, Conn.

98,675.—Railway Car Truck.—Isaac Dripps, Fort Wayne, Ind.

98,676.—Anchor for Securing Cores in Molds.—Zabina Ellis, Philadelphia, Pa.

98,677.—Dust Ring for Watch Frames.—S. D. Engle, Hazleton, Pa.

98,678.—Programme Clock.—S. F. Estell, Richmond, Ind

98,679.—Wash Boiler.—Thomas Evans, Newark, N. J.

98,680.—Vapor Burner.—J. E. Finley, Memphis, Tenn.

98,681.—Railway Car Axle Coupling.—D. F. Fetter, New York city.

98,682.—Fence.—Jacob Fox, Bucyrus, Ohio.

98,683.—Railroad Pushing Jack.—Alfred Freeman, Peoria, Ill.

98,684.—Latch.—F. W. Gammell, Spring Valley, Iowa.

98,685.—Water Supply Pipe for Locomotives.—Frank Gerrard, Kansas City, Mo.
98,686.—Water Meter.—Othniel Gilmore, Raynham, Mass.
98,687.—Potato Planter.—S. T. Godfrey, Seaville, N. J.
98,688.—Globe Valve.—E. J. Gould, Milwaukee, Wis.
98,689.—Dropping Device for Harvesters.—O. C. Green, Dublin, Ind.
98,690.—Medical Compound.—H. H. Grigg, Philadelphia, Pa.
98,691.—Paper Engine.—Ebenezer Hawkins, Islip, N. Y.
98,692.—Rag Cutter.—J. W. Barbour, Winooski Falls, Vt. Antedated Dec. 29, 1869.
98,693.—Sickle Grinder.—A. B. Jones, Lowell, Wis.
98,694.—Window Button.—Morton Judd and A. D. Judd, New Haven, Conn.
98,695.—Saw Swage.—Simon Kinney, Bignellville, N. Y.
98,696.—Machine for Dressing Felloes.—Henry Kurtz, Washington, D. C.
98,697.—Safety Valve.—T. S. La France, Elmira, N. Y.
98,698.—Wrench.—A. B. Lipsey, New York city.
98,699.—Bridge.—H. S. McDowell, Columbus, Texas.
98,700.—Harvester.—Christina J. Miller, administratrix of Charles G. Miller, deceased, and Benj. Kersting, Springfield, Ohio, assignors, for one half, to G. W. Hoglin and S. D. Graffin.
98,701.—Car Axle Lubricator.—T. J. Mooers, Blossburg, Pa.
98,702.—Combined Press for Cheese, etc.—C. C. Musselman, Somerset, Pa.
98,703.—Churn.—J. P. Nichols, New Richmond, Ohio.
98,704.—Picker for Wool.—S. R. Parkhurst (assignor to E. R. Parkhurst and W. H. Holt), Mont Clair, N. J.
98,705.—Cotton Gin.—Stephen R. Parkhurst (assignor to Emily R. Parkhurst and Warren H. Holt), Mont Clair, N. J.
98,706.—Machine for Making Wire Heddles.—Peter Philip and Franklin Philip, Stockport, N. Y.
98,707.—Machine for Forging Nails for Horseshoes.—Silas S. Putnam, Dorchester, Mass.
98,708.—Corn Plow.—William B. Raper, Carthage, Ill.
98,709.—Spring Hinge.—David Renshaw, Brooklyn, N. Y., assignor to Edward P. Bray, Elizabeth, N. Y. Antedated January 8, 1870.
98,710.—Ruling Device.—E. H. Robinson, Janesville, Wis. Antedated January 3, 1870.
98,711.—Hay Fork.—Luman Rogers, Pittsburgh, Pa.
98,712.—Mode of Treating Vegetables to Obtain Fiber for Paper, etc.—Julius Augustus Rothe, Philadelphia, Pa.
98,713.—Sawing Machine.—Cyrus W. Saladee, Circleville, Ohio.
98,714.—Construction of Safes, Vaults, or Doors.—James Sargent, Rochester, N. Y.
98,715.—Device for Controlling Horses.—Norman P. Slade, Franklin Grove, Ill. Antedated January 5, 1870.
98,716.—Railway Car Brake.—Erastus Slater, Girard, Pa.
98,717.—Pipe Coupling.—Edmund Smith, Hamburg, Germany.
98,718.—Apparatus for Feeding Swine.—Nathan Stockwell, Ousquaga, N. Y. Antedated December 30, 1869.
98,719.—Bearing for Rudder Heads.—Retire C. Sturges, Boston, Mass.
98,720.—Adding Machine.—Edward Augustus Swain, New York city.
98,721.—Carriage Seat.—Samuel Toomey, Wilmot, Ohio.
98,722.—Horse Collar.—J. L. Van Wert, Tolland, Mass.
98,723.—Railway Car Coupling. — Jerome B. Vedder, Gloversville, N. Y.
98,724.—Cut-off Valve Gear.—Charles W. Wailey, New Orleans, La., assignor to New Orleans Pneumatic Propelling Company.
98,725.—Mode of Operating Valves in Steam Engines.—George I. Washburn, Worcester, Mass.
98,726.—Steam Generator.—Francis William Webb, Bolton, England.
98,727.—Composition Resembling Horn. — William M. Welling, New York city. Antedated January 1, 1870.
98,728.—Molders' Flask.—Alanson Wilcox, Green Island, N. Y.
98,729.—Sheet-iron Wash Tub and Buckets.—David Alcorn and John Walsh, New York city.
98,730.—Coffin.—Wm. G. Algeo, Allegheny, Pa.
98,731.—Car Brake.—Arthur M. Allen, New York city.
98,732.—Railroad Car Spring.—Timothy F. Allyn, Nyack, N. Y.
98,733.—Cap for Coffin Nails.—Stephen A. Barker (assignor to New England Toy Company), Providence, R. I.
98,734.—Force Pump.—William Beers and William Raynor, Milan, Ohio.
98,735.—Machine for Jointing Barrel Staves.—John B. Bell, Pittsburgh, Pa.
98,736.—Key Guard.—Max E. Berolzheimer, New York city.
98,737.—Harvester.—Cornelius R. Brinckerhoff, Rochester, N. Y.
98,738.—Circular Loom.—Caroline Bryant (administratrix of the estate of Mertoun C. Bryant, deceased), Lowell, assignor to Wm. J. Towne, Newtonville, Mass.
98,739.—Water Wheel.—Edward M. Buckley, Amenia Union, N. Y.
98,740.—Pump.—Wm. S. Carr, New York city.
98,741.—Scroll Case for Water Wheels.—John Chase, Paterson, N. J.
98,742.—Wire Cradle.—Louis Chevallier, Williamsburg, N. Y., and Robert Brass, Waterbury, Conn.
98,743.—Folding Chair.—Thomas Babbitt Comins, Jun., Lowell, Mass.
98,744.—Gas Burner.—Joseph W. Cremin, New York city.
98,745.—Papering Pins. — C. O. Crosby, New Haven, Conn.
98,746.—Machine for Tenoning Spokes. — James P. Crutchfield and C. T. Whitten, Longmire's Store, S. C.
98,747.—Pipe Tongs.—Jonathan Dunlap Davis, Fitchburg, Mass.
98,748.—Cartridge Box.—S. Allan Day, Bowling Green, Ohio.
98,749.—Faucet.—John H. Dorst, New Albany, Ind.
98,750.—Step for Street Car.—Albert A. Duly, New York city.
98,751.—Kitchen Table.—Ferdinand Ehrhardt, Washington, D. C.
98,752.—Sash-rope Guide.—Winslow W. Fifield, Medford, Mass.
98,753.—Oscillating Steam Valve.—I. W. Forbes, La Porte, Ind. Antedated Dec. 14, 1869.
98,754.—Steam Engine Valve Gear.—I. W. Forbes, La Porte, Ind. Antedated Dec. 14, 1869.
98,755.—Balance Slide Valve.—I. W. Forbes, La Porte, Ind. Antedated Dec. 14, 1869.
98,756.—Holder for Brooms and Mops.—H. L. Franklin and Eugene Clark, Nashua, N. H.
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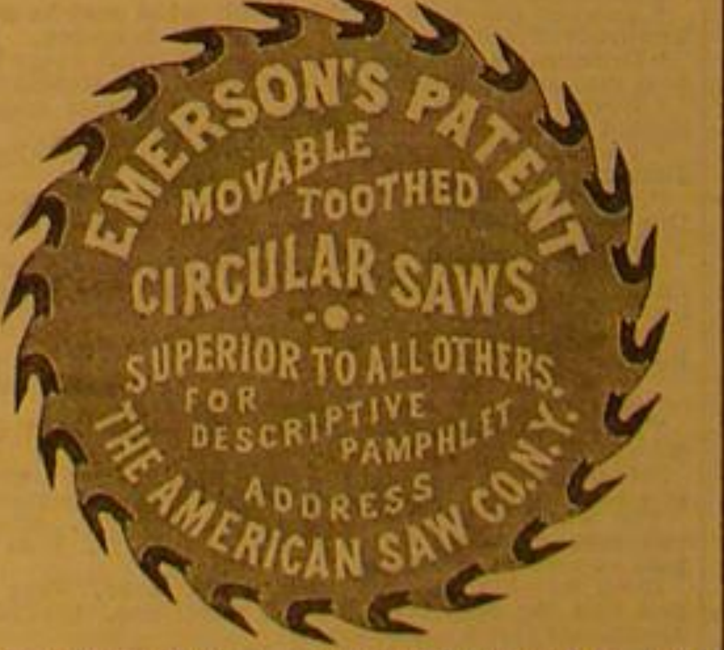

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