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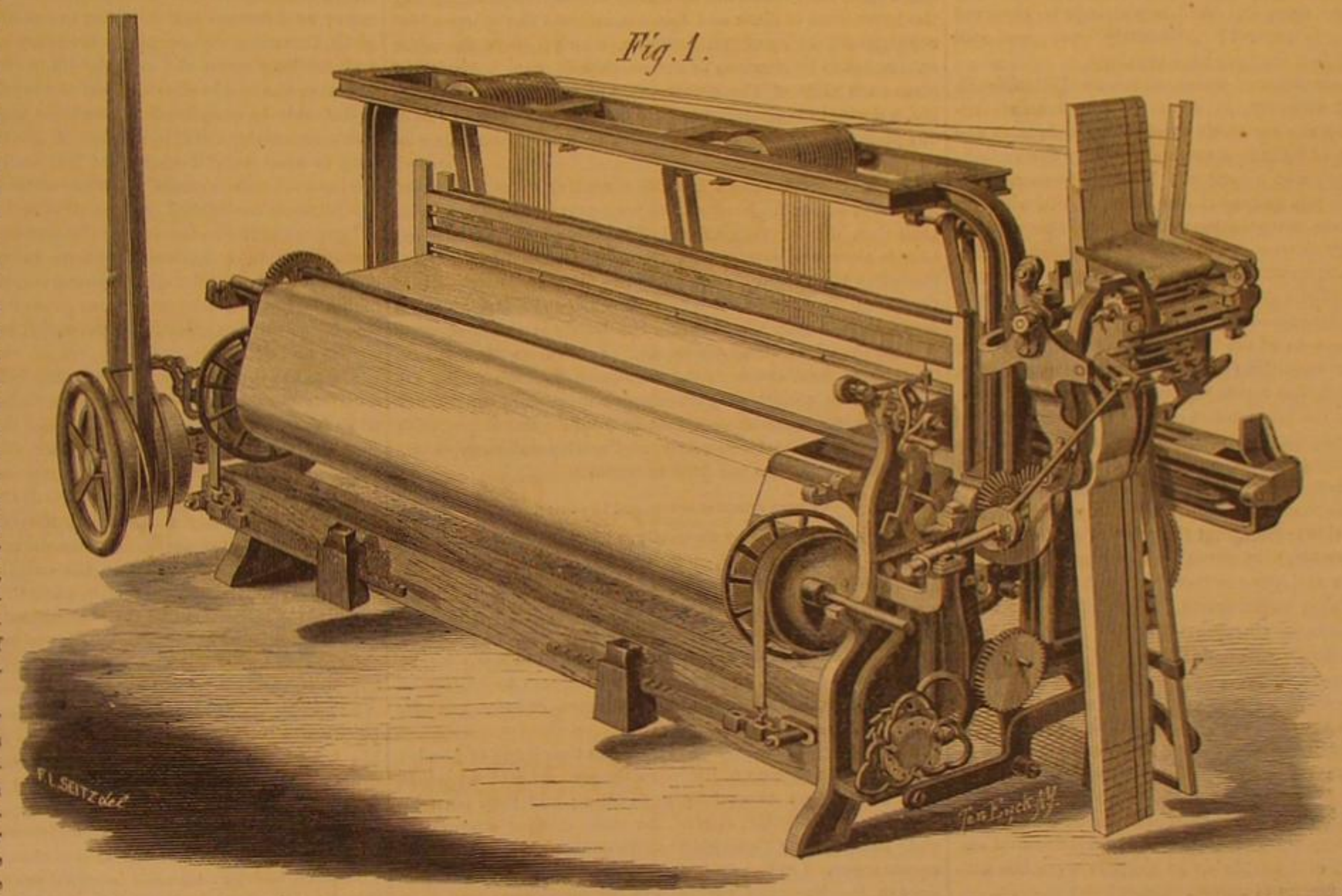
Improved Independent Shuttle-Motion Loom.

The loom and the millstone supply two positive necessities to the human race. Both are old devices, yet notwithstanding they have been so long in use, and though the best minds have for centuries studied them with a view to, if possible, render them more effective, there yet remain in both defects in their operation which inventive talent is seeking to remove.

So far as the loom is concerned the attempts at improvement seem to be in ,considerable degree, toward the modification of the shuttle movement. Of the latter class our readers will recollect we gave something more than a year since a notable example in the Lyall "Positive Motion" Loom. We this week present to our readers engravings and a description of still another shuttle movement, which has claims worthy the consideration of manufacturers, and which, so far as we are aware, employs a radically different principle from any of the looms in modern use.

Fig. 1.



STEVER'S INDEPENDENT SHUTTLE-MOTION LOOM.

It is claimed for this loom, that as the shuttle is driven by a motion entirely independent of any other movement in the loom, the shuttle moves at a uniform speed, no matter whether the speed of the loom be one pick or two hundred picks per minute. This claim is sustained in practice, as we can testify, having seen the loom in operation at the recent Fair of the American Institute recently held in this city, and at which this loom received the first premium. This peculiarity of the movement obviates the difficulties arising from irregular speeds, such as smashes, etc., and also secures greater uniformity in the texture woven than can be attained on other looms in which the movement of the shuttle is directly communicated through the agency of cams or other devices.

It requires skill and judgment, acquired by experience, to start the ordinary loom at precisely the right time to throw the shuttle through the web and avoid its lodgment therein. Inexperienced help are apt to err on this point, and cause damage from their awkwardness. With the loom under consideration there is not the slightest danger of such an accident, as the shuttle is always automatically thrown precisely at the right time. It follows that untrained hands may be set to attend it without risk of injury to the texture.

The construction, as will be seen on reference to the engravings, is extremely simple, and it is claimed to be at all times reliable and accurate in its action.

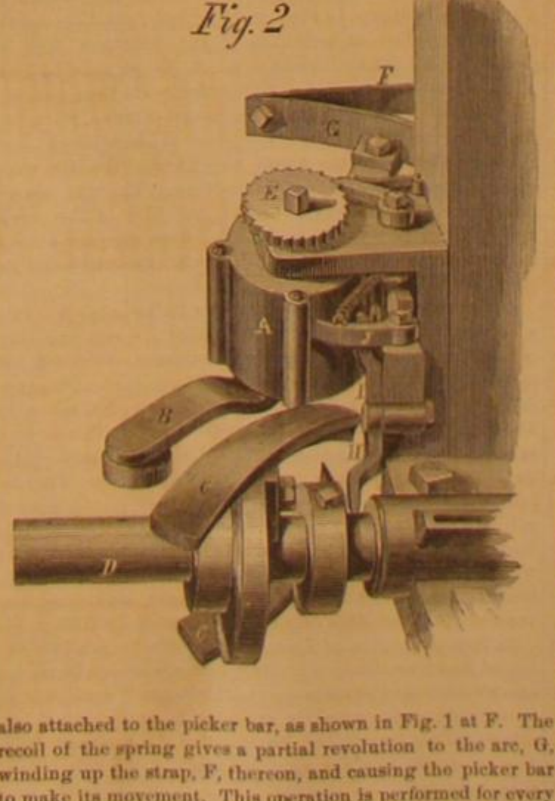
This shuttle movement can be applied to all looms now in use for weaving carpets, woolen, cotton, or silk textures, and it is claimed, costs even less than the ordinary pick movement for which it can be substituted in about two hours. It distributes the power more uniformly to the belt, allowing the lay to run with greater steadiness, and causing no zigzag motion in the travel of the shuttle along the race-board, which arises from the track and cam pick. The latter derives its power from the speed of the loom, often causing it to force the filling off from the bobbin when moving at high speed. In this movement, however, the power applied to driving the shuttle being always uniform, the difficulty specified is obviated, as the shuttle always passes through the web at the same speed, regardless of the speed of the loom.

It is claimed that it also takes less power to drive the looms owing to the superior steadiness of the movement. It is further claimed that an operator can run one third more looms with this shuttle movement attached than with the old movement, and that the expense of repairing is very largely reduced by its use.

Fig. 1 shows the loom in perspective, as seen from the back side; and Fig. 2 is a detail showing the principle of the shuttle movement.

The drum, A, Fig. 2, contains a strong, coiled, flat spring, which is partially wound up by means of an arm, B, having at its extremity a friction roller. The arm, B, derives its motion from cams, C, attached to the shaft, D. The power thus stored up in the spring is retained by a pawl, J, which engages with a projection on A until such time as it is desired to use it in driving the shuttle, when the pawl, J, is released from its engagement with the projection on A by the lever, I; the latter being actuated by a small cam on the shaft, D. Another arm extending from the top of the drum, A, carries at its extremity an arc, G, to which a strap, F, is attached, which strap is

Fig. 2



also attached to the picker bar, as shown in Fig. 1 at F. The recoil of the spring gives a partial revolution to the arc, G, winding up the strap, F, thereon, and causing the picker bar to make its movement. This operation is performed for every throw of the shuttle, the proper tension of the spring being regulated by winding it up on the stem, E, where it is held by a ratchet and pawl, as distinctly shown in Fig. 2

This description comprises the general features and operation of this simple movement, and will explain how, at either high or low speed of the loom, the shuttle speed will always be uniform, and its throw always take place at the proper time to pass clear of the web.

Patented, January 18, 1870, by Jeremiah Stever, whom address for further particulars at Waterbury, Conn.

How to Save Peach Trees.

A discovery of no small moment, says the Philadelphia *Ledger*, in the interest of agriculture, has been made by Dr. Geo. B. Wood, and communicated by him to the American Philosophical Society, of which he is president.

Peach trees in this vicinity, after producing a few crops, not only cease bearing, but perish in a short time; whereas, the natural life is fifty or sixty years, or more. The cause of this defective power of growth is believed by Dr. Wood to be owing to a deficiency of potash in the soil, and he assures us, that if this alkali be supplied to the tree so that it shall recall the small roots and be absorbed, the fruit-bearing power is restored, and the fruit itself, prematurely perishing, is revived.

Believing, with most persons, that the cause of the decay lay in worms at the root of the peach tree, he put in operation a plan which he had seen his father perform more than fifty years before; viz., of digging around the base of the stem a hole four or five inches deep, scraping away all the worms that could be found burrowing at the junction of the stem and root, and filling the hole thus made with wood ashes from the fire, which, of course, retained all their potash. This was done in the autumn of 1868; and with a result in the following spring at which he himself was astonished. The trees appeared to have been restored to all their early vigor and freshness; they put forth bright green leaves, blossoming copiously, and bore a crop of fruit such as they had never borne before, many of the branches breaking down under the load of peaches.

Dr. Wood, in reflecting on these results, noticed that several of the peach-trees had no worms, and came to the conclusion that we must look for an explanation to some other cause than the destruction of a few worms; and this cause he believed to be the ashes, the potash of which, being dissolved by the rain, had descended along the roots to the rootlets, and presented to them the very food for the want of which they were dying. Decaying apple trees bearing stinted and inedible fruit, have been revived by a similar process, and with like results. Now is the time to adopt the experiment.

SINGER SEWING MACHINE PATENT.—The patent of the Singer sewing machine expires in a few days, and the Commissioner of Patents, after a full hearing of the reasons for renewing the patent, has decided adversely. The refusal to renew the patent does not make it unreservedly available to the public, inasmuch as there are other patents taken out upon improvements connected with the original patent which are still in force. Strong effort was made, however, by the owners of the patent to have it renewed, but the Commissioner inclined to the opinion that all these patents should, as they expire, be thrown open to the public.

ALL the mills in Maine have been started again by the fall rains. Many of them had been stopped a long time for want of water, and the losses to owners and operatives are heavy.

SCIENTIFIC USE OF THE IMAGINATION.

John Tyndall, LL.D., F.R.S., before the British Association.

[Concluded from page 320.]

I trust, Mr. President, that you—whom untoward circumstances have made a biologist, but who still keep alive your sympathy with that class of inquiries which nature intended you to pursue and adorn—will excuse me to your brethren if I say that some of them seem to form an inadequate estimate of the distance which separates the microscopic from the molecular limit, and that, as a consequence, they sometimes employ a phraseology which is calculated to mislead.

When, for example, the contents of a cell are described as perfectly homogeneous, as absolutely structureless, because the microscope fails to distinguish any structure, then I think the microscope begins to play a mischievous part. A little consideration will make it plain to all of you that the microscope can have no voice in the real question of germ structure. Distilled water is more perfectly homogeneous than the contents of any possible organic germ. What causes the liquid to cease contracting at 39° F., and to grow bigger until it freezes? It is a structural process of which the microscope can take no note, nor is it likely to do so by any conceivable extension of its powers. Place this distilled water in the field of an electro-magnet, and bring a microscope to bear upon it. Will any change be observed when the magnet is excited? Absolutely none; and still profound and complex changes have occurred.

First of all, the particles of water are rendered diamagnetically polar; and secondly, in virtue of the structure impressed upon it by the magnetic strain of its molecules, the liquid twists a ray of light in a fashion perfectly determinate both as to quantity and direction. It would be immensely interesting to both you and me if one here present, who has brought his brilliant imagination to bear upon this subject, could make us see as he sees the entangled molecular processes involved in the rotation of the plane of polarization by magnetic force. While dealing with this question he lived in a world of matter and of motion to which the microscope has no passport, and in which it can offer no aid. The cases in which similar conditions hold are simply numberless. Have the diamond, the amethyst, and the countless other crystals formed in the laboratories of nature and of man no structure? Assuredly they have, but what can the microscope make of it? Nothing. It cannot be too distinctly borne in mind that between the microscopic limit and the true molecular limit there is room for infinite permutations and combinations. It is in this region that the poles of the atoms are arranged, that tendency is given to their powers, so that when these poles and powers have free action and proper stimulus in a suitable environment, they determine first the germ and afterwards the complete organism. This first marshaling of the atoms on which all subsequent action depends baffles a keener power than that of the microscope. Through pure excess of complexity, and long before observation can have any voice in the matter, the most highly trained intellect, the most refined and disciplined imagination, retires in bewilderment from the contemplation of the problem. We are struck dumb by an astonishment which no microscope can relieve, doubting not only the power of our instrument, but even whether we ourselves possess the intellectual elements which will ever enable us to grapple with the ultimate structural energies of nature.

But the speculative faculty, of which imagination forms so large a part, will nevertheless wander into regions where the hope of certainty would seem to be entirely shut out. We think that though the detailed analysis may be, and may ever remain, beyond us, general notions may be attainable. At all events, it is plain that beyond the present outposts of microscopic inquiry lies an immense field for the exercise of the imagination. It is only, however, the privileged spirits who know how to use their liberty without abusing it, who are able to surround imagination by the firm frontiers of reason, that are likely to work with any profit here. But freedom to them is of such paramount importance that, for the sake of securing it, a good deal of wildness on the part of weaker brethren may be overlooked. In more senses than one Mr. Darwin has drawn heavily upon the scientific tolerance of his age. He has drawn heavily upon *time* in his development of species, and he has drawn adventurously upon *matter* in his theory of pangenesis. According to this theory, a germ already microscopic is a world of minor germs. Not only is the organism as a whole wrapped up in the germ, but every organ of the organism has there its special seed.

This, I say, is an adventurous draft on the power of matter to divide itself and distribute its forces. But, unless we are perfectly sure that he is overstepping the bounds of reason, that he is unwittingly sinning against observed fact or demonstrated law—for a mind like that of Darwin can never sin wittingly against either fact or law—we ought, I think, to be cautious in limiting his intellectual horizon. If there be the least doubt in the matter, it ought to be given in favor of the freedom of such a mind. To it a vast possibility is in itself a dynamic power, though the possibility may never be drawn upon.

It gives me pleasure to think that the facts and reasonings of this discourse tend rather towards the justification of Mr. Darwin than towards his condemnation, that they tend rather to augment than to diminish the cubic space demanded by this soaring speculator; for they seem to show the perfect competence of matter and force, as regards divisibility and distribution, to bear the heaviest strain that he has hitherto imposed upon them.

In the case of Mr. Darwin, observation, imagination, and reason combined have run back with wonderful sagacity and success over a certain length of the line of biological succession. Guided by analogy, in his "Origin of Species" he placed as the root of life a primordial germ, from which he conceived the amazing richness and variety of the life that now is upon the earth's surface might be deduced. If this were true it would not be final. The human imagination would infallibly look behind the germ, and inquire into the history of its genesis.

Certainty is here hopeless, but the materials for an opinion may be attainable. In this dim twilight of speculation the inquirer welcomes every gleam, and seeks to augment his light by indirect incidences. He studies the methods of nature in the ages and the worlds within his reach, in order to shape the course of imagination in the antecedent ages and worlds. And though the certainty possessed by experimental inquiry is here shut out, the imagination is not left entirely without guidance. From the examination of the solar system, Kant and Laplace came to the conclusion that its various bodies once formed parts of the same undislocated mass; that matter in a nebulous form preceded matter in a dense form; that as the ages rolled away heat was wasted, condensation followed, planets were detached, and that finally the chief portion of the fiery cloud reached, by self-compression, the magnitude and density of our sun. The earth itself offers evidence of a fiery origin; and in our day the hypothesis of Kant and Laplace receives the independent countenance of spectrum analysis, which proves the same substances to be common to the earth and sun. Accepting some such view of the construction of our system as probable, a desire immediately arises to connect the present life of our planet with the past. We wish to know something of our remotest ancestry.

On its first detachment from the central mass, life, as we understand it, could hardly have been present on the earth. How then did it come there? The thing to be encouraged here is a reverent freedom—a freedom preceded by the hard discipline which checks licentiousness in speculation—while the thing to be repressed, both in science and out of it, is dogmatism. And here I am in the hands of the meeting—willing to end, but ready to go on. I have no right to intrude upon you, unasked, the unformed notions which are floating like clouds or gathering to more solid consistency in the modern speculative scientific mind. But if you wish me to speak plainly, honestly, and undisputatiously, I am willing to do so. On the present occasion

You are ordained to call, and I to come.

Two views, then, offer themselves to us. Life was present potentially in matter when in the nebulous form, and was unfolded from it by the way of natural development, or it is a principle inserted into matter at a later date. With regard to the question of time, the views of men have changed remarkably in our day and generation; and I must say as regards courage also, and a manful willingness to engage in open contest, with fair weapons, a great change has also occurred.

The clergy of England—at all events the clergy of London—have nerve enough to listen to the strongest views which any one amongst us would care to utter; and they invite, if they do not challenge, men of the most decided opinions to state and stand by those opinions in open court. No theory upsets them. Let the most destructive hypothesis be stated only in the language current among gentlemen, and they look it in the face. They forego alike the thunders of heaven and the terrors of the other place, smiting the theory, if they do not like it, with honest secular strength. In fact, the greatest cowards of the present day are not to be found among the clergy, but within the pale of science itself.

Two or three years ago in an ancient London college—a clerical institution—I heard a very remarkable lecture by a very remarkable man. Three or four hundred clergymen were present at the lecture. The orator began with the civilization of Egypt in the time of Joseph; pointing out that the very perfect organization of the kingdom, and the possession of chariots, in one of which Joseph rode, indicated a long antecedent period of civilization. He then passed on to the mud of the Nile, its rate of augmentation, its present thickness, and the remains of human handiwork found therein; thence to the rocks which bound the Nile valley, and which team with organic remains. Thus in his own clear and admirable way he caused the idea of the world's age to expand itself indefinitely before the mind of his audience, and he contrasted this with the age usually assigned to the world.

During his discourse he seemed to be swimming against a stream; he manifestly thought that he was opposing a general conviction. He expected resistance; so did I. But it was all a mistake; there was no adverse current, no opposing conviction, no resistance, merely here and there a half humorous but unsuccessful attempt to entangle him in his talk. The meeting agreed with all that had been said regarding the antiquity of the earth and of its life. They had, indeed, known it all long ago, and they good-humoredly rallied the lecturer for coming amongst them with so stale a story. It was quite plain that this large body of clergymen, who were, I should say, the finest samples of their class, had entirely given up the ancient landmarks, and transported the conception of life's origin to an indefinitely distant past.

In fact, clergymen, if I might be allowed a parenthesis to say so, have as strong a leaning towards scientific truth as other men, only the resistance to this bent—a resistance due to education—is generally stronger in their case than in others. They do not lack the positive element, namely, the love of truth, but the negative element, the fear of error, preponderates.

The strength of an electric current is determined by two things—the electro-motive force, and the resistance that force has to overcome. A fraction, with the former as numerator and the latter as denominator, expresses the current-strength. The "current-strength" of the clergy towards science may also be expressed by making the positive element just referred to the numerator, and the negative one the denominator of a fraction. The numerator is not zero nor is it even small, but the denominator is large; and hence the current strength is such as we find it to be. Slowness of conception, even open hostility, may be thus accounted for. They are for the most part errors of judgment, and not sins against truth. To most of us it may appear very simple, but to a few of us it appears transcendently wonderful, that in all classes of society truth should have this power and fascination. From the countless modifications that life has undergone through natural selection and the integration of infinitesimal steps, emerges finally the grand result that the strength of truth is greater than the strength of error, and that we have only to make the truth clear to the world to gain the world to our side. Probably no one wonders more at this result than the propounder of the law of natural selection himself. Reverting to an old acquaintance of ours, it would seem, on purely scientific grounds, as if a Veracity were at the heart of things; as if, after ages of latent working, it had finally unfolded itself in the life of man; as if it were still destined to unfold itself, growing in girth, throwing out stronger branches and thicker leaves, and tending more and more by its overshadowing presence to starve the weeds of error from the intellectual soil.

But this is parenthetical; and the gist of our present inquiry regarding the introduction of life is this: Does it belong to what we call matter, or is it an independent principle inserted into matter at some suitable epoch—say when the physical conditions become such as to permit of the development of life? Let us put the question with all the reverence due to a faith and culture in which we all were cradled—a faith and culture, moreover, which are the undeniable historic antecedents of our present enlightenment. I say, let us put the question reverently, but let us also put it clearly and definitely.

There are the strongest grounds for believing that during a certain period of its history the earth was not, nor was it fit to be, the theater of life. Whether this was ever a nebulous period, or merely a molten period, does not much matter; and if we revert to the nebulous condition, it is because the probabilities are really on its side. Our question is this: Did creative energy pause until the nebulous matter had condensed, until the earth had been detached, until the solar fire had so far withdrawn from the earth's vicinity as to permit a crust to gather round the planet? Did it wait until the air was isolated, until the seas were formed, until evaporation, condensation, and the descent of rain had begun, until the eroding forces of the atmosphere had weathered and decomposed the molten rocks so as to form soils, until the sun's rays had become so tempered by distance and by waste as to be chemically fit for the decompositions necessary to vegetable life? Having waited through those æons until the proper conditions had set in, did it send the fiat forth, "Let life be!"? These questions define a hypothesis not without its difficulties, but the dignity of which was demonstrated by the nobleness of the men whom it sustained.

Modern scientific thought is called upon to decide between this hypothesis and another; and public thought generally will afterwards be called upon to do the same. You may, however, rest secure in the belief that the hypothesis just sketched can never be stormed, and that it is sure, if it yield at all, to yield to a prolonged siege. To gain new territory modern argument requires more time than modern arms, though both of them move with greater rapidity than of yore.

But however the convictions of individuals here and there may be influenced, the process must be slow and secular which commends the rival hypothesis of natural evolution to the public mind. For what are the core and essence of this hypothesis? Strip it naked and you stand face to face with the notion that not alone the more ignoble forms of animalcular or animal life, not alone the nobler forms of the horse and lion, not alone the exquisite and wonderful mechanism of the human body, but that the human mind itself—emotion, intellect, will, and all their phenomena—were once latent in a fiery cloud. Surely the mere statement of such a notion is more than a refutation. But the hypothesis would probably go even further than this. Many who hold it would probably assent to the position that at the present moment all our philosophy, all our poetry, all our science, and all our art—Plato, Shakespeare, Newton, and Raphael—are potential in the fires of the sun.

We long to learn something of our origin. If the evolution hypothesis be correct, even this unsatisfied yearning must have come to us across the ages which separate the unconscious primeval mist from the consciousness of to-day. I do not think that any holder of the evolution hypothesis would say that I overstate it or overstrain it in any way. I merely strip it of all vagueness, and bring before you unclothed and unvarnished the notions by which it must stand or fall.

Surely these notions represent an absurdity too monstrous to be entertained by any sane mind. Let us, however, give them fair play. Let us steady ourselves in front of the hypothesis, and, dismissing all terror and excitement from our minds, let us look firmly into it with the hard, sharp eye of intellect alone. Why are these notions absurd, and why should sanity reject them? The law of relativity, of which we have previously spoken, may find its application here. These evolution notions are absurd, monstrous, and fit only for the intellectual gibbet in relation to the ideas concerning matter which were drilled into us when young. Spirit and matter have ever been presented to us in the rudest contrast, the one as all noble, the other as all vile. But is this correct? Does it represent what our mightiest spiritual teacher would call the eternal fact of the universe? Upon the answer to this question all depends.

Supposing, instead of having the foregoing antithesis of spirit and matter presented to our youthful minds, we had been taught to regard them as equally worthy and equally wonderful; to consider them, in fact, as two opposite faces of the self-same mystery. Supposing that in youth we had been impregnated with the notion of the poet Goethe, instead of the notion of the poet Young, looking at matter, not as brute matter, but as "the living garment of God;" do you not think that under these altered circumstances the law of relativity might have had an outcome different from its present one? Is it not probable that our repugnance to the idea of primeval union between spirit and matter might be considerably abated? Without this total revolution of the notions now prevalent the evolution hypothesis must stand condemned; but in many profoundly thoughtful minds such a revolution has already taken place. They degrade neither member of the mysterious duality referred to; but they exalt one of them from its abasement, and repeal the divorce hitherto existing between both. In substance, if not in words, their position as regards spirit and matter is: "What God hath joined together let not man put asunder."

I have thus led you to the outer rim of speculative science, for beyond the nebulæ scientific thought has never ventured hitherto, and have tried to state that which I considered ought, in fairness, to be outspoken. I do not think this evolution hypothesis is to be flouted away contemptuously; I do not think it is to be denounced as wicked. It is to be brought before the bar of disciplined reason, and there justified or condemned. Let us hearken to those who wisely support it, and to those who wisely oppose it; and let us tolerate those, and they are many, who foolishly try to do either of these things.

The only thing out of place in the discussion is dogmatism on either side. Fear not the evolution hypothesis. Steady yourselves in its presence upon that faith in the ultimate triumph of truth which was expressed by old Gamaliel when he said: "If it be of God, ye cannot overthrow it; if it be of man, it will come to nought." Under the fierce light of scientific inquiry this hypothesis is sure to be dissipated if it possess not a core of truth. Trust me, its existence as an hypothesis in the mind is quite compatible with the simultaneous existence of all those virtues to which the term Christian has been applied. It does not solve—it does not profess to solve—the ultimate mystery of this universe. It leaves in fact that mystery untouched. At bottom it does nothing more than "transport the conception of life's origin to an indefinitely distant past."

For, granting the nebula and its potential life, the question, whence came they? would still remain to baffle and bewilder us. And with regard to the ages of forgetfulness which lie between the unconscious life of the nebula and the conscious life of the earth, it is but an extension of that forgetfulness which preceded the birth of us all. Those who hold the doctrine of evolution are by no means ignorant of the uncertainty of their data, and they yield no more to it than a provisional assent. They regard the nebular hypothesis as probable, and in the utter absence of any evidence to prove the act illegal, they extend the method of nature from the present into the past. Here the observed uniformity of nature is their only guide. Within the long range of physical inquiry they have never discerned in nature the insertion of caprice. Throughout this range the laws of physical and intellectual continuity have run side by side. Having thus determined the elements of their curve in this world of observation and experiment, they prolong that curve into an antecedent world, and accept as probable the unbroken sequence of development from the nebula to the present time.

You never hear the really philosophical defenders of the doctrine of uniformity speaking of *impossibilities* in nature. They never say, what they are constantly charged with saying, that it is impossible for the builder of the universe to alter His work. Their business is not with the possible, but the actual; not with a world which *might* be, but with a world which *is*. This they explore with a courage not unmixed with reverence, and according to methods which, like the quality of a tree, are tested by their fruits. They have but one desire—to know the truth. They have but one fear—to believe a lie. And if they know the strength of science, and rely upon it with unswerving trust, they also know the limits beyond which science ceases to be strong. They best know that questions offer themselves to thought which science, as now prosecuted, has not even the tendency to solve. They keep such questions open, and will not tolerate any unlawful limitation of the horizon of their souls. They have as little fellowship with the atheist who says there is no God as with the theist who professes to know the mind of God.

"Two things," said Immanuel Kant, "fill me with awe: the starry heavens and the sense of moral responsibility in man." And in his hours of health and strength and sanity, when the stroke of action has ceased and the pause of reflection has set in, the scientific investigator finds himself overshadowed by the same awe. Breaking contact with the hampering details of earth, it associates him with a power which gives fulness and tone to his existence, but which he can neither analyze nor comprehend.

COL. FISHER, Ex-Commissioner of Patents, has returned to the practice of law at Cincinatti.

NOTES AND MAXIMS ABOUT HEALTH.

BY DR. DIO LEWIS.

Gluttony counts one hundred victims where drunkenness counts one.

To regulate health we must regulate diet.

Certain kinds of food feed the fat and leave the muscles and brain to starve. Certain other foods feed the muscles exclusively, and certain others the brain. A large part of the food of Americans is composed of white flour, sugar, and butter. People who try to live upon such stuff gradually starve to death.

There is a gentleman in Boston who has amassed an immense fortune. His carriage is the finest in the neighborhood, and he wastes money lavishly; but his face is the picture of despair. Life is a torture to him, because he is nervous and dyspeptic. Half the rich men and women belong to the category of the miserable; they cannot digest their dinners.

The common notion that our health and life depend upon a mysterious Providence is downright infidelity. A child goes out of a hot room with naked arms and legs in pursuit of its daily supply of poisoned candies, and then dies of croup. Is that a mysterious Providence? If a man indulges himself until he gets the gout, and the disease attacks his heart and kills him, is his death a mystery?

The reason that the American people are such dyspeptics is, that they eat and drink so much, and eat and drink so fast.

The teeth will not decay if they are kept clean. A toothbrush is a good thing, but one good toothpick is worth an armful of toothbrushes. There is a gentleman now living in New York city who has three beautiful front teeth which he purchased from the mouth of an Irishman. His own teeth were removed and instantly Patrick's were transferred.

The process of digestion begins in the mouth and ends in the lungs. The mouth grinds the food; the lungs supply the oxygen which converts the products of the food into pure and useful blood.

Dr. Lewis once attended the lecture of a Thomsonian doctor who explained the use of mercury as follows:

"And now do you know how marcury produces the rheumatiz? I'll tell you exactly how marcury produces the rheumatiz. You see marcury has a great many sharp pints, and them sharp pints go straight in the flesh, and when the muscles rub over them sharp pints it scratches, and that's the rheumatiz."

Many people imagine themselves afflicted with serious diseases when they are only suffering from dyspepsia. A dyspeptic patient always despairs; a consumptive always hopes.

John Abernethy was the greatest man the medical profession has produced in modern times. Perhaps no other man has contributed so much to temperance in eating as he.

To make the best bread that can be made of wheat, obtain good wheat and grind it without bolting; mix it with cold water until it is as thick as can be well beaten with a spoon; after it is thoroughly beaten down, put it into a large iron pan, composed of many little ones, which must first be made hot; put it then quickly into a hot oven, and bake it rapidly as possible.

Indian corn makes excellent nourishment. It contains a large amount of oil, has remarkable fattening qualities, and is likewise remarkable as a heat producer. Rice keeps its consumers fat, but it lacks the elements which feed the muscles and brain.

Potatoes, both Irish and sweet, are very poor food for brain and muscle.

Of meats, the best for heat and fat are pork, mutton, lamb, beef, and veal; for muscle, beef, veal, mutton, lamb, and pork; for brain and nerve, beef, veal, mutton, lamb, and pork.

In cold weather, fat meat, butter, and the like will keep the body warm; and in warm weather milk, eggs, bran bread, and summer vegetables will keep it cool.

There is no difficulty in a poor man's having meat for his family every day. Take, for example, what is called a shank of beef. The very best can be bought for a fraction of what the dearest parts cost. A single pound cooked in a stew with dry bits of bread will make a meal for an entire family.

The Greek and Roman armies ate but once a day.

The common impression that tomatoes are the healthiest of all vegetables is a mistake. If eaten at all, it should be with great moderation, and never raw. Tomatoes have sometimes produced salivation. Dr. Lewis knew a young woman who had lost all her teeth from excessive eating of tomatoes.

Pies and cakes are poisonous.

To healthy persons mineral waters are not wholesome.

Corsets are most injurious to digestion. Their use finally results in an immense and very ugly protuberance of the abdomen.

Light and sunshine are indispensable to health, and great curative agents in disease.

Those who suffer from heartburn, should avoid soups, drink nothing at meals, say "No, thank you," to pies and cakes, and go without supper.

If you wish to live to eighty-five in the full enjoyment of all your faculties, go to bed at 9 o'clock, and eat twice a day a moderate quantity of plain food.

The native American requires more sleep than the average European. Nine or ten hours' sleep in a single night is very beneficial. Thin Yankees should go to bed at nine and rise between five and six.

In a girl's school which Dr. Lewis conducted with great success at Lexington, Massachusetts, the health rules were as follows:

"To go to bed at half past eight every evening, to rise early in the morning and take a walk, to walk a second time during the day, to eat only twice a day plain nourishing food, to wear no corsets, to exercise twice a day half an hour in gymnastics, and to dance an hour for about three times a week. The gymnastic exercises proved invaluable; but the nine hours in bed were still more so."

The word biliousness is a sort of respectful cover for piggishness. People are not bilious who eat what they should.

Weakness of the stomach is a protection against other maladies. So dyspepsia is the safety valve, and may be spoken of as one of the sources of longevity.

People who are fat can easily be reduced by reducing their food and giving them more exercise. Such persons must not sleep too much. Long sleep fattens. Thin people, on the contrary, should sleep a great deal.

Military Chemistry.

There is one department in the British service which has been of the most essential service ever since its establishment, viz., the Department of Chemistry. It was, says the *Public Ledger*, formed during the Crimean war, at the suggestion of the illustrious Faraday, to check the frauds of the contractors for army supplies at that time. The Minister of War allotted to it a large space in Woolwich Arsenal, fitted up with laboratories, provided with every species of apparatus, with fine balances for estimating results, with the most powerful microscopes, with machinery for analyzing gases, with photographic studios, etc., etc., all of which were placed under the control of a distinguished professor of chemistry and half a dozen well-skilled practical assistants, whose time is fully employed in a variety of matters, and just now, especially, in testing metal for the manufacture of guns and projectiles, in examining the elements of gunpowder, in analyzing the stores and food of the soldier, and in many other experiments of a similar kind.

It is somewhat surprising that such an establishment was not founded long ago, familiar as all the world is with the tricks of contractors in times of public necessity, as during a war. It is a melancholy fact that there should exist a class of men who have no scruple in sacrificing, not merely the health and lives of their fellow men, but the very safety and existence of their country, in order that they may make money out of its necessities.

We need only turn our eyes to France at the present moment for a sample of what these men are capable of. What French contractors have done lately, English contractors did during the Crimean war, and American contractors did during our civil war. The guilt seems to be characteristic of the class generally, and not of any one nation in particular. But the good effects of such an institution as the British Military Department of Chemistry were shown in the recent Abyssinian war, when out of a large number of articles supplied to the troops none were complained of, for they had previously been tested by the Department.

The rule now is, that when tenders are sent in for supplying stores to the army, the contractors are bound to forward, at the same time, specimens of the material they intend to supply. These samples are carefully tested in the chemical department, and the firm that offers the most suitable articles at the lowest prices receives an order to supply the goods. Subsequently, when these are sent in, a further examination takes place to ascertain whether they are equal to the samples first submitted, and only if this proves to be the case are the stores accepted and paid for.

The number and variety of the articles operated upon is extraordinary. Almost all the belongings of the soldier pass in one way or other under the eyes of these chemical detectives. The cloth of his coat, the thread with which it is sewn, the gold lace, the accoutrements, are all tested, and the buttons he wears must be covered with a film of metal sufficiently strong to withstand the action of the acid which the chemist applies to them. The bread, milk, flour, biscuit, preserved meat, vegetables, fruit, etc., of his rations are periodically sent to Woolwich to be tested, and it is said that the system has been so rigorously applied throughout the service that, even at remote stations, flagrant cases of fraud are now rare.

Considerable pains are taken to provide wholesome drinking water in barracks, and a very large portion of the work of the chemical department is devoted to this point. Specimens of the water used at the military stations abroad as well as at home are forwarded to the arsenal for analysis, and reports as to its qualities, together with advice to the commanding officers, are sent to the different stations. Barrack and equipment stores are not forgotten. Soap, candles, oils, coal, coke, emery dust, varnish, blacking, paper hangings, and all kinds of paint are analyzed carefully in order to prevent the injurious action of arsenic, lead, and other poisonous metals. Soap, in particular, is always severely tested, by reason of the facility with which it may be adulterated, and because it is used in such large quantities.

Very great vigilance is also exercised over camp equipage; the making of the canvas uninflammable and unfavorable to the formation of mildew, the perfecting of the india-rubber coating for the ground sheets on which the soldier spreads his blankets, and other like cares also occupy the department. The services it has rendered are immense. The condition of the modern soldier is very different from that of the soldier of even half a century ago, when he was looked upon as little better than "food for powder."

THE war is effecting the tobacco trade of this country adversely, France and Germany being the largest consumers of Europe, and with England requiring, during the year ended June 30, 1870, 186,000,000 pounds of leaf tobacco, 2,064,000 cigars, and 20,181 pounds of snuff.

STEAM RAILROAD FERRIES BETWEEN ENGLAND AND FRANCE.

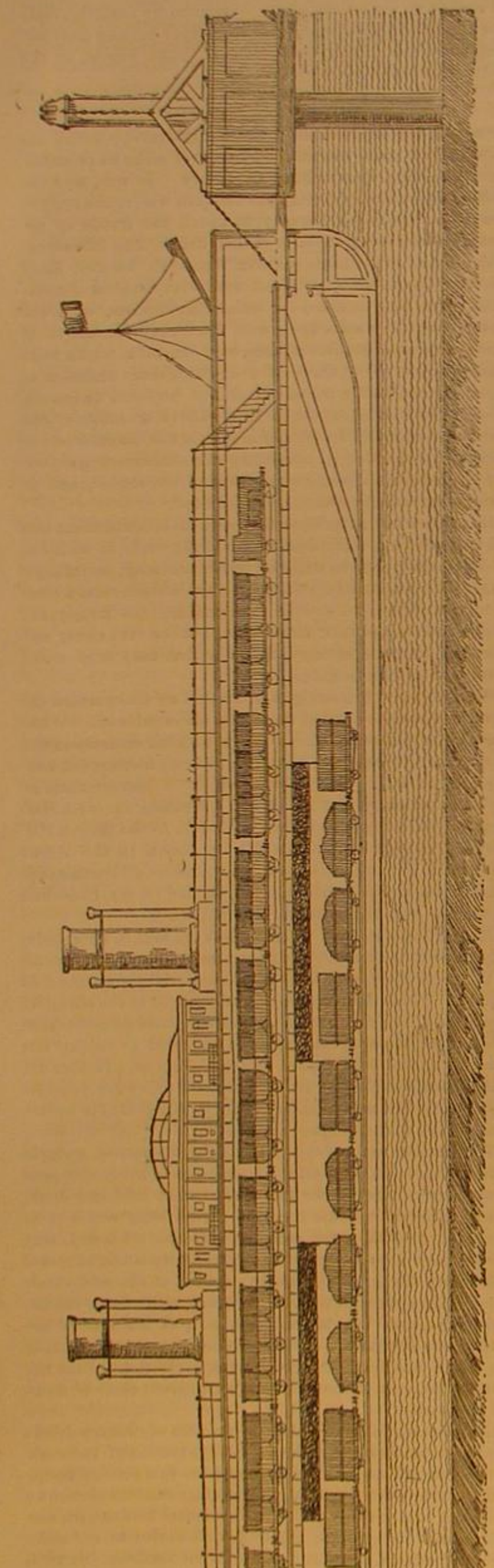
It has been mentioned in these columns that an English company has been formed with a view to effect a simple and practical solution of the problem of quick, safe, and comfortable transportation, across the Straits of Dover, between France and England, for railway passengers. The plan adopted seems to us far more feasible than the bridges and tunnels hitherto proposed.

The method is due to Mr. Fowler, who proposes to use an immense steam ferry-ship, capable of receiving entire trains on its ample decks, with all their passengers, freight, and baggage.

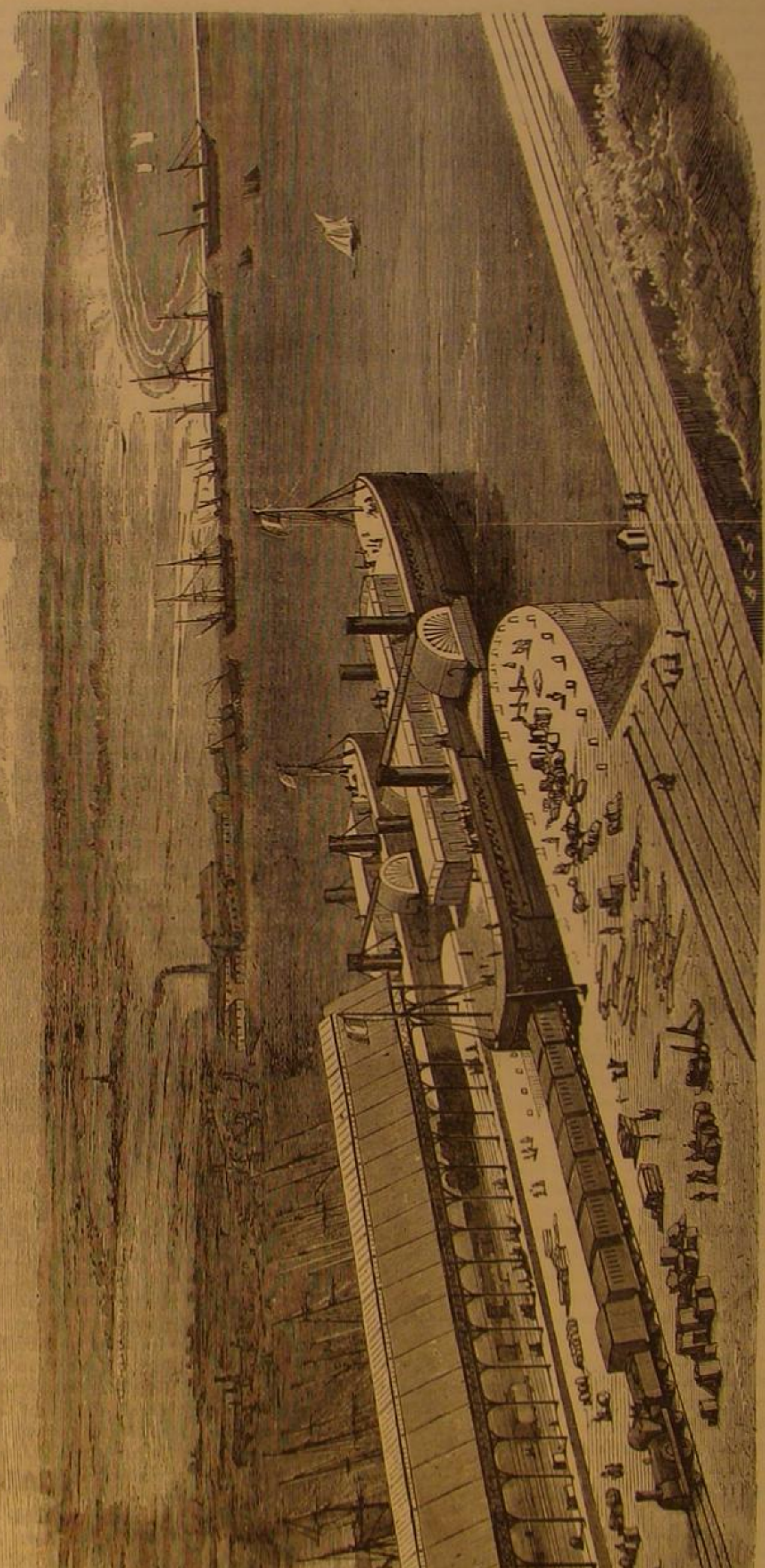
We need not dwell long on the details by which the embarking and disembarking of trains will be accomplished, since the accompanying engravings sufficiently indicate them, and they are in principle the same as those employed on American railway ferries which transport trains.

The differences in the model of the vessel and its details from American vessels used for a similar purpose, are only such as will adapt the ship to the much longer and rougher voyages it will be obliged to encounter.

We may add that the vessel will be only about seventy five feet shorter than the *Great Eastern*, or something more than six hundred feet in length. This great length is intended not only to accommodate the length of trains but also to give immunity to passengers from sea-sickness, as the rolling of the waves cannot much affect the stability of a vessel of this size.



LONGITUDINAL SECTION OF THE BOAT AND LANDING.



BIRD'S-EYE VIEW OF THE DEPOT AND DOCKS TO BE CONSTRUCTED AT ANDRECELLES AND DOVER.

Docks capable of receiving the trains are to be provided at Dover and Andrecelles—the latter point being considered better than Calais for this purpose. The estimates of cost for v—l and docks amount to fifty millions of francs, in round numbers about ten million dollars American currency, and it is thought the execution and putting into operation of the plan will occupy three years.

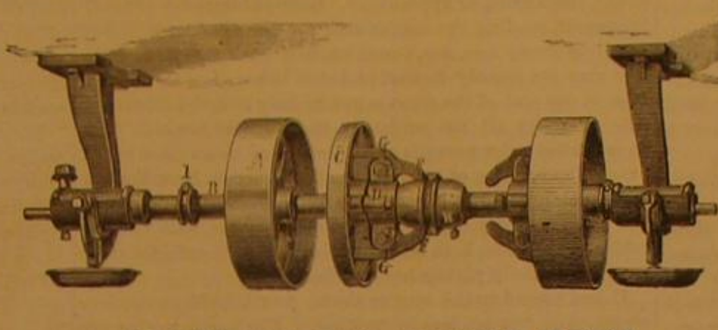
The system can hardly be regarded as an experiment, except in so far as the magnitude of the vessel and width of water to be traversed are concerned, as it has been already fully tried on American rivers, and even in crossing arms of the sea, in various places. The design of Mr. Fowler is simply, as we have said in substance, a modification of a plan already found feasible.

It is thought the passage in this vessel may be made in one hour, under favorable circumstances of wind and tide.

Improved Friction Clutch.

Our engraving exhibits a new form of friction clutch, claimed to be more simple in construction, more positive in its action, and more easily adjusted and kept in working order by ordinary workmen, than other clutches of the same class, thereby combining a greater degree of utility and durability.

A loose pulley, A, fits closely and turns freely on the shaft, B. The inside of the rim of this pulley is beveled, to fit the taper of the wheel, C. The hub of the wheel, C, traverses longitudinally on the shaft, B, or works partially upon the hub of the pulley, A, when it is desired to give the latter a longer and firmer bearing on the shaft. The taper surface of the wheel, C, bears upon the inside of the rim of the wheel, A, throughout its whole circumference when the two are brought into contact.



PRATT'S IMPROVED FRICTION CLUTCH

A collar, D, is fitted to and secured upon the shaft, B, having ears, E, between which are fitted dogs, F, which have a free action on pivots in the ears, E. The ends of these dogs next the wheel, C, take their bearing against prominences, G, formed on the wheel, C, and the opposite ends bear upon the collar, H.

A series of springs act in connection with dowel pins in the collar, D, to throw out the wheel, C, when it is desired to release the pulley, A, from the clutch, the pins also serving to maintain the proper relative position of the wheel, C, to the collar, D.

By pushing the clutch collar, H, toward the wheel, C, in the ordinary way, the outer ends of the dogs, F, are forced apart, their inner ends being at the same time pressed against the prominences, G, on the wheel, C, which is then pressed home to its engagement with the rim of the wheel, A.

The position of these pulleys in the engraving would not admit of this action, the wheels being separated on the shaft in order to show the construction better, but in setting the pulley, A, the collar, I, is employed, by means of which the pulley, A, is held up so closely to the clutch wheel, C, that a very slight motion of the clutch collar, H, is sufficient to complete the engagement.

Patented, Feb. 22, 1870, by Francis A. Pratt. Address for further information Pratt, Whitney & Co., Hartford, Conn

Correspondence.

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

Cleansing Boilers.

MESSRS. EDITORS:—It is well known that water impregnated with earthy matters produces, when boiling in a steam boiler, a scum on the surface. If this scum be collected and blown out, the boiler will seldom require to be opened and cleansed; but if the scum be allowed to accumulate and settle upon the plates where the fire impinges, the injury to the boiler will be in proportion to the thickness of the accumulation, which, according to the nature of the deposit, assumes either the form of scale or mud. When it assumes the first named form, the boiler will require to be often opened and cleansed, or the injury from the burning of the plates will be great.

The arrangements, of which I send you drawings, and which are designed to prevent such deposits, consist of a number of hopper-like mouthed vessels introduced into the boiler standing a little above and below the water-line. These vessels communicate, by means of vertical pipes, with a horizontal pipe that passes through to the outside of the boiler, as the scum arises, and falls again in the water, the open mouthed vessels collect it; and, as at intervals, the valve at the end of the pipe spoken of is opened, the collected scum or deposit is "blown out," and the boiler plates are thus kept clean. (See Nos. 1, 2, and 3).

In diagrams annexed the longitudinal pipe, extending from end to end, is shown at A, Fig. 2, which is perforated with two rows of small holes, communicating by the pipe, to the cock or valve, D. At the top of the longitudinal pipe, A, there are vertical pipes, E, each mouthed by a cast-iron funnel, F, at the level of the water, which funnel faces the front or firing end of the boiler. The cast-iron funnel in diagrams, Nos. 1 and 3, is supplied with elevated partitions, H, leading to the receiving chamber at the top of the vertical pipe, E. The heat from the firing end causes a continual roll or flow of the water towards the back end, by which means the scum enters the funnels, from whence, by opening wide the cock, or valve, D, it is swept away into the sewer or drain.

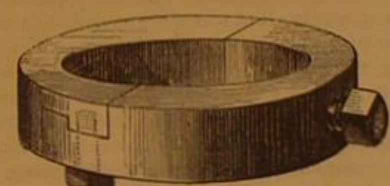
The apparatus can be so modified as to suit every description of boiler, whether multitubular, two-flued, or cylinder boilers, and of any length, can be cleansed from end to end in less than one minute, without stopping the working. In water there is a great difference in quality for steam purposes, some waters scarcely give out any deposit, while with others the deposit is great, and this is the cause of considerable difficulty, if not constantly removed.

It therefore behooves the engineer, when he has to work with water of the latter description, to be exceedingly attentive, and to look well after the interior as well as the exterior of his boiler, and particularly where the water has spent dyewares and acids mixed up with it, as is often the case in manufacturing districts. In this matter, as in many others, he may lay it down as a rule, that the utmost cleanliness possible will result in a saving of fuel, and in the prevention of much "wear and tear" to the boiler. T. C.

Philadelphia, Pa.

Securing Collars and Eccentrics to Shafts.

MESSRS. EDITORS:—In the course of travel I came across the device herewith illustrated, for securing collars and eccentrics, particularly those on locomotives, which is a most excellent plan, and one of those simple arrangements that commends itself to all mechanics at a glance. It is as good as a solid collar, and has the advantage that it can be put on or taken off without disturbing any other details of the machine.



This device is the invention of Mr. T. G. Gorman, Master Mechanic of the Toledo, Wabash & Western Railroad shop, at Springfield, Ill., and explains itself to every intelligent person. EGBERT P. WATSON.

Prevention of Incrustation in Boilers.

MESSRS. EDITORS:—Three years ago I had charge of a tubular boiler in the Stanley Rule & Level Co.'s Works, New Britain. The water was hard, forming a hard, brittle scale, and the method tried there was a battery in the inside of the top of the boiler, designed to keep the iron charged with electricity, and prevent the formation of scale. It was effectual, for after something over a year's trial, the tubes and shell were found to be entirely free from scale.

The arrangement alluded to is patented, and I think it is as good as anything that can be used, as it is simple, and causes no trouble after it is put in. I should like to hear from others whether similar success has been met with when water of a different quality has been used.

Waterbury, Conn. W. E. CRANE.

Fig. 1

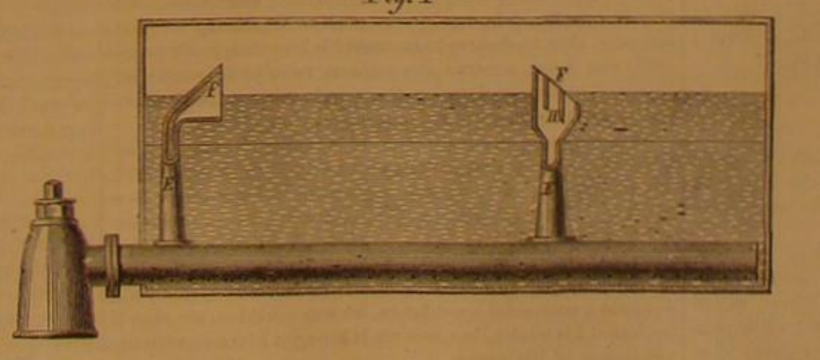


Fig. 2

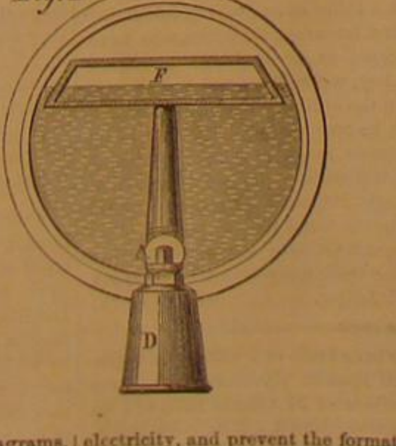
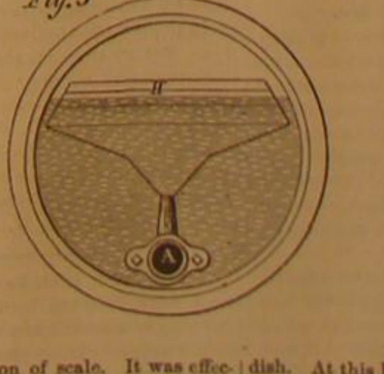


Fig. 3



A Cheap and Efficient Low Water Detector.

MESSRS. EDITORS:—Noticing in the last issue of your paper the criticism of Mr. B. Franklin on the use of the fusible plug of common tinman's solder for a low water detector, I desire to ask Mr. Franklin a few questions. First, would any boiler be safe to use with a scale over the iron or the fire-box plate so thick that steam under the usual pressure would not find vent through a ¼-inch hole?

Second. Would not the iron become hot enough to meet solder before a scale would make over the plug, so as to prevent the escape of steam?

Third. Was such a plug ever recommended as a low water indicator, or was it simply as a detector? There is quite a difference between the two purposes.

Fourth. If the water gets below the crowning sheet so as to heat it sufficiently to melt out the plug, is it not time that the fire in the furnace was put out?

Fifth. Would Mr. Franklin recommend keeping up the fire and running right along after it was ascertained that the water was below the crowning sheet? If so, then water must be pumped into the boiler with the crowning sheet red hot. Would not this endanger explosion at once?

In the last report, as published in the SCIENTIFIC AMERICAN, of the Hartford Steam Boiler Inspection and Insurance Company they report twenty-five burned plates. These plates were either burned by the water getting below them or by the collection of scale or sediment, so that the water did not come in contact with the iron.

The fusible plug may be made long enough to project through the inner surface of the sheet half an inch or even more if necessary. This would prevent the scale or incrustation from forming over the end of the plug, so as to prevent escape of steam in case the plug melted.

What objection would there be to the use of such a plug in the boilers of steamers? Could not a ¼-inch hole be stopped at any time by driving in a pine plug if necessary? INQUIRER.

Shoemakers' Measure.

MESSRS. EDITORS:—Stimulated by your generous invitation to "some one" to state what is the true shoemakers' measure, and gravely concluding that I am "some one," as well as any other man, I betook myself to my footman, *vulgo* shoemaker, and made the necessary inquiry by inspection of his "measure." The same revealed the following facts, to wit:

No. 1 *is* $4\frac{1}{3}$ inches, and every additional number $\frac{1}{3}$ of an inch more, but only for children's feet. For adults, No. 1 is $8\frac{1}{3}$ inches, and every additional number $\frac{1}{3}$ of an inch more, so that No. 10 is $11\frac{1}{3}$ inches. "Constant Reader," whose No. 10 shoe measures $11\frac{2}{3}$ inches, does evidently rejoice in the possession of a stout understanding, as the leather thereof adds $\frac{1}{3}$ of an inch to the length of the last, to which the measure is actually applied. OCCASIONAL READER.

Welding Cast Steel.

MESSRS. EDITORS:—Noticing an inquiry in your paper for a recipe for welding cast steel, and having had considerable experience in that direction, I will attempt a few practical suggestions, and the result of my experience.

So much, however, depends upon the skill of the operator, that in unskillful hands any instructions might fail to be of use.

I have welded stone drills, points into mining picks (into the solid steel, not the iron), points into cold chisels as an experiment, and cast steel bars of various sizes, in the following manner: First, by upsetting the two ends that are to be welded considerably larger than the welded part is to be when hammered down to the proper size; then split one of the ends a little deeper than the bar is thick; draw out the ends of the lips, and narrow them up at the points. The end to be welded into this I draw out into a blunt wedge shape, narrowing the end also. I make a cut with a cold chisel on one side of the wedge-shaped end in order to prevent it from slipping out when sticking them together, as hereinafter explained. I then heat the two ends that are to be united to a cherry red, using common borax, unite them in the usual way, driving them together endwise, then closing down the two lips with the hammer, at a bright cherry red, they will stick together. Then put on plenty of borax, and heat in a charcoal fire to a point just above a bright cherry red, but not to a sparkling heat as in welding iron. At the proper welding heat of cast steel, the borax can be seen in a charcoal fire to run over the steel and curdle, giving the appearance of curdled milk on the bottom of a dish. At this heat, if done quickly, as perfect a weld can be made of common cast steel as can be made in welding iron, and not injure the steel in the least.

In this manner I have welded stone drills and cold chisels so as to use and wear them right through where the weld was made.

I have tried various materials made under recipes and different compounds for the purpose, and some of them possessed wonderful sticking qualities in holding the parts while being united, but never found anything that would make as sure a weld as borax. J. E. E.

To Pocket Chronometer Makers---A Challenge---A Bomb-Shell in the English Camp.

MESSRS. EDITORS:—In my third challenge to pocket chronometer makers, I propose clearly to explain what I mean by friction-isochronism, as it refers to the isochronism of the pocket chronometer, whether the chronometer or lever escapement is used.

The so called "Isochronal spring" is not isochronal, it makes its shorter vibrations in longer time. With a real isochronal spring the chronometer escapement gains in smaller tension (smaller motion of the balance), and the lever escapement more so; hence the spring must make its shorter vibrations, as above stated, to become the "Isochronal spring" of horology. The isochronal vibrations of a chronometer are made by a non-isochronal spring. This is one condition, and has for its cause reduction in motive force. Friction-isochronism is as different from motor-isochronism as is the duplex from the chronometer escapement; and has for its cause increase of friction per same force against the detent. These two conditions are antagonistic—one gains, and one loses, in smaller tension. Here the "Adjuster" asks the isochronal property of the spring to "serve two gods." Will it do it? Accidental results are to have nothing to do with this challenge.

Thus far, however, the thing is not necessarily impracticable, because the spring can be made to gain in smaller tension, and the motor made equal by the fuzee; but a third condition mixes with the above two, and has for its cause, external motion.

Here my challenge begins, where the two first-mentioned conditions end, and I am to use two, and the competitor one balance. The chronometers are to be tested in any machine that may somewhat imitate the motion of the pocket.

Hanover, Pa. J. MUMA.

Smoky Chimneys.

MESSRS. EDITORS:—It is a well-known fact that the chimney flues of the upper floors of houses seldom have a good draft. Being one of those who, on account of the enormous rents in this city, are compelled to "live high," or, to use a Yorkism, "in the top of the house," I, or rather my better half, has been afflicted for the last two years with one of the above domestic pests. I remedied the evil as follows:

I went to a stove store and procured four lengths of five-inch pipe with an elbow on one end, and a cap raised about three inches from, and attached to, the other, and had the several joints riveted together. Then I went to the top of the house and lowered it down the flue until the end with the elbow came opposite to the hole in the flue where the stove-pipe from the kitchen entered it, then inserted said pipe in the elbow, making a continuous pipe from the stove, through the flue, and projecting two feet above the top, fastening a collar around it resting on the top of the chimney to hold it in position.

The result was that a smouldering fire in the stove immediately sprang into intense life and heat, and in a very few minutes the stove was red hot. The whole expense of the job was two dollars.

The philosophy of the matter is this: In so short a flue the products of combustion do not remain in it sufficiently long to heat it to a degree sufficient to rarefy the air and give it an upward tendency. But the iron pipe, being thin, is quickly heated, and the air is thereby rarefied and ascends, causing a rapid current through the grate to supply its place. Y.

New York city.

Thermantidote.

MESSRS. EDITORS:—Refering to No. 17 (22d ult.), I would respectfully acquaint "T," Natchez, Miss., that the European residents of British India, have in use a machine such as he desires for cooling purposes.

I am not able to describe it in detail, but I know the principle is the same as a "fanning mill," and the current of air passes through a screen made of an aromatic grass, called "*Kus Kus*," *kept moist*, and consequently rendering all objects in its vicinity cool enough. I am induced to trespass thus much on your valuable time and space, in hopes that some of your readers acquainted with mechanics, may from the hint here given be enabled to perfect a design for the

Brooklyn, N. Y. "THERMANTIDOTE."

How Much Work a Horse can Do.

At a former meeting of the British Association in Dublin, Mr. Charles Bianconi, of Cashel, read a paper relative to his extensive car establishment, after which a gentleman stated that at Pickford's, the great English carrier's, they could not work a horse economically more than ten miles a day, and wished to hear Mr. Bianconi's opinion on the subject. Mr. Bianconi stated, he found, by experience, he could better work a horse eight miles a day for six days in the week, than six miles a day for seven days in the week. By not working on a Sunday he effected a saving of 12 per cent.

Mr. Bianconi's opinion on this point is of the highest authority; for although the extension of railways in the land has thrown thirty-seven of his vehicles out of employ, which daily ran 2,446 miles, still he has over nine hundred horses, working sixty-seven conveyances, which daily travel 4,244 miles; it is also founded on the result of forty-three years' experience.

Peter Cooper and the Cooper Institute.

At the head of the famous street called the Bowery, in the city of New York, stands the lofty edifice of brown stone which is known throughout the country as the Cooper Institute. There is a little park in front of it; and, standing unconnected with other buildings, at the point where the Bowery divides into two avenues, it makes a noble termination to the broadest and not least imposing of our streets. The ground floor of the building is occupied by showy stores, and the second story by the offices of various public institutions, the rents of which, amounting to about thirty-five thousand dollars a year, are the fund which supports the institution.

Under ground is a vast cavern-like lecture-room, in which political meetings are held, and where courses of popular lectures are delivered upon art and science. In the third story there is an extensive reading-room, furnished with long tables and newspaper stands, wherein the visitor has his choice of about three hundred journals and periodicals from all parts of the world.

This room is not much frequented in the daytime; but in the evening every seat is filled, and every stand is occupied by persons, well dressed, and polite indeed, who observe the strictest order, and yet have evidently labored all day as clerks, mechanics, or apprentices. Several ladies are generally present, reading the magazines; for this apartment is free to all of every age, sex, condition, and color, provided only that they are cleanly dressed and well behaved. On a platform at one end of the room a young lady sits, the librarian, who exercises all the authority that is ever needed. The most perfect order prevails at all times, and no sound is heard except the rustling of leaves. In all the city of New York, a more pleasing spectacle cannot be found than is exhibited in this spacious, lofty, and brilliantly-lighted room, with its long tables bordered on both sides by silent readers, presided over by a lady quietly plying her crotchet needle.

If you ascend to the stories above, you behold scenes less picturesque, but not less interesting. The upper stories are divided into class-rooms and lecture-rooms. In one you may see fifty or sixty lads and lasses listening to a lecture upon chemistry, illustrated by experiments. In another, a similar class is witnessing an exposition of the electric telegraph. In another apartment, there will be a hundred pupils seated at long tables, drawing from objects or copies; and in another, a smaller class is drawing a statue, or a living object, placed in the center of the room. Drawing, indeed, would appear to be a favorite branch with the frequenters of this establishment, nearly all of whom are engaged in some mechanical business which drawing facilitates. Young machinists and engineers, young carpenters and masons, who hope one day to be builders and architects, young carriage makers, upholsterers, and house painters, who aspire to exercise the higher grades of their vocation, are here in great numbers in the various rooms devoted to drawing and painting. There are classes, also, the pupils of which, both boys and girls, learn to model in clay, several of whom have produced creditable works.

In the day time most of these upper class rooms are empty; but, soon after seven in the evening, crowds of young people begin to stream in from the streets, ascend the stairs, and fill all the building with eager young life. At half-past seven work begins, and after that time no one is admitted. The classes continue for an hour or two hours, according to the nature of the subject or exercise. By half-past nine the rooms are again silent and deserted. The reading-room closes at ten; the lights are extinguished, and the Cooper Institute has discharged its beneficent office for one day more.

All this is free to every one on two simple conditions; first, that the applicant knows how to read, write, and cipher; and, secondly, that he desires to increase his knowledge. Of course every one must observe the ordinary rules of decorum; but this is so uniformly done by the pupils that it scarcely requires mention.

Such is the Cooper Institute. This is that Evening School which Peter Cooper resolved to found as long ago as 1810, when he was a coachmaker's apprentice looking about New York for a place where he could get instruction in the evening, but was unable to find it. Through all his career as a cabinet maker, grocer, manufacturer of glue, and iron founder, he never lost sight of this object. If he had a fortunate year, or made a successful speculation, he was gratified, not that it increased his wealth, but because it brought him nearer to the realization of his dream.

When he first conceived the idea, there were no public schools in the city, and such a thing as an evening school had not been thought of. His first intention, therefore, was to establish such an evening school as he had needed himself when he was an apprentice boy, where boys and young men could improve themselves in the ordinary branches of education. But by the time that he was ready to begin to build, there were free evening schools in every ward of the city. His first plan was therefore laid aside, and he determined to found something which should impart a knowledge of the arts and sciences involved in the usual trades; so that every apprentice could become acquainted with the mechanical or chemical principles which his trade compelled him to apply.—*James Parton in the N. Y. Ledger.*

SATISFACTORY trials have been made of a mitrailleuse procured from Belgium by the Spanish Government, and discharging in a minute ten volleys of 37 conical balls of 1 oz. weight apiece. These projectiles pierced a 3-in. metal plate at 1,400 yards, at which distance three per cent reached the mark. The weight of the mitrailleuse was 336 pounds, and its cost about $1,000.

A Wonderful Toy---An Automatic Masterpiece---Reducing the Pictorial Arts to Machinery.

Joseph Bergmann, who lives in a little wooden house on Farm street, Job Hill, has for fourteen years been steadily working with one object in view—the perfection of a wonderful piece of mechanism. One night, fourteen years ago, he dreamed of a machine such as he has constructed. At first he thought little of it. Then it began to occupy his mind to the exclusion of other subjects, and after a time he began the work, at first at odd spells, and then continuously for days. Some inexplicable power was urging him on whenever he thought of giving it up. When the spells of infatuation came upon him everything had to be abandoned. His ordinary work had to be laid aside, even though there was no bread upon the cupboard shelf, and many a night the poor artisan went hungry to bed. But after years of anxious toil the dream is verified, the work is completed.

But before we describe, even most imperfectly, the machine, let us say something of its author. Bergmann is a German about fifty years of age, and speaks English imperfectly. He is a little diminutive man, with a pale, sallow countenance, and a look which speaks of care and thought, if not of positive suffering. He is very poor—the house is almost bare of furniture—and in speaking of the dream and the work which had so infatuated him, he said it would have been better for him if he had never experienced the one or undertaken the other. He is a cabinet-maker, and the skill of an almost marvelous handiwork, as well as the stamp of remarkable inventive genius, is to be seen in the construction of the machine.

The machine eclipses all the automatons in the world. The reader must imagine a beautiful miniature structure set upon a huge mass of rocks, with road-beds winding up the sides of the rocks, and streams of running water coursing down precipitous bluffs. This miniature house represents the residence of a wealthy old miller, with his grist mill, saw mill, oil mill, etc., adjoining. There are some thirty figures to be seen in the foreground and about the buildings and mills. There is also a little fountain in the foreground, with the water playing, and a lake with a boat and oarsmen.

All these mills and figures and playing waters are set in motion by means of a combination of machinery similar to the works of a clock, and when these are wound up and set running every figures takes up its automatic movement. The old miller sits in an elegant apartment reading a newspaper. His eyes follow the column downward. His head inclines with a corresponding motion. The column is finished, and the sheet is turned over, and the eyes are attracted to another portion of the paper. Every movement is wonderfully life-like.

The miller's wife sits in another apartment industriously spinning. The domestics are going about performing their daily toil. The saw mill is a *fac-simile* of such an institution. The log is in its place, and slides along to meet the teeth of the saw, which is working up and down cutting it in two. The attendants are all busy in their several duties. The grist mill is also going. One man is tending and feeding the hopper. Every now and then he goes back and forth with a tray upon his shoulders, the contents of which he pours into the mouth of the hopper.

The great water wheel is moving steadily under the pressure of water from above, and the elevator keeps up its show of relieving a canal boat of its load of grain. Teams loaded with sacks are seen going to and from the mills. A man is perched upon the gable of the miller's home, adjusting a little bird cage to the eaves, and doing his work most perfectly.

The oil mill is also at work, and the figures are all busy about it performing their several missions. The boatman on the lake is rowing backwards and forwards, and apparently having a good time all by himself. Thus the entire operations of an immense establishment are carried on with as much definiteness and aim as in real life, every figure doing its work with the utmost exactness—the whole forming a wonderful combination of machinery.—*Troy Times.*

California and Oregon Railroads.

The original estimate of railroad distance between Sacramento, California, and Portland, Oregon, was 750 miles. The cars of the California and Oregon Railroad Company are now running for 115 miles of the distance in California, and those of the Oregon and California Company seventy-one miles in Oregon, making 186 miles in all, and leaving the space between 564 miles. The Oregon end of the road is graded ready for the track about thirty miles further, the company have a large quantity of iron on the way, and early in the spring they expect to reach Eugene City, at the head of the Wallamet Valley and 125 miles south of Portland. A large force of men is at work on the California end of the road, which is to be rapidly pushed. Probably the opening of next summer will see the staging distance between the railroad track in either State reduced to little more than 400 miles, possibly to 300.

As illustrative of the beautiful influence of furnishing an attractive and elevating means of amusement and entertainment at such prices as will render them generally accessible to the poorest classes, the experience of the Crystal Palace, in London, is in point. For sixteen years that institution has been in operation under a wise and charitable arrangement by which musical entertainments and amusements of every sort have been furnished at a merely nominal expense to visitors, during which time 24,000,000 people, workmen and those of the poorer classes, have availed themselves of its privileges, and not more than a dozen cases of intemperance or irregularity have been reported by the police as connected with the numerous gatherings at the place.

THE BALLOON AS AN AID TO METEOROLOGICAL RESEARCH.

A PAPER READ BY PROF. JOHN WISE BEFORE THE FRANKLIN INSTITUTE.

In the science of meteorology there is no instrumentality competent to do so much good, and which has as yet received so little attention as the balloon. The phenomena of the atmosphere, in their relations to climate and sanitary effects—to agriculture, to physiology—to our mental forces and temperaments, are more fertile in scientific developments than an observer from the earth would suppose. Meteorological investigations are as occult, tame, and spiritless, without the aid of an air-ship, as would be hydrographical investigations without the water ship. The deep-sea soundings, so pregnant with interest in their revelations of infusorial life at the bottom of the ocean, find their counterpart in the deep air soundings in the opposite direction, in the myriads of vegetable life floating upon the currents of the atmosphere. It is not an uncommon thing to see the air currents above the clouds teeming with thistle seed, each one with its silken parachute sailing along in the grand procession. And so, too, is it with the pollen of other plants, moving along in little nebulous cloud patches.

The upper air is not so barren of scientific interest as its apparent vicinity, when viewed from the earth, would indicate. It is a marvel that so fruitful a subject, and one so easily to be explored, is so much neglected. The science of light seems almost reversed in looking down through the atmosphere to the earth from an insulated position of two or three miles of altitude. The earth looks concave, and the horizon is loomed up above the level of the observer. Sometimes a city five or ten miles off may be seen hanging in the heavens upside down, and illuminated by three suns. When this phenomenon presents itself above the cloud region it is more distinctly defined than when it occurs near the surface of the earth.

The phenomena of the clouds are full of interest. Some are dense, and some are attenuated. Some are warm, and some are cold. Some are light and some are dark. Some are charged with ozone. Passing through an ozone cloud causes hoarseness; it acts upon the mucous membranes, and is first perceptible by smell, and the twinging sensation it produces upon the cuticle of the hands and face. When the balloon comes near a cloud, electrical excitement takes place; it also occurs when the balloon is passing from one current of air into another. The finer part of the light sand ballast, used by the aeronaut, is drawn in a stream from the car up and against the body of the balloon. Also, the fine-cut index paper, used by aeronauts, is, in such cases, drawn up against the balloon, hanging there for a while with a tremulous motion, and then falling off. I have heard it making a crepitating noise when thus thrown out by handfuls. The stillness is so profound above the clouds that a noise, not perceptible on the earth, is quite discernible there.

It is remarkable how suddenly, at times, the currents of air strike the balloon, causing it to swing slightly to and fro, as well as to rotate on its vertical axis. These sharp crossing currents are always attended with marked electrical evolutions. The gas in a balloon, that is perfectly transparent when it leaves the earth, is changed into a cloud when it gets into a region of clouds. And it assumes this character of cloud in a perfectly clear atmosphere, when the balloon reaches the region of frost. I have had my hair thickly covered with hoar frost on a Fourth of July, and cloud issuing from the neck of the balloon, at an elevation of 19,000 feet.

The atmosphere is always clear and transparent after a rain storm; it is only then that an observer aloft has a great scope of view of mundane objects. On such occasions, the view in ascending from the seashore is very imposing. It is well known that from the land, or the surface of the sea, a ship is not visible when twenty miles off. The earth's convexity being about eight inches to the mile, and this obstruction of convexity, increasing as the squares of the distances, limits the sight of a ship within moderate scope. Thus, in ascending from a place like Boston harbor, the scene becomes very interesting. As you gradually go up, so come up the ships behind the horizon. It looks like magic. Of a clear day you can see ships at sea a hundred miles off, when the sun is in the opposite direction. With cloud fields between the observer and the ships, they have the appearance of sailing above and over the clouds. So the meandering of a river is sometimes seen convoluting itself over and under the clouds in the distance. These unique sights are, of course, optical illusions, but, without a knowledge of the science of optics, would be deemed mysteries. They prove, however, how subject we are to be misled by our senses in cases where science is not available to correct their errors.

The most marked difference between an earth view and a sky view occurs in the storm cloud. The nimbus, or thunder cloud, when viewed from the earth level, looks like an agitated and confused mass of leaden-colored vapor. When viewed from a little above its level, and from a few miles distance, it looks symmetrical. Bulged out above and below, and contracted in its middle, it trails along over the earth like a huge smoking, fuming engine, dragging its lower part slightly behind, like the trail of a court lady's garment. The electrical cannonading as it passes along, gives it quite a grand and imposing effect. It is quite practicable to sail above, behind, or in the midst of these imposing meteors. Sailing behind one, and between its upper and lower cloud, I saw a beautiful prismatic-colored grotto, and, apparently from within this grotto, came terrific peals of thunder. This grotto was, no doubt, produced by the refractive power of the gas in the balloon, as the sun was shining in between the upper and lower cloud, and through the balloon, and the grotto appeared on the opposite side of it; that is, the grotto was on the east side, and the sun on the west side of the balloon, and it was late in the afternoon. That such was its cause is inferred from the fact that prismatic circles of light had appeared in the upper cloud surface, when the sun's rays passed through the gas of the balloon when sailing above it. This phenomenon only occurred with a silken balloon; silk becomes transparent when varnished; cotton does not. A silken balloon is also more susceptible of electrical excitement, than one of cotton. A silken flag crepitates in passing from one current of air into another, a phenomenon not perceptible in a cotton one.

Storm clouds do not all discharge thunderbolts. When a certain field space of atmosphere contains a number of them—and I have seen seven at one time, small ones—they deposit rain in fitful showers, but discharge no thunderbolts. When two or more of them coalesce, then discharges of electricity follow. These detached nimbus clouds are prevalent in the month of April and May, and produce what we term "April showers."

During the heat of summer the thundergust proper prevails. Its constant attendant is heat. We all know this from common experience, the precedent suffocating heat before a thundergust. When these meteors are generated suddenly they give out snow hail, and rain. The snow melts partly into hail, and partly into rain. Hailstones contain in their center a nucleus of snow. In rising up from the earth the deposition from a cloud grows diffuse, more and more, until you enter the base of the cloud, where it is a dense mist; and as you rise in the cloud, this mist becomes thinner, until near the top when it ceases entirely; at this point the cloud becomes warm, and when emerging from its top still warmer, caused by radiation and reflection; and then follows a twinging sensation in the cuticle of the face and hands like the pricking from bunches of needles, also slight hoarseness, with more or less pain in the base of the brain, and in the ears, when the ascent is sudden.

It is impossible to hold a level position in the body of a thunder cloud. You are all the time going up or down. The vortex current carries you up through the central part of the cloud, diverging the balloon outward with the outspreading vapor, upon which it describes its outward and downward course, generally to be drawn in again near the base of the cloud, and from thence upward on the uprising stream, and so on, like an endless chain, until you leave it by an increase of levitating force from its top, or an increase of gravitating force at its base; in the one case by a copious discharge of ballast, in the other by a copious discharge of gas.

To explore one of these meteors is, at first, calculated to produce a degree of anxious solicitude, but when experienced for a while, and duly considered, the experience becomes interesting and sublime, and well calculated to inspire the meteorologist with a desire to renew the investigation of atmospheric phenomena.

There is no disk rotation in a storm cloud, but there is a vortical rotation in its center caused by the two forces of the inrushing and uprushing air, shown in the swinging and rotating motion it gives to the balloon. This inward motion of the air toward the vortex of the cloud extends beyond the outer margin of the meteor, and will gradually draw the balloon toward and into the vortex. This can be prevented by giving the balloon an upward or downward motion, as, in either case, the center of the storm will recede from the air ship, and thus we have the power of riding in the wake or in the midst of a thundergust.

It may be deemed a hazardous mode of investigation to sail up into the air three or four miles high, but when we take into comparison the number of air voyages made, and the accidents related to them, we shall find as favorable results as in sea voyages. I have accounts of thirteen balloons that exploded while high in the air with their occupants, two of them with myself, while above the clouds, and in none of these was any one harmed. The law of atmospheric resistance is as certain as the law of atmospheric buoyancy. I even controlled the collapsed descending balloon from falling into a piece of woodland by lightening the weight in the disposal of ballast, and thus drifted beyond the trees.

So far as I have investigated accidents with balloons, not a single case occurred from any intrinsic principle of danger connected with the art. Not so with the sea ship. These two elements, wind and water, coming in conflict, cause the destruction of the vessel. Water, nearly a thousand times denser than air, and the air moving against the ship with a velocity of a hundred miles per hour, and the immense mast leverage, must necessarily bring a tremendous force upon its framework. Not so with the air ship. It has but one element around it, and, once free in the air, it matters not, so far as its ability to stand the strain is concerned, whether the wind moves one mile or one hundred miles per hour. Even with the latter velocity, your vessel glides along so smoothly and gracefully as not to ruffle a cobweb suspended from its flagstaff. Did you not perceive objects on the earth receding and approaching, it would be impossible to discern that you were moving at all. I traveled forty miles in forty-eight minutes in the midst of a cloud stratum, without being aware that I had moved forty rods before landing.

When accidents have occurred with balloons, they were always attributable, either to defective construction or a want of ordinary skill in the persons operating them. It is a deplorable truth that many, if not most, persons who use balloons are not scientific. And yet, this class have generally the most marvelous stories of blood oozing from their finger ends, and the balloon turning topsy-turvy, and the miraculous escapes they have made, to relate.

I trust enough has been said and done to show that we can go up into the air, into the cloud, into the storm, by day or by night, to investigate the phenomena of the upper air without incurring the accusation of being reckless, especially when high officials of state use them to escape from a beleaguered city, and governments send them off with mail-route agents to distribute daily mails.

The Franklin Institute, a time-honored school of art and science, is worthy of the establishment of a section of meteorology for the purpose of exploring the wonders of the atmosphere with the aid of a balloon and meteorological instruments. An air ship can be constructed for such purpose at a trifling cost as compared to the advantages to be derived; and the cost of inflation is now vastly reduced in the facilities afforded by the coal gas; and with such men as Dr. Wahl, our efficient secretary, to make the investigations, and an experienced air navigator to take charge of the air ship, and if my experience is worth anything, it would be voluntarily given, much can be done toward the establishment of certain scientific data as related to meteorological phenomena in the course of a year.

Dr. Wahl allows me to say, that he has not only no hesitation in making such explorations, but that he would most earnestly and cheerfully engage in the pursuit. The barometer, hygrometer, and electrometer, in the corner of the house, may hang there a century, and not reveal as much to the explanation of meteorological science as they will in one day up in the clouds, in the hands of a well-trained person.

We owe such a course of investigation to the age we live in. The onward march of knowledge exacts it and demands it at the hands of the learned institutions, and there is none so well adapted to its prosecution as the Franklin Institute.

When it is considered that we do not know, to this day, from whence the source of electricity in cloud phenomena—whether in storms it is a primary or a resultant; whether there is one kind or two kinds developed in a thundergust; whether the thunderbolt makes its detonation forcing its passage through the air, or in its percussion upon more solid matter; whether the bolt darts from one cloud to another, or whether it invariably darts to the earth—we should use all reasonable means to find out. The European scientists shot arrows into the air to learn something of atmospheric electricity. Franklin, always practical, not being able to get up into the clouds himself, sent up his representative, the kite, and, in a moment, demonstrated a fact, which, for a thousand years, had been held in abeyance—the identity of cloud and machine electricity. The great philosopher, fearing the ridicule of the unlearned over a man flying a kite, went clandestinely out to Bush hill, under cover of his son, to try the mission of his aerial messenger, and it proved and settled the long-mooted question.

The air-ship is destined to settle the question of the relation of atmospheric with terrestrial electricity, and how this pervading agent—gravitation *per se*, or intrinsic motion, or vis-vitæ, or whatever we may term it—is to be appropriated to our common welfare; for in it we live, and move, and have our being.

Buhl Work and Reisner Work.

Buhl was a cabinet-maker in the days of Louis the Fourteenth, and was instrumental in bringing into use a kind of decorative furniture, or furniture decoration, which has been more or less in favor ever since. It was not usually, in his work, actual wood that formed the surface; more frequently it was brass, silver, or some other metal, inlaid in tortoise-shell, on a wood backing. The mode of procedure was curious. A layer, say, of brass, and a layer of tortoise-shell, each as thin as veneer, were glued on opposite surfaces of a piece of paper; another piece of paper was glued outside, a pattern or device was drawn on the outside paper, and all the lines of the device were cut through and through with a fine saw. A little moistening removed the papers, and separated the inlay. What followed? Two patterns could be produced out of the two veneers: a brass inlay in tortoise-shell, and a tortoise-shell inlay in brass. The inlays, thus fabricated, were applied as veneers to the surface of a cabinet or other article of furniture. Old cabinets, thus adorned by Buhl and his cotemporaries, are now eagerly bought up at high prices by art collectors.

Another cabinet-maker of the same period, Reisner, varied the form of his productions by employing two kinds of wood instead of brass and tortoise-shell: usually selecting tulip wood and some darker variety. This was called Reisner work; like real Buhl work, it now commands high prices. It is evident that, the principle once being clearly understood, its application may be almost infinitely varied, according to the choice of materials, whether tortoise-shell, ivory, mother-of-pearl, ebony, fancy woods, gold, silver, brass, copper, or what not. Cheap imitations of Buhl work are now produced by cutting out the veneer patterns with a stamping press, instead of by the slower aid of a saw. Other cheap imitations are made in the papier-maché workshops of Birmingham; fanciful patterns in brass, stamped out, are fastened down upon papier-maché, and the interstices of the device gradually filled up with successive coatings of black japan varnish. As to the devices that may be cut out with a fine saw, the fretwork of a pianoforte furnishes a very good example; although it is not often that the workman attempts anything of a pictorial character therein.

OF the 20,000 horses captured by the Prussians at the surrender of Sedan and elsewhere the best have been picked out and supplied to the German artillery and cavalry. These include many capital Norman horses for the cavalry, and heavy animals for the artillery. The Barbary horses of the African troops, excellent as they are, are deemed too small for the Prussian cavalry.

IT is now said that the Mont Cenis tunnel will be completed in 1871. The Hoosac tunnel will require three years more for its completion. Both affairs are great bores.

THE WYCKOFF WOOD PAVEMENT.

The accompanying engravings exhibit the construction of the Wyckoff wood pavement, for which the following advantages are claimed: Superior cheapness and ease in construction, with durablity. It can be taken up for the purpose of laying water pipes, gas pipes, or other purposes, and relaid without injury.

Fig. 1 represents the upper surface of the pavement, and Fig. 2 is a section of the same.

The openings being irregular in form and position, afford a good foothold for horses, and being filled with gravel and cement from top to bottom, make a solid and easy roadway. The courses being irregulas prevent sweeping out of the material between joints, and also produce less jar upon vehicles than regular courses.

This pavement is very simple in its construction, and not liable to get out of order, a split block being irregular in surface, gives the cement a better chance to adhere, forming a key, so to speak, which prevents their moving out of place. Split blocks are more durable than sawed, for the same reason that split shingles are better than sawed; they will repel instead of absorb moisture. The blocks are cut off the log, six inches in length, and split into an irregular shape, of sufficient size for openings to accommodate the horses' foothold. These blocks are then thoroughly saturated in boiling tar. Upon the street being properly graded, a close flooring of boards is laid down, both sides of which are previously mopped with a coat of hot tar, care

Fig 1

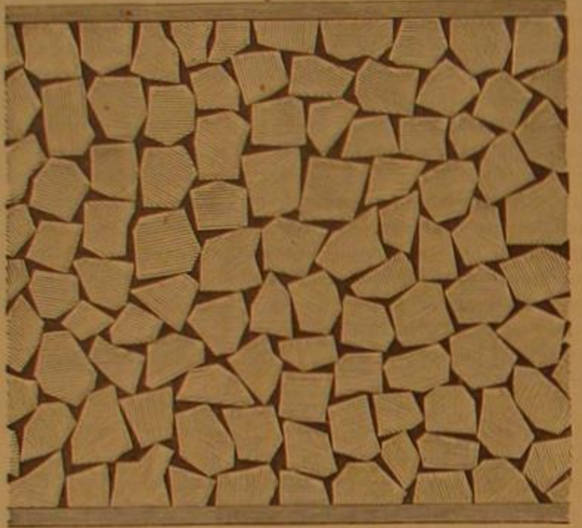
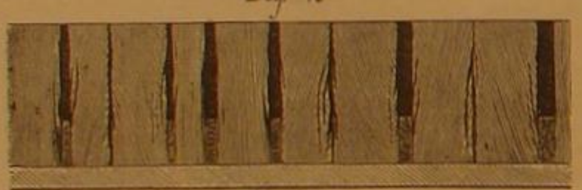


Fig 2



being taken to make a perfectly even surface. Then upon this the tarred blocks are set up endwise, side by side against each other, without an intervening board partition, as is required by another method; and sawdust, tan bark, or any other fibrous material, is put in the crevices, to the depth of about one inch, which forms a perfect packing around the blocks, preventing the gravel from working under them. The remaining spaces are then filled up with heated gravel, and hot tar poured over it, after which the whole surface is cemented over with tar, gravel, and sand, which may be left on until thoroughly packed in the openings, which gives a hard, smooth surface. The longer it is used, the smoother and more compact it becomes, as the gravel and sand are being constantly tamped into the crevices. After a sufficient time has elapsed, the gravel and sand may be swept off the surface. It has been extensively laid down in the city of Elmira, and also in Pittsburgh, Pa.; Detroit, Mich.; Williamsport, Bellfonte, and Towanda, Pa.; at which places it can be seen and tested. Patented June 2, 1868. Further information can be had at the office of the Wyckoff Wooden Pavement Company, Elmira, N. Y.

Rating Steam Engines.

Messrs. Barnet, Le Van & Co., of Philadelphia, Pa., write us that they are glad we are agitating the question of uniform standards in rating steam engines. We are sure our views will also commend themselves to other manufacturers of steam engines. This firm has adopted a standard for rating, making the cut off at two-thirds stroke, and seventy-five pounds boiler pressure. The mean effective pressure, calculated from these data, should be, in a well constructed engine, 0·82 of the boiler pressure, or 61·40 lbs. We do not think this firm is the only one that is using some such standard of calculation; what we contend for, is, however, a uniform standard for general adoption and use.

Poisonous Chemicalized Wood.—Mr. John O. Connell, whose communication in regard to the poisoning of workmen by chemicalized wood, in the erection of a railroad depot, recently appeared in these columns, now writes that the wood was prepared by a process known as the Foremaniger Patent. Another victim has since died. We have sought to find this patent in the published reports, but have failed, and can therefore give no details of the process.

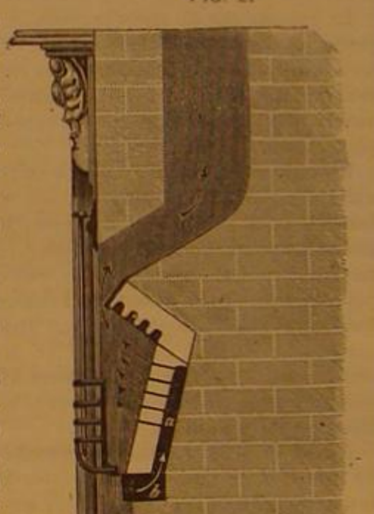
STRONG'S PATENT FIREPLACE.

The accompanying engravings represent an improvement in fireplaces patented by James C. Strong, of Buffalo, N. Y., Sept. 21, 1869. The object of the invention, which is constructed on correct principles, is to increase combustion by a consumption of the gases which in ordinary fireplaces mostly pass off through the chimney.

The back of the fireplace recedes from the bottom toward

the top, as shown in both engravings, thus forming a deep space or chamber above and in rear of the fire basket, in combination with an inclined corrugated top, inclining upward from the back toward the front. Back of this recess or chamber is an air chamber, supplied with air by means of two apertures, *b b*, under the fire basket. From this air chamber many small holes are perforated through the back of the fireplace, *a*, through which currents of heated air are continually distributed into the back of the fire, thus supplying the gases evolved by the burning coal, with much more oxygen than they could receive from the front alone, at a place where the temperature is always high enough to ignite them, thereby creating more perfect combustion, and, of course, obtaining more heat from the same amount of fuel.

Fig. 2.

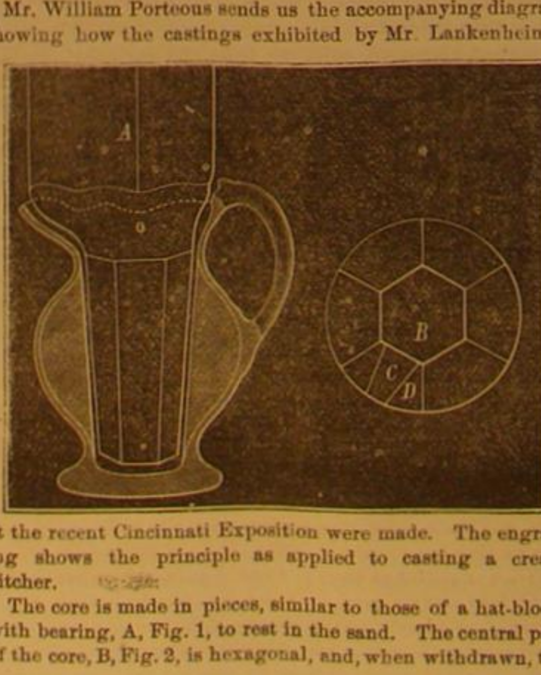


The corrugations in the top, more clearly shown in Fig. 2, retard the gases in their passage to the throat of the chimney, and keep them rolling back into the fire, thus giving more time for them to unite with the oxygen. The inclination of the top assists greatly in reflecting the heat into the room. The consuming of the gases greatly lessens the amount of smoke, so that this fireplace can be used in chimneys that sometimes smoke with an ordinary open fire. These fireplaces are made for both hard and soft coal; the only difference being that the fire baskets for soft coal should be much deeper on the bottom than those for hard coal, simply to give more room for the soft coal; but hard or soft coal will burn equally well in either kind of fireplace.

This fireplace has taken the first premium at fairs wherever exhibited, and has given perfect satisfaction to all who have tried it. Any information respecting the fireplaces may be obtained by addressing the patentee, James C. Strong, Buffalo, N. Y.

PIERCED CORES IN METAL CASTING.

Mr. William Porteous sends us the accompanying diagram showing how the castings exhibited by Mr. Lankenheimer



at the recent Cincinnati Exposition were made. The engraving shows the principle as applied to casting a cream pitcher.

The core is made in pieces, similar to those of a hat-block with bearing, A, Fig. 1, to rest in the sand. The central part of the core, B, Fig. 2, is hexagonal, and, when withdrawn, the pieces, C and D, are taken out and the remaining pieces can then be removed.

We are quite certain this principle is not a new one in the making of cores, but it may, nevertheless, give a useful hint to many of our mechanical readers. Mr. Porteous, who sends the drawing, is the maker of the articles mentioned as exhibited at Cincinnati.

IMPROVED BREAST-STRAP PROTECTER FOR HARNESS

Our engravings show an improved method of protecting the breast straps of harness, by which they are saved from rapid wear. It consists in the combination of a curved shield with two links, which are hinged to the ends of a shield, and clamp the latter to the breast strap.

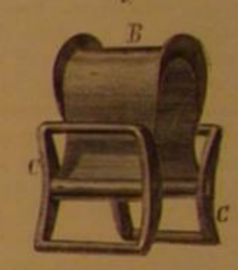
Fig. 1 is an edge view of the whole attachment, and Fig. 2 a side view of the shield with the links. A represents the breast strap, and B the curved metal shield, placed against the inner side of the breast strap, and its curvature being such as to fit the strap, as shown in Fig. 1.

To the ends of the shield are pivoted central cross-bars of the two links, C. These links are made of iron or other suitable material, in the form shown in Fig. 2. Their sides are slightly bent, to give the peculiar shape shown in Fig. 1.

The strap is drawn through both links, and rests against the outer surface of the shield. As draft is applied, the links firmly clamp the shield against the strap. The ring of the neck yoke will wear against the shield instead of cutting away the strap as has hitherto been the case. Instead of merely being drawn through the links, the ends of the breast

Fig. 1

Fig. 2



strap may be attached to the outer ends of the links. The strap would in that case, extend from the link to the collar, and thence forward through the link and around the shield, the action of the apparatus being the same as in the other method of attachment above described.

Patented, Sept. 6, 1870, through the Scientific American Patent Agency, by Lorenzo R. Ward, of Ward's Corners, Iowa.

PERPETUAL MOTION.

We shall commence in our next issue a series of illustrated articles on Self-Motive Power. We have ample material for extending the subject through the year 1871, but shall continue their publication no longer than they are likely to prove of interest to our readers. For many of the designs and descriptions we shall lay tribute to a recent London work, edited by Henry Dircks, C.E. Others will be obtained from local sources, many of which possess most melancholy interest to those who have expended a life of study and a fortune in pursuit of the chimerical "*Perpetuum Mobile.*"

How to Stop the Leakage of Gas-Taps.

Many people are annoyed by the slight leakage of gas-taps, causing an offensive odor deleterious to health in the apartments where they are placed, and also increasing their bills. In many cases they may easily remedy the evil without sending for a plummer or gas-fitter. To do this they should turn off the gas back of the meter; then take out (a screw driver is all the tool required) the plug. Next light a wax, sperm, or paraffin candle, and drop the melted wax, sperm, or paraffin upon the surface of the plug, till it is covered with a thin layer. Next, screw in the tap, and in nine cases out of ten the leak will be stopped, and remain stopped.

The manufacturers of Berlin who have given employment to German workmen expelled from Paris, are said to be extremely well satisfied with the result. A great number of handsome and useful objects, known as *articles de Paris*, can be already produced in Berlin, quite as elegant as those of the French capital, and considerably cheaper. We believe the French will one day discover that they made a grand blunder in driving beyond their frontiers an industrious population who have so largely contributed to the prosperity of France.

Scientific American,

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Contents:

(Illustrated articles are marked with an asterisk.)

THE "SCIENTIFIC AMERICAN"—WHAT IT HAS DONE AND WHAT IT EXPECTS TO DO.

What might seem egotistical in an individual—a talk solely about himself—is pardonable in a newspaper, in placing before the public its claims for support and patronage, and the proprietors and publishers of the SCIENTIFIC AMERICAN would certainly prove themselves far superior to the ordinary weaknesses of mankind could they suppress all expression of gratification at the splendid and growing success of their journal.

The increase in quantity and variety of its contents, secured by contributions from the most popular scientific writers of the day, has been amply repaid in increased popularity and enlarged circulation; and our promise to maintain our paper at the very head of all papers of its class published in the world, has been kept, not only to our own satisfaction, but to that of our readers, as our numerous correspondents daily testify.

It has been the aim of the publishers rather to lead the minds of readers into new, suggestive, and profitable channels of thought, and to open the way for new applications of useful discoveries in the arts, than to dwell, at the risk of self-repetition, upon worn-out and thread-bare topics. To this end the foreign and home scientific publications have been ransacked for additions to useful knowledge, and the condensed results of these researches are weekly laid before our readers.

Our mechanical descriptions and illustrations are highly valued at home and abroad, and the most important are constantly reproduced in foreign engineering and scientific publications, and full credit given to their source.

Wherever the English language is spoken or read, our paper finds its way; and our advertisers are constantly surprised by letters of inquiry from distant and out-of-the-way places, from which they had no thought of patronage.

Our correspondence columns have been ably sustained, and the discussion of the single topic of balancing cylinders, etc., in the present volume, is worth more to any mechanic than the price of subscription.

Of the editorial department, we need only say, that the extensive copying of its articles sufficiently indicates their practical and scientific value, while their suggestiveness is shown by the correspondence, inquiries, and inventions they call forth.

Thus much for what we have already done. A word now in regard to the future conduct of the paper.

We are approaching the end of the volume and the end of the year, and our subscribers may rest assured that our motto is still "*Excelsior.*" There is to be no retrograde movement. We shall advance with the general advancement of the period. And while we shall, in future, perhaps pay more attention to matters of general scientific interest, we shall do this in such a popular style, that all our readers shall be interested, and without lessening the practical character of our eminently practical journal.

While we are thus laboring to our utmost to make the SCIENTIFIC AMERICAN a necessity to every individual desirous of a reliable and thorough record of scientific and mechanical facts and progress, we are sure our legion of friends will continue their efforts to extend its influence and circulation. The best assurance that a subscriber can give of his satisfaction with our paper is the name of a new subscriber won by his solicitation. It is only by increase of circulation that we can increase our scope and variety of matter; and subscribers, who now get more for their money than any other paper in the world gives, will get still more for all the increase of our subscription list effected by their aid.

BEET-ROOT SUGAR—HOW THE WAR IS LIKELY TO AFFECT THE MANUFACTURE IN FRANCE.

As we have anticipated, the production of beet-root sugar in Europe is likely to be very largely diminished. In view of this prospect prices are advancing, and as the proportion of beet-root sugar in the world's consumption is a very large percentage of the entire aggregate, it is probable that for some time to come high prices in all kinds of sugar will be the rule.

The recent terrific hurricane in Cuba has probably done serious injury to the cane-growing regions, and the news has at least temporarily stimulated the market.

The Department du Nord, in which the German forces are now operating is one or the richest of the beet-producing regions of the earth. The effect of the campaign upon the sugar industry is thus described by a resident of the North of France:

"What is the result to us? Why, ruin. In my *pays* no less than twenty-two beet-root mills were to have been set in motion this year. They are built—they are ready, but we have no workmen, and no coals. The young men who were exonorated, and who had drawn good numbers—who had, in short, settled to industrious lives, thinking that the State had no further military claims upon them—are drafted off absolutely like *les moutons de monsieur!*"

In England the effect of this has been to stimulate efforts to introduce the beet-root sugar manufacture into that country, and the English journals are at the present moment discussing the subject with vigor. A prominent journal, hitherto of decided free-trade proclivities and antecedents, admits that but for a rigid protective policy there would never have been a beet-root sugar industry anywhere. The admission, however, is salved over by the expression of a doubt as to whether, afterall, the "game was worth the candle," and this concession to a protectionist policy is made with ill grace and wry faces.

How the war will affect, if it affect at all, this infant industry with us, it is hard to say. If prices should be greatly stimulated it may temporarily assist in the development and prosperity of the establishments already in operation, but can we think, not permanently influence the manufacture one way or the other.

SHAD VS. BLACK BASS.

An important and interesting discussion has recently been conducted in *Forney's Weekly Press*, in which all pisciculturists, sportsmen, and even the general reader ought to be interested, since it intimately relates to the stocking of our rivers with fish. The controversy may be said to be that of Shad *vs.* Black Bass, in which Black Bass has been called upon to show cause why he should not be laid under perpetual injunction not to enter the waters of the Delaware.

The plaintiff in the case brought numerous witnesses on the stand to prove the ruffianly and predatory character of the defendant, and to show that his entrance into the peaceful waters of the Delaware, would result ultimately in the extinction of that branch of the Shad family now inhabiting and holding peaceable possession of the said Delaware River, as the powerful Black Bass race were known to be of so warlike a disposition, and so prone to kill and devour the infants of the Shad family, as also the infants of all other honest, peaceable, and innocent fishes; that the two races could not live together in the same waters, consistently with the welfare and peace of the commonwealth; and that the superior prowess of the said Black Bass, his heirs, and assigns would enable him and his descendants to drive out and destroy all members of the house of Shad from their present habitation.

The principal witness on the part of the plaintiff was Dr. Slack, of Troutdale, the extensive and well-known pisciculturist, who testified as follows:

"The black bass is one of the most voracious of our fresh-water fishes. Breeding rapidly, and, it is said, guarding the nest in the manner of our common sunfish, it can bid defiance to any other denizen of our waters. Even the pike will disappear in waters in which the black bass has been introduced. It frequents the upper portion of rivers above tide water, and its food is almost entirely young fishes, of which one bass will destroy an immense number.

"Now, what will be the effect of the introduction of this fish in the Delaware river? Certainly our young shad have already too many enemies without our having recourse to a new and extremely dangerous one. Frequenting, as I have said, the upper portion of our river, they will certainly encounter the young shad in their descent toward the ocean. It has been asserted that they will not inhabit the same waters as other valuable fishes.

"In opposition to this statement, I would say that on the evening of October 10, 1870, Mr. Williams, of Upper Black Eddy, while seining the river for rock-fish, captured a bass of two pounds weight, which had probably escaped from the Schuylkill. At that date, as is well known, the river was filled with young shad on their downward trip. I must therefore state that I oppose in toto, as do many of our oldest and most experienced fishermen, the introduction of black bass or any other carnivorous fishes into the Delaware, believing that such introduction would seriously affect, if not totally destroy, the shad fisheries of that river."

The Commissioners of the State of New Jersey concur in the opinion of Dr. Slack, who is himself one of the Commissioners. They say:

"We decidedly object to the introduction of black bass into the Delaware river, believing it will be detrimental to the shad fishing interests. This is our honest, unbiased opinion, and as such, we have never hesitated to express it."

On the other hand, a man who signs himself "Fisherman," believes the bass will not interfere with the shad to their detriment. He says, in addition to this opinion, that the principal cause of the fall off in shad is the unrestrained pouring in of refuse and filth from the drains of coal oil refineries and the like into the creeks, and thence to the rivers. Whenever a freshet has occurred in the Schuylkill the river is poisoned to such a degree as to kill the shad and other fish in great numbers. Stop the filth and you need not fear the bass. On the other hand, he has fished considerably on the Potomac river where bass and other fish, even more voracious are abundant, and yet the shad fail not to increase in that river ten times as fast; perch and rock-fish are at the same time a hundred times more abundant, millions upon millions of eels swarm its waters (than whom no fish in inland waters is more predatory), and catfish are considered refuse at the fisheries on account of their great numbers. They predatory, and yet they all thrive. Let the proper authorities prevent the cause of the disease and all will go well enough, but until then all will be in vain."

Notwithstanding the facts stated by "Fisherman" go to show that various kinds of predatory fishes may inhabit the same waters in company with those less formidable, and without the total extinction of the latter, and notwithstanding the facts he states are familiar to all sportsmen, it is nevertheless a fact, that numerous instances are on record of the extinction in streams of weaker fishes by the introduction of more powerful ones, and the great diminution of the numbers of certain fishes from this cause is a fact of which every neighborhood almost has its legend. If the authorities are wise the bass will be excluded from the fair waters of the Delaware, as in point of value to man they are incomparably inferior to the shad, although their being "game fish" renders them more desirable to those who fish only for amusement.

THE PRINCIPLE OF BRACING.

Very few mechanics understand the true principle of bracing, but they may readily discover it by performing a very simple experiment. If four bars of wood be joined together by pins in the form of a square, each corner being joined by a single pin, it will be found that the square thus formed may be altered to the form of a rhombus, by an exertion of force only sufficient to overcome the friction of the pins and the inertia of the bars. If three bars be joined by pins at the corners to form a triangle, it will be found that not the slightest change in form can be produced except by the rupture of the bars or pins, or such as is due to the elasticity of the materials.

If any number of bars more than three be joined in a similar manner to inclose an area, no matter what may be its shape, that shape may be altered without rupturing the pins or bars. The triangle is then the only figure, the shape of which cannot be altered without breaking or stretching the sides. For the alteration of the form of a triangle involves the lengthening or shortening of at least one of its sides, while the alteration of form in any figure having more than three sides may be made without any change in their length.

To secure the greatest possible rigidity then, the sides should, if made of homogeneous material, be equal in length and size, for, as elasticity will always admit some flexure, that side will stretch most which has the greater length. But an equilateral triangle cannot have a right angle, and hence is not practical in bracing under ordinary circumstances of construction where the corners to be braced are mostly right angled.

The next most rigid form would be to have the two legs of the triangle terminated by the brace equal, but this involves, in calculating the length of the brace, the use of the square root of 2 as a multiplier—a cumbrous decimal. Carpenters, for the most part, adopt the plan of laying out the legs of the right angle in the ratio of three to four, then the proportional length of brace will be five of the same denomination of length. This is a very convenient rule, depending upon the fact that the square root of the sum of the squares of three and four is five, and another fact that the hypothenuse of a right-angled triangle is equal to the square root of the sum of the squares of the other two sides. This gives sufficient stiffness for ordinary purposes, but where very heavy strains are to be sustained it is better to make the brace cut off equal distances on the post and beam.

The principle of bracing might be advantageously employed in many cases where it is not at present used. We were once much pleased with a very light, yet strong, ladder, which owed its strength in great measure to a series of wire braces extending from a flat ring around the middle of each rung, to the side pieces, and tightened by a nut and washer. This ladder, though much lighter than ordinary ones of equal length, was yet more rigid, and was free from the springing of ordinary ladders under the step. A good tension brace is oftentimes more effective than those which offer resistance in both directions, and this form of bracing is becoming more and more used in modern bridge building, and in the construction and setting up of machines. But with these, as with the other class of braces, it is true that the nearer equal they can be made to the other sides of the triangles of which they form the third sides, the more rigid will be the structures they are designed to strengthen.

PYROTECHNIC MIXTURES.

Lieutenant Harder, of the Artillery Corps, recently presented to the Physical Society of Frankfort the following table of mixtures for producing colored lights. As they are founded upon practical experience, we copy them for the benefit of our readers:

1. White light: 8 parts saltpeter, 2 parts sulphur, 2 parts antimony.

2. Red light: 20 parts nitrate of strontia, 5 parts chlorate of potash, 6½ parts sulphur, 1 part charcoal.

3. Blue light: 9 parts chlorate of potash, 3 parts sulphur, 3 parts mountain blue (carbonate of copper).

4. Yellow light: 24 parts nitrate of soda, 8 parts antimony, 6 parts sulphur, 1 part charcoal.

5. Green light: 20 parts nitrate of baryta, 18 parts chlorate of potash, 10 parts sulphur.

6. Violet light: 4 parts nitrate of strontia, 9 parts chlorate of potash, 5 parts sulphur, 1 part carbonate of copper, 1 part calomel.

For the so-called stars, the ingredients of which are to be stirred in with alcohol, the following mixtures can be recommended:

1. White stars: 9 parts saltpeter, 3 parts sulphur, 2 parts antimony.

2. Red stars: 20 parts nitrate of strontia, 12 parts chlorate of potash, 11 parts of sulphur, 2 parts charcoal, 2 parts antimony, 1 part mastic.

3. Blue stars: 20 parts chlorate of potash, 14 parts carbonate of copper, 12 parts sulphur, 1 part mastic.

4. Yellow stars: 20 parts of chlorate of potash, 10 parts of bicarbonate of soda, 5 parts of sulphur, 1 part of mastic.

5. Green stars: 12 parts of nitrate of baryta, 28 parts of chlorate of potash, 15 parts of sulphur, 1 part of mastic.

6. Violet stars: 9 parts chlorate of potash, 4 parts nitrate of strontia, 6 parts sulphur, 1 part carbonate of copper, 1 part calomel, 1 part mastic.

APPLICATION OF RUHMKORFF'S INDUCTION COIL TO THE COPYING OF DRAWINGS.

All draftsmen are acquainted with the simple device of puncturing holes through a drawing for the purpose of obtaining an outline and afterwards transferring the outline by sifting fine plumbago or other powder through the small holes. The fatigue of making the holes by hand is very great, and M. Canderay, of Lausanne, proposes to employ the induction coil for this purpose.

A table covered with tin foil is connected with the negative pole; on it may be placed as many sheets of paper as the spark will pass through. The positive pole, consisting of a metal bar, insulated with gutta-percha, can serve as a pencil for copying the tracings. The metal point of the pencil being moved about on the contour and outline of the engraving, electric sparks spring across every time a connection is made, and puncture fine holes through the paper.

It is said to require little skill to guide the pencil, as the ink tracings being good conductors, carry the pencil easily along. In the case of valuable engravings it is better to make a copy with the pantograph and use that for the punching process. The pantograph is connected with the positive pole of the induction apparatus, and it is placed upon a table, one half of which is covered with tin-foil. The drawing to be copied lies upon the insulated half, and the sheets of paper to be punctured are laid upon the tin-foil. The pointer of the pantograph moves around the outlines of the engraving and between the pen and the foil the sparks pass to pierce the paper upon which the outline is to be made. In this way the engraving or original drawing is in no way injured.

Important to Manufacturers.

The law granting to foreigners patents on designs and trade-marks, is of great importance to manufacturers abroad, whose goods are brought to the American market; and it is well they should know that manufacturers in this country who have been in the habit of copying foreign designs in the fabrication of their goods are opposed to this law and will besiege Congress during the winter session for its repeal or modification, so as to discriminate against foreign manufacturers. It is therefore important to manufacturers abroad to avail themselves at once of the law as it now exists. Pamphlets of information furnished free at this office.

Female Type-Setters.

"It is said that there is no hope of there ever being a large supply of female type-setters in the market. As soon as a girl becomes a proficient and valuable compositor some male printer marries her, and that puts an end to her work in the printing office."

So says one of our exchanges, and there is considerable truth in its statement. We have had female compositors in our office for several years, and like them very much indeed. They have proved sober, truthful, and faithful in the discharge of duty. It is true that we have lost some excellent girls in consequence of the greater attractions of matrimony, but what we lost in this way was gained by the man fortunate enough to find so good a partner. We have found it somewhat inconvenient to tolerate much courting in our office, but this intrusion upon business hours done away with, makes us decidedly favor the employment of female type-setters.

LETTERS FROM THE SOUTH.

ATLANTA, Ga., Oct. 23, 1870.

Atlanta—Great Progress—Future—Rolling Mill—The Fair—Climate of Northern Georgia—Marietta and Dalton Railroads—New & Old Ga. R. R.—Athens—Cotton Factories—Augusta and its Surroundings.

Twenty years ago Atlanta was a place of about 2,000 inhabitants. Previous to the war it contained nearly or quite 15,000. Almost totally destroyed by the misfortunes of war in 1864, it has rallied, and the census now gives 29,000 inhabitants. The traveler who looks on the thriving, rushing city of to-day is little disposed to believe that the fires of the war left only 3 business and 300 dwelling houses in the place, yet such is the fact. It truly deserves the name an enthusiast gave it of the "Chicago of the South." It has been much improved by the burning out, as hardly a house or store has been erected that is not of brick, and many new streets have been opened. The influx of settlers is great, as much as 2,000 in six months. What makes the place grow is hard to tell, but it grows, and grows with a solid class of inhabitants—mechanics and their families. It has one of the finest climates in the world. A number of railroad workshops are located here, as are also a large rolling-mill, a paper-mill, and other large manufactories, while a cotton factory to be run by steam is talked of, and will soon be built. The enterprising Kimball Bros. have it in hand, and they stop at nothing, and everything they touch seems to flourish.

The two great wonders of Atlanta just now are the Kimball House, and the new railroad passenger depot. The first is the largest, finest, and most complete hotel in the South, and if kept as well as it is fitted up, will bring many travelers to the place. It was commenced on the 28th of March, 1870, and the brick work was fully completed, and one half the house ready for guests on Oct. 17. This rapidity of construction would seem to make it insecure, but my Northern readers must remember first that Atlanta is a very dry climate, then the warm summer gave an advantage.

The railroad depot is entirely of iron, with galvanized roof, and with a row of brick offices on one side. It is 355 feet long, and 120 feet wide in one span. Its cost was $135,000, and the work is being done by a Philadelphia firm. It is to contain at least five tracks, to accommodate the five railroads which center at Atlanta.

Just in the city limits is the large rolling mill of Messrs. Scofield & Co. They roll railroad rails and merchant bars. The same firm own a couple of furnaces near Cartersville, on the Western & Atlantic R. R. Previous to the war they only re-rolled old rails; they have since placed the mill in a better location and enlarged it. They employ a large number of hands, and, I am informed, have made it a profitable business.

This is the week of the State Fair, and it has been in progress since last Wednesday. The show of machinery is very good, but nearly every piece of it is from the Northern or Western States. The engine which drives the shafting is from Corning, N. Y., and the boiler one of Root's patent.

The great increase in the use of improved plows and other agricultural labor-savers at the South was very apparent throughout my trip, and it is easy to see the great interest taken in them here. In vehicles the Atlanta manufactory makes a handsome show, fully equal to those from the North. In the line of cotton and woolen manufactures, the latter is creditable, the former almost disgraceful to a State which has 25 cotton factories, and raises so much of the staple. Only five are represented—one of these strictly woolen, another part cotton and part woolen. Two paper mills exhibit their products—the Atlanta and the Pioneer. The factories are the Eagle & Phœnix, Columbus, Chattahoochee, Kemp, and Concord—last woolen.

Dr. Land, a chemist, with Pemberton, Taylor & Co., exhibits for that firm numerous chemicals and perfumes, all manufactured in Atlanta. They are as good as I ever saw.

In stock there is not a great variety, though some very fine. Mr. Peters, of Calhoun, exhibits some fine bloods and crosses. I mention his name, for to him and his neighbor, Dr. Woring, is due much credit for improving the grade of Georgia stock.

The grounds are well arranged, and the buildings of a good character, and the general management of the Fair is very good. The officers of the society are polite and attentive, and but for that nonsensical show called a Tournament, in which a young man was killed, all would have passed off well. Col. D. W. Lewis, the present secretary, held the same position in the first State Society, twenty-five years ago.

At a County Fair which I attended at Dalton, in Northern Georgia, I saw some household furniture manufactured there from native woods, which in every respect would compare favorably with any of Northern make. Here all is from the North. But there is a rapidly growing sentiment here in favor of building up home manufactures, and Northern mechanics who come in and establish such are eagerly welcomed.

Atlanta has four daily papers, all supposed to be flourishing, though one of them sold a day or two ago that all put together did not have the circulation one should have. The *New Era* and the *Constitution* seem to take the lead. Besides these there are two agricultural, and several religious weeklies.

I have spoken of the fine climate of Atlanta, the same may be said of all Northern Georgia. It is invigorating, never intensely hot in summer, or severely cold in winter. From Atlanta to Dalton is high ground, thence the grade descends to the Valley of the Tennessee, at Chattanooga. Dalton is the terminus of the Selma R. & D. R. R., and the commencement of the Ga., East Tenn. & Va. R. R.; the Western & Atlantic runs through the place. Then a railroad is chartered from Dalton to Western North Carolina, and another to Stevenson, junction of Nashville & Chattanooga, and Memphis & Charleston Railroads. As with all other charters in this State, these roads have $16,000 in bonds per mile as each twenty miles are finished. The soil is good; on the west of the town the rocks are limestone mostly, and the soil likewise, while on the east the primitive rocks and soil prevail. Water power is not convenient, but coal is within fifteen miles by one of the projected railroads. It is now brought from Tennessee. Wood is abundant, cheap, and good. Iron ore is found close to the town.

Marietta, on the Western & Atlantic R. R., twenty miles north of Atlanta, is a beautiful town, noted for its delightful climate, especially in summer. The place itself has no manufactories except two tanneries, which seem to be flourishing. In fact, the whole line of this road seems to abound with good locations for this business. Near Marietta is the Concord Woolen Mill, mentioned as exhibiting at the State Fair. They employ 42 hands, and run 360 spindles and 16 Crompton looms. They get their fine wool from Pennsylvania, and get abundance of coarse from the surrounding country. The superintendent told me that near him on the Nickajack was a fine water power, about three miles from the railroad, that would run 4,000 spindles, and which might be bought cheap.

I consider the line of the A. & W. R. R. as particularly inviting to Northern people, and especially mechanics. Water power and coal are abundant. The best kinds of wood are cheap, and wagon-making and other species of wood-work might be made very profitable. The railroad is now under very liberal management, and Col. Blodgett, the superintendent, is desirous in every way of encouraging the incoming of settlers. Dalton, I think, is particularly a place of promise. It has been proposed to continue the railroad from Bainbridge to Columbus up to Rome, and thence to Chattanooga; this would open a new and good country to the westward, and perhaps injure Atlanta, but I do not think it will be so extended.

Traveling eastwards from Atlanta, we pass over the Georgia Railroad, which runs through a country that in the hands of good cultivators will be a fine region. It is already improving, especially near the town of Madison. By a branch road I reached Athens. This place is the seat of the State University, the residence of many of the wealthy and educated men of the State. It is probably the most polished town of the State, and is not the less famous for the talent of its men than the beauty of the ladies. And here I may say that the rich mountain air of this Northern Georgia produces that healthy glow and robust form seldom seen in the Southern beauty, the finest types of which are found in this region.

The town itself has but little vigor and enterprise, but there are located in its immediate vicinity five cotton factories, and one cotton and woolen factory in the town. The last runs 4,488 spindles and 78 looms on cotton, and 260 spindles and 6 looms on wool. It is one of the neatest factories I have been in. The Pioneer Paper Mill is also near the town, and a machine shop and foundery, which have a wide reputation for good work, are in the town itself. There are many other water powers unimproved. The Georgia Factory, one of the five, is the first factory ever built in the State, and some say in the South. None of these suffered from the war. The Athens Company's works have been built since 1860. They prefer American machinery.

North of Athens is a country almost unknown. It is rich in minerals, especially iron and gold, and is also a fine farming region. It is being opened to the world east and west by the Air Line R. R. from Atlanta to Charlotte, and another line is to built from Athens to Clayton, connecting them with Knoxville & Charleston R. R. Cotton grows well near Athens and for many miles above. There are two small cotton factories in this northern section.

The country surrounding Augusta is a cotton-growing region. It is frequently called the Black Belt because it was a section where many slaves were owned, and cotton almost exclusively grown. They are now rapidly learning that they can grow other crops as well as cotton.

Augusta is a place of considerable business, having a large trade from South Carolina, as well as Georgia. The river is navigated to Savannah by steamboats which might be better and run lighter. It has new railroads to Atlanta, Macon, Savannah, Charleston, and Columbia. I believe no new ones are prepared in the State direct to the place, though the Georgia Road is building several branches which will benefit the place.

There is one cotton factory in the city, which has become somewhat famous by large published profits. It should be remembered in looking at these figures that these profits are made not on the actual cost of the factory, but its present capital. It is certainly a well-managed concern, but I doubt if so well arranged or so perfect as the Eagle and Phœnix, at Columbus. This Augusta factory is stated to contain 15,000 spindles and 600 looms. The water power is apparently inexhaustible, but I was informed that the canal will have to be enlarged to meet the increasing wants of this factory. The canal has three levels, and a fall of 45 feet. Several good sites for small factories are for sale.

The city has water-works, using river water, filtered and pumped to a tower reservoir. The gas works use coal, some Tennessee and some Northern. It is a beautiful city, and the broad streets with their rows of trees render it very attractive to the eye of the pleasure tourist, but extremely odd to a business man.

On the line of the Ga. R. R., sixteen miles from Atlanta, at Flat Shoals, I was told that Mr. Christy, of the Passaic (N. J.) mills, had purchased, and would there build a factory and remove his machinery.

East of Augusta, and but a few miles over South Carolina boundary, is the well-known Graniteville Factory and the Bath Paper Mills, both said to be flourishing institutions. On the east side of the river a railroad is being built to connect the city with Port Royal, S. C.

Augusta is a far better cotton country than Atlanta, yet it has not the climate of that place, and while the latter has been growing with astonishing rapidity the former has been almost at a standstill. There is, however, much solid wealth in Augusta, and its people do well what they undertake.

I cannot close without mentioning the new and really superb bridge built over the Savannah by the Charlotte & Augusta R. R. Co. It is a credit to their enterprise, especially when the old dangerous affair of the South Carolina road has become a time-honored institution. H. E. C.

American Silk and Steam Plowing.

From an address delivered by the U. S. Commissioner of Agriculture at the Illinois State Fair, held in September, we cull the following extracts:

SILK PRODUCTION.

It is not strange, in the beginning of our career of industrial development, that the little silk worm has been neglected as a source of employment and wealth, and the national appreciation of *Bombyx mori* may have been modified by a remembrance of the *Morus multicaulis*. It would be creditable and profitable to us, as a nation, could we outgrow the tendency to *mania* in the initiation of a new rural pursuit, and thus avoid its disastrous abandonment and deep-seated prejudice, which long prevent its successful introduction. The signs of the present time indicate, for the rearing of silk worms, an assured success, and a permanency of decided promise. As labor multiplies, an interest like this, capable of almost indefinite extension in manufacture, acquires vastly increased importance. Already four of the seven branches of silk production can compete with foreign nations, namely, "Throwing" of the silk or preparation of the threads, the dyeing of silk, the regeneration and spinning of silk waste, and the automatic weaving of plain stuffs. In silk-weaving England now employs 200,000 persons, and the utilization of silk waste in France requires 30,000 workmen, and realizes $20,000,000.

We believe we can yet compete with outsiders in rearing the worms, reeling the cocoons, and weaving figured goods. California already produces millions of cocoons, in a climate in which the worms are thus far as healthy as any in the world; and the Eastern and Southern States are beginning to embark in the business. The sale of eggs for exportation at $4 to $10 per ounce, has been temptingly remunerative since the prevalence of the silk worm disease in Europe, which inflicts an annual loss upon France alone, according to M. Thiers in a speech in the Corps Legislatif, of $20,000,000 annually. In eighty years, the annual value of the silk manufacture of France has advanced from $5,000,000 to $150,000,000.

Who will venture to estimate the value of silk goods in the United States thirty years hence, manufactured from American cocoons? Thousands of individuals (in suitable climates) incapacitated for the severe labors of agriculture, can compete successfully for the supply of the raw material.

It may be an interesting fact to the dwellers in these prairies, begirt with osage orange hedges, that the naturalist of the Department of Agriculture has readily obtained cocoons of beautiful silk, from worms feed exclusively upon the *Maclura aurantiaca*; this experiment has been confirmed by a late communication received at the Department, from a reliable correspondent, who states that he has, the past season, fed upwards of ten thousand worms, with perfect success, upon the osage orange alone.

STEAM PLOWING.

Among the improvements of the future, inevitable in successful accomplishment and beneficent in its results, I deliberately place that of steam culture. Its success is already assured in Europe. Five sets of steam machinery are now in active and profitable operation in this country—three upon sugar plantations in Louisiana, and two on a cotton plantation in Mississippi. A set run by two 20-horse power engines, cultivating to the depth of twenty inches, last year produced a hogshead of sugar more per acre than horse-power culture by its side.

We shall make changes in this English machinery—we may perfect a thoroughly American machine (though it should not be forgotten that the Fowler method is based upon an American invention) before the use of steam in culture becomes general upon our farms; but that result is sure to come, and I see no reason why it should not soon be reached. It is folly to assume that the noble art of agriculture is to derive no benefit from steam, or that commerce and manufactures must exclusively appropriate an invention which has already wrought a revolution in the industries of the earth.

THERE are probably 50,000,000 acres of sterile plains between the Mississippi river and the Rocky Mountains. Some of them are too barren to produce anything, while some could be made productive by irrigation.

Tanning in Pennsylvania.

The Philadelphia *North American* states that new tanneries, on the most improved plans, are being established in the immense bark regions of northern Pennsylvania, on the line of the Philadelphia and Erie Railroad and its tributaries, and infers that these are for the supply of the New York hemlock sole leather market, as the bark is exhausted in Wayne county, Pennsylvania; and Greene, Delaware, Ulster, and Sullivan counties, New York State, which have for nearly half a century been the headquarters of the hemlock tannage for New York market. But the whole of the mountain regions of Pennsylvania are covered with such boundless forests of oak, hemlock, and chestnut, that the facilities for tanning are unlimited. Philadelphia has been and still is the center of the oak sole leather business.

Philadelphia, formerly a market chiefly for Yankee boots and shoes, is now a great manufacturer of all kinds of footgear herself; and her products are preferred generally by the buyers from the interior, south, and west. This should give a great impetus to the tanning business in the interior of the State, along all the lines of railway traversing the forest regions. The preference, however, seems to be given to Philadelphia, on account of the facility of access to ample supplies of hides, foreign and domestic. Three thousand head of cattle are sold there every week, and the consumption of meat by such a city throws a constant fresh supply of hides on the market. For this reason, the preferred plan is to gather the bark in the forest, ship it to Philadelphia, and tan the hides there; since, if the tanneries be established in the forest, the hides must be shipped thither. In New York operations the plan pursued is to establish the tanneries in the bark regions, and send the hides to them by rail. As the supply of hides, both foreign and domestic, is much larger there than in any other part of the country, the dealers are able to keep these tanners always busy. But in many cases the city houses engaged in the hide and leather trade own and work the country tanneries. In other cases the large city houses sell on commission for the country tanners, to whom they make cash advances, the same as in the domestic dry goods trade.

By these arrangements the large importations of foreign hides, and the heavy sales of cattle in the New York market, have a direct relation to the tanning and leather trades, and the great operators in cattle are aided in their efforts to command the meat market of the whole region near New York. The importers of hides are, of course, sure of a market at all times among the country tanners; while, at the same time, the live stock dealers of New York seek to increase the local consumption of meat in suburban towns, to enhance their marketable supply of hides.

CURIOUS PHENOMENON.—J. S. McKinsey, of Caddo Grove, Johnson Co., Texas, writes us that in some of the wells in that vicinity, the water always sinks during the prevalence of a north wind, and refills again on the change of the wind to another quarter. The wells are about 300 miles from the Gulf of Mexico, and at a considerable distance from any river. If the facts are as stated, this is a most singular phenomenon, and one for which no explanation which occurs to us seems adequate.

SMOKY CHIMNEYS.—I. S. Clough has tried D. R. Miller's plan of curing smoky chimneys, recently published in our correspondence columns, and writes that it works admirably. The plan is, substantially, to fill up the chimney to where the pipe enters it.

THE silver mine in Sterling, Mass., which was worked before the revolution and its ore carried to England, has been leased by Fitchburg parties, and is to be at once reopened.

APPLICATIONS FOR THE EXTENSION OF PATENTS.

MACHINERY FOR FORMING HAT BODIES.—Ira Gill, Walpole, Mass., has petitioned for an extension of the above patent. Day of hearing Dec. 28, 1870.

PLATFORM SCALES.—Thaddeus Fairbanks, St. Johnsbury, Vt., has petitioned for the extension of the above patent. Day of hearing Dec. 28, 1870.

FEEDING LUMBER LATERALLY IN SAWING MACHINES.—Samuel R. Smith, Cincinnati, Ohio, has applied for an extension of the above patent. Day of hearing Jan. 4, 1871.

STRIPPING THE TOP FLATS OF CARDING ENGINES.—William B. Bates, Mansfield, Mass., administrator of George Wellman, deceased, has petitioned for an extension of the above patent. Day of hearing Jan. 11, 1871.

HARROW.—Daniel W. Shares, Hamden, Conn., has petitioned for an extension of the above patent. Day of hearing Jan. 11, 1871.

MACHINE FOR CUTTING TENONS ON BLIND SLATS.—Seth C. Ellis, Jersey City, N. J., has petitioned for an extension of the above patent. Day of hearing Jan 18, 1871.

METHOD OF JOINING BOXES, ETC.—James Stimpson, Baldwinsville, Mass., has applied for an extension of the above patent. Day of hearing January 18, 1870.

ACCELERATING FIRE-ARM.—Azel S. Lyman, New York city, has applied for an extension of the above patent. Day of hearing Jan. 18, 1871.

MACHINES FOR CUTTING VENEERS.—Peter Cook, Tonawanda, N. Y., has petitioned for an extension of the above patent. Day of hearing Jan. 18, 1871.

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.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

2,636.—Brussels and Tapestry Carpets.—George Crompton, Worcester, Mass. October 5, 1870.

2,642.—Working of Galvanic Batteries.—E. D. McCracken, H. J. Newton, H. B. Kirkland, and J. B. Husson, New York city. October 5, 1870.

2,662.—Bows, Scarves, etc.—E. H. Clark, Chicago, Ill. October 7, 1870.

2,668.—Process for Treating the Ores of Metals, and the Apparatus and Mechanical Appliances used therein.—B. Spencer, New York city. October 8, 1870.

NEW BOOKS AND PUBLICATIONS.

MODEL SUBURBAN ARCHITECTURE, Embodying Designs for Dwellings of Moderate Cost, varying from $1,400 to $5,000. Together with Extensive and Elaborate Villas, Banking-Houses, Club-Houses, Hotels, Engine-Houses, and a Variety of Architectural Features, Interior and Exterior, given to the Largest Scale of any Similar matter ever before published in this country or Europe, most of which have been Prepared for Execution in Different Localities in the Eastern and Middle States. By G. B. Croff, Architect, 179 Broadway, Saratoga Springs, N. Y. Sold by A. J. Bicknell & Co., Troy, N. Y., and Springfield, Ill.

We can say nothing further for this book than is said in its title as given above, except that the designs are such as, in our opinion, are calculated to prove of much service to suburban builders. The book is got up in creditable style in respect of text, engraving and binding, and is of quarto form.

SIGN, CARRIAGE, AND DECORATIVE PAINTING. Including Full Instructions in Fresco Painting, and a vast amount of Useful Information derived from Practical Experience. By S. Gibson, Practical and Decorative Painter. New York: Jesse Haney and Co., Office of "Haney's Journal," 119 Nassau street. Price, 50 cents.

This is one of a series of small, but thoroughly practical trade manuals, which are proposed to be issued by Messrs. Haney & Co. We judge the aim has been to give practical directions and plain recipes calculated to guide the ordinary workman in his processes rather than to dwell at length on the theory of the harmony and mixing of colors, although on the latter head there are some useful remarks. The amount of information condensed into this work could scarcely be greater, considering its size and price.

DIRECTORY OF THE PLUMBERS, GAS AND STEAM FITTERS, AND COPPERSMITHS. Also the Gas Companies, with the Names of their Presidents, Secretaries, and Treasurers in the United States for 1870. Comprising a List of the Names and Addresses of Persons and Companies in these Trades in every City and Town in the United States. New York: J. Arthurs Murphy & Co., Publishers, 111 Nassau street. 1870.

This is one of a series of directories for these and other trades which are designed to be issued by these publishers.

DYSPEPSIA: Its Varieties, Causes, Symptoms, and Treatment, by Hydropathy and Hygiene. By E. P. Miller, M.D. New York: Miller, Haynes & Co., No. 41 West Twenty-sixth street. 1870.

This is a little work bound in pamphlet form, which discusses the function of digestion, the causes of dyspepsia, its symptoms and treatment, general and special. It is written in a plain style, and will be read with interest by all who expect to have, or do not wish to have the harassing and undermining disease of which it treats.

SNAIL SHELL HARBOR. INTO THE HIGHWAYS. CHARITY HURLBURT. Boston: Henry Hoyt.

These three volumes are issued from the well-known publishing house of Henry Hoyt, of Boston, and are handsomely printed and bound. The works are primarily intended for the young, and are designed to enforce upon their minds in an easy and graceful manner the great lessons of the Bible. Henry Hoyt never publishes a book which may not be safely recommended on sight, and these three volumes are not exceptions to this well-merited confidence in whatever issues from his press. The volumes before us are excellent gift books, and can be obtained in this city of N. Tibbals & Son, No. 37 Park Row.

QUERIES.

[We present herewith a series of inquiries embracing a variety of topics of greater or less general interest. The questions are simple, it is true but we prefer to elicit practical answers from our readers, and hope to be able to make this column of inquiries and answers a popular and useful feature of the paper.]

1.—What kind of mold is necessary to cast articles out of ordinary soft solder, or similar composition of alloy?—T. P.

2.—How can buckskin gloves be made soft, white, and pliable after they have been washed?—G. C. L.

3.—Can small zinc shafts be turned in a lathe? If so, what form of tools is necessary? I have tried it and don't succeed to my satisfaction. G. D. B.

4.—How can I make long leather cord of even thickness and perfectly cylindrical for small belts—the diameters to not exceed one tenth of an inch? What is the best leather for this purpose?—A. R. K.

5.—I wish to make a number of holes one tenth of an inch in diameter in a brass plate. It is absolutely essential that they should be exactly uniform in size, and bored perfectly true. The plate is an inch and one half thick. I find I cannot drill them with sufficient accuracy. Will some experienced workman tell me how I can make a good job of this?—G. F.

6.—Is there no way in which atmospheric pressure may be made to force water in a pump higher than the general average of thirty feet? I think I have read of some method for doing this, but cannot now remember where I saw it or what it was.—J. K. F.

7.—Will some one inform me how the coating on oiled silk is spread so uniformly and thinly?—J. D.

8.—Can the cutting power of a glazier's diamond be restored when it ceases to work well? I have such a diamond, but it does not cut properly.—E. P. G.

9.—What is the cement used for putting the plush on hat bodies, and how is the operation performed?—R. B. S.

10.—I wish to know from practical millers the proper speed for millstones to do the best work in grinding the various cereals milled in this country. I find little or nothing in the practical (?) works on milling I have purchased to gain knowledge on this and other points.—J. Y.

11.—I wish to make several ladders twenty feet in length. How shall I make them to combine greatest strength with least weight? Can such ladders be practically made to fold up to the length of an ordinary truck wagon without making them so weak as to be unsafe?—L. A.

12.—I wish a good recipe for cheaply bleaching woolen rags.—S. T. D.

13.—Will some practical mechanic tell me how I can bore out true a segment of a hollow cylindrical ring, the segment being the sixth part of such a ring, the diameter of which is two feet, and the diameter of the bore being required to be six inches?—L. V.

14.—How are the hollow hemispheres in bullet molds made so accurately?—J. B. C.

15.—Can wind wheels or feather wheels, such as are used in the striking movements of clocks be relied upon to give a perfectly uniform motion to a train of wheel work?—L. M. M.

16.—I wish to run down from a steep side hill this winter a large quantity of logs. Will some reader of the *Scientific American* tell me the best way to make a sliding way, as is done in Maine and Vermont?—A. R. B.

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 advertisements at $1.00 a line, under the head of "Business and Personal.

All reference to back numbers should be by volume and page.

S. L., of ——.—We repeat our answer to A. M. T., of Mass., in regard to the aggregate pressure of the atmosphere upon the earth's surface being less than the entire weight of the atmosphere. Your illustration of your argument against this proposition of the water in three tumblers, the first being shaped like the frustum of a cone, the second a cylinder, and the third an inverted frustum of a cone, and each weighing the same, has no point bearing on the question at issue. If your argument is correct, and the pressure on each square inch of surface is more than the weight of a vertical column, this pressure would increase with decrease of the size of the earth. Let us now suppose the earth reduced to an infinitely small sphere, a material point. The pressure on this point would be, according to your theory, infinitely greater than on the same area of surface now, and you then have the mechanical and mathematical absurdity of a definite weight, producing an infinite pressure, without antecedent motion. Take another look at this subject.

W. H., of ——.—Authorities differ as to the mechanical power of the human frame, compared with that of the horse. Hassenfratz considers the power of a man in carrying loads on a level road to be one eighth that of the horse, and in drawing loads one seventh horse power. Coulomb makes it from one-seventeenth to one twenty-fourth horse power in drawing loads, the man using a wheelbarrow, and the horse using a four-wheeled or two-wheeled vehicle, the ratio being greater when the horse is attached to a two-wheeled vehicle than a four-wheeled one. We consider a fair average would be to allow for the power of a man one tenth that of the horse.

B. F. W., of Ga., says W. H. L., of Pa., and his neighbors can destroy "small red ants," by placing cracked hickory nuts (or shell barks are the best), in plates; the ants will collect in large numbers to eat the cracked nuts, then throw them (the ants and nuts) into the fire, or into boiling water. This plan has been practiced successfully in ridding houses of this pest. Cracked chicken bones or sugar may be used for the same purpose, but are not so good, as the ants become sooner satisfied, and retire; whereas they can only nibble off minute portions of the nuts and collect in larger numbers on them. Persevere in the above plan and the ants will be destroyed.

W. L. J., of ——.—Any solvent you may use to remove the tar spilled upon the granite block will be apt to stain the stone permanently, by carrying into the texture tar in solution. If this is not an objection, soften the tar by holding near it or over it a heated stone, or a hot plate of iron, then dilute it with oil, and scrape off as much as you can get off. Add a little more oil, and wash with soft soap and water. Wipe dry, and complete the washing with benzine.

J. R. St. C., of ——.—The speed of the Irish mail train from Chester to Holyhead, England, is between forty-two and forty-three miles per hour. Forty miles per hour is about the average speed for fast trains in England. No train has ever run at eighty miles per hour, and in our opinion never will. Single locomotives have sometimes accomplished sixty miles an hour, and it is possible they have drawn light trains at tha speed, but if so the instances are not numerous.

A. D., of N. Y.—From your statement we infer that you are attempting to raise the water from your well through a greater distance than an ordinary suction pump will raise water in your locality. If this be correct you will have to use a combined suction and force pump, the barrel of which is placed below the top of the well. The fact that the bottom of the well is drilled through rock, will prevent your using a chain pump.

D. D. K., of ——.—If you mean what expenditure of coal is necessary to get up a pound pressure in an ordinary boiler, your question cannot be answered. The larger the boiler the more it will take, if you wish to know how much coal it will take to evaporate a pound of water; the question is also indefinite. It will vary from three to ten pounds of water per pound of coal in the different kinds of boilers in use.

F. H. H., of Mass.—Commercial zinc, whether in ingots or sheets is liable to contain, and generally does contain, one or more of the metals, lead, iron, tin, cadmium, arsenic, and copper. It is rolled into sheets while heated between 200° and 300° Fah., at which temperature it is quite ductile and malleable. At higher temperatures it is extremely brittle, and volatilizes at a red heat.

E. M. C., of Pa.—With the ordinary run of engines, it is not safe to estimate the amount of evaporation per horse power per hour, as less than a cubic foot of water, but many of the most improved engines, using variable cut-offs, do much better than this.

N. S., of Conn.—Your question is utterly unintelligible. Tho answer to it, as it reads would be, "to ascertain the number of revolutions of a water wheel per minute, count them," but this cannot be wha you mean. What do you mean?

A. H., of Mo.—Steam pipes, one and one half inches in diameter, nearly closed with a limestone deposit, are ruined. There is no practical way to get off this scale, of which we are aware

Recent American and Foreign Patents.

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

SECURING STONES TO GRINDING AND SCOURING CYLINDERS, ETC.—H. C. Havemeyer and David P. Burdon, New York city.—This invention relates to a new method of securing stones or equivalent grinding or scouring articles to the rims of wheels or cylinders, with an object of insuring a simple method of fastening said stones, and of securely retaining the same in place.

MOSAIC FLOOR.—Joseph Stegmiller, New York city.—This invention has for its object to prepare a mosaic floor in such manner that the same can be prepared for use in the shop, and transported in a perfect state to the place where it is to be laid down.

FOLDING CHICKEN COOP.—J. R. Achenbach, Saddle River, N. J.—This invention has for its object to furnish a simple and convenient folding coop for chickens, young ducks, or other fowls.

ADJUSTABLE DRAFT DEVICE FOR PLOWS.—C. L. Jackson, Millersburgh, Ill.—This invention relates to a new and useful improvement in a device for varying the line of draft of plows, when in motion or at rest, so that the depth of furrow may be varied, according to the form or surface of the ground.

SILICIOUS COMPOUND.—William A. Battersby, Williamsburgh, N. Y.—This invention relates to a new composition for casting or molding pipes, tiles, and other similar articles, as well as for sidewalks, streets, flooring, and similar purposes, and has for its object to so fuse together and combine the inexpensive and abundantly silicious matter that the same can be advantageously utilized for the above purposes.

CEMENT FOR ROOFING AND OTHER PURPOSES.—Oliver Porter, Waterford, Me.—This invention relates to a new and useful improvement in a cement, more especially designed for roofing, but which may be used for other purposes where it is desired to exclude moisture and form a fire-proof surface.

BOILING SICCATIVE OIL.—James B. Pollock, Port Richmond, N. Y.—This invention consists in an improved and economical arrangement of apparatus for making siccative oils or varnishes, in a safe and cheap manner and short time, as compared with the usual mode of boiling or making a siccative oil or varnish from linseed oil.

MITER BOX.—Justin Devoge, Meadville, Pa.—This invention relates to improvements in miter boxes, and consists in a combination with a box for holding the stuff of a saw clamp or guide, arranged for holding the saw above the article to be sawed near the end, and adjustable either to a vertical plane, or to any oblique plane across the box, also adjustable to a perpendicular or any other angle with the box. The said box having a vertically adjustable bottom and a secondary bottom made in two parts, which may be adjusted to suit the requirements of strips or pieces which have oblique sides, the said two parts being on opposite sides of a dividing wall.

OPERATING WINDOW CURTAINS.—John Stephens, Fairview, Ohio.—The object of this invention is to provide suitable and efficient means for lowering and raising the upper ends of window curtains, without reference to or disturbing the lower end, and it consists in an upper roller, to which the curtain is attached, which is operated on vertical cords, and held in position by a weighted tassel and band or cord.

CULTIVATOR.—Isaac Low, East Fairfield, Ohio.—This invention has for its object to furnish an improved cultivator, simple in construction and effective in operation, and conveniently operated.

COMBINATION MATCH PLANE.—Lewis Bundy, Mooer's Forks, N. Y.—This invention relates to a new and useful improvement in a combined match plane and plow for working in wood, whereby tongues and grooves of variable depth and of variable width of margin may be cut.

PISTON PACKING.—Wm. Ord, Brooklyn, Ohio.—This invention relates to new improvements in the construction of the rings for pistons in steam engines, pumps, etc., and has for its object to provide a convenient packing for the split parts of the same, and, also, to regulate the elasticity of the rings, making the same equal throughout.

WAGON BOLSTERS.—J. W. Pearman and J. F. C. Lutz, Holden Mo.—This invention relates to improvements in bolsters for wagons, and consists in ironing the ends with cast metal attachments, cast with two leaves or plates one for the top and the other for the bottom of the bolster, the ends of which are fitted between these leaves and bolted to them, and the standards are cast with the solid part at the ends.

COTTON-SEED PLANTER.—John C. King, Spring Place, Ga.—This invention relates to a new and useful improvement in a machine for planting cotton seed, and all other seed for which it is adapted, and also for distributing guano and other fertilizers, and the invention consists in the manner of delivering and regulating the quantity of seed, and in the manner of covering the same.

PROCESS OF DECOLORIZING ANILIC AND PHENIC COLORS ON FABRICS.—Jean Lambert, Jr., New York city.—The object of this invention is to produce white designs or ornaments on fabrics that have been steeped in or dyed by anilic or phenic coloring matter, by bleaching certain portions of such coloring matter on or in the fabric. The invention consists in the application of powdered metals or soluble cyanides to the said fabrics, for the purpose of producing the stated local bleaching or decoloration.

STRAW CUTTER.—G. S. Garth, Mill Hall, Pa.—This invention relates to improvements in cutting machines for cutting hay, straw, and other long feed, and consists in improvements in the construction and arrangement of the same, calculated to facilitate the feeding and cutting, and to produce a durable and simple machine that will be more efficient than any now in use.

OIL-CAKE PACKING.—Washington Hawes, Port Richmond, N. Y.—This invention relates to improvements in apparatus for forcing one or more of the last cakes into the sacks previously filled, or nearly filled, by hand, to pack the said sacks as much as possible, and it consists in a vertically working follower, actuated by a winding drum and cord, for forcing it down, which drum is connected with a driving shaft, for working it, by a friction clutch, having a foot-lever attachment for varying the friction and the power on the follower, while in action, so that the same may be regulated according to the capacity of the oil cake, whereby the great losses by breaking the cakes in the common hand process of packing may be avoided.

GRINDING MILLS.—J. M. Westmoreland, Danville, Texas.—This invention relates to improvements in grinding mills, and consists in a novel and simple mode of obtaining the motive power for working the grinding stones, or other devices, by arranging them on spindles placed radially in a frame supported on a center pivot, around which it is capable of revolving, and at the outer end on wheels upon the spindles of the grinding stones, resting on a circular track, so as to be set in motion by the friction thereon, or it may be by cog teeth, gearing with teeth on the said wheels, when the frame is drawn around the central pivot by horses or other animals.

DITCHING MACHINE.—J. W. Roberts, Hartford City, Ind.—This invention has for its object to furnish an improved machine for opening ditches which shall be so constructed as to open the ditch, raise the dirt, and deposit it at the sides of the ditch.

MATCH-BOX.—John Monaghan, Tuckahoe, N. Y.—This invention has for its object to furnish an improved match-box which shall be so constructed as to hold the matches securely, without having a cover, and keep them dry, while leaving their ends exposed, enabling them to be conveniently removed as may be required.

FAUCET.—C. A. Douglas, Franklin, N. Y.—This invention has for its object to furnish an improved faucet for drawing off liquids from vats or other vessels placed one within the other, and which shall be so constructed that the liquid may be drawn from either vessel as may be desired.

BOTTLE STOPPER.—W. L. Hoefer, Jeffersonville, N. Y.—This invention has for its object to furnish a simple, convenient, inexpensive, and effective stopper for bottles containing soda water or other liquid exerting an outward pressure, and which shall be so constructed that after being once applied to the bottle it can neither be pushed fully in nor drawn fully out of the bottle, but may be readily pushed far enough inward to allow the liquid to flow out freely.

FAMILY FRUIT DRYER.—J. P. Miller, Somerville, N. J.—This invention has for its object to furnish a simple, cheap, and convenient fruit dryer or kiln which shall be so constructed and arranged as to enable the heat in the stove, when the cooking is finished, and which has hitherto been wasted, to be utilized in drying the fruit for the family or for market, so that each one may furnish himself with or prepare for market a supply of clean and wholesome perfectly dried fruit at scarcely any expense.

DOOR STOP.—L. C. Wemple, Rockford, Ill.—This invention has for its object to furnish an improved device for stopping a door, when it is swung open, before it may strike the wall, and which will hold the door open, and thus prevent it from slamming and swinging shut accidentally.

APPARATUS FOR CUTTING OR GIVING FORM TO WOOD.—G. E. Mather, Wellingborough, England.—This invention relates to the use of stone, artificial stone, or other gritty composition adapted to cut into wood and give form thereto. For this purpose the natural or artificial stone or composition is fitted to a spindle, which is caused to revolve, and the form desired to be given to the wood is produced as a counterpart on the edge or other surface of the stone or composition. The wood to be cut is of continuous length, as in the case of moldings, is conducted by guides to the surface of the revolving stone or composition. If the articles in wood to be cut are circular they are supported on spindles or centers, carried by levers or other arms or guides in series and by bands, or otherwise caused to revolve, and they are replaced in succession as the forms desired are obtained.

ROACH AND BUG TRAP.—Thomas Williams, Tompkinsville, N. Y.—This invention relates to a new device for catching Croton bugs, cockroaches, and other creeping insects, and consists in the arrangement of a smooth entrance, which is so placed that the animals cannot crawl out through the same.

WASHING MACHINE.—Horace Warner, Ridgway, Pa.—This invention relates to a new and useful improvement in machines for washing clothes, having especial reference to a washing machine for which letters patent were granted the inventor, dated November 19, 1867. The present invention consists in the mode of raising the vertical shaft and cones from the tub, and in the mode of fastening them down and keeping them in place when in the tub.

WASHING MACHINE.—H. E. Smith and G. F. Spear, New York city.—This invention relates to a new power washing machine of that class in which a rotary cylinder is arranged within a cylindrical case.

ELEVATOR.—G. C. Timpe, New Orleans, La.—This invention comprises an improved arrangement of differential gears and shifting devices therefor for varying the connection according to the weight of the load.

ROTARY STEAM ENGINE.—James Constantine, Mansfield, La.—This invention relates to improvements in rotary steam engines, and consists in a novel arrangement with a piston, through which the steam is admitted from a hollow shaft constantly open to the live steam, of two cut-offs working through the periphery of the cylinder at opposite points, and an exhaust through a hollow boss on the shaft.

MACHINE FOR SHAVING SHINGLES, ETC.—Charles Shelmidine, Summit, N. Y.—The object of this invention is to construct a machine by means of which shingles can be shaved and edged, and other articles, such as barrel staves, etc., finished and planed. The machine is intended to operate in one continuous process, and to be fully adjustable to all shapes and sizes of articles to be finished.

FEED CYLINDER FOR ROSSING MACHINE.—Charles Gilpin, Cumberland, Md.—This invention relates to a cylinder intended for tanners' use in connection with a knife, in taking off the epeidermiss or "ross" from bark previous to grinding the same. The invention consists of a cylinder divided into a number of lengths, all forming parts of the same piece however, and all having different diameters, the length at one end having the greatest diameter the next length less, the third less, and so on in a regularly-decreasing series to the opposite end, and least length which is of the least diameter, the object of this construction being to adapt the cylinder to pieces of bark of different thickness, so that the proper quantity of ross in each case may be taken off without changing the position of the knife.

DEVICE FOR DELIVERING MAIL BAGS TO RAILROAD CARS.—James B. McLain, Newark, Ohio.—The object of this invention is an improved device for saving the necessity for stopping mail trains in order to take on board the mails at the way stations. The apparatus, designed to stand by the side of the track, has a pivoted arm upon which the mail bag is hung in such a position that a suitable device on the car can grasp the bag as the car passes by, and take it on board; in doing this the support is knocked from under the arm and the latter falls out of the way of the other cars.

PLOW.—L. W. Richardson, Roscoe, Ill.—The object of this invention is an improvement in the construction of mold boards, and consists in forming them double—that is, of an iron and steel plate, the latter being made in sections, which are bolted to the former. This construction allows the exterior plate to be hardened to any required degree so that it may be highly polished, or to be conveniently repaired when broken, or otherwise injured, in any part.

SWITCH LOCK.—Alonzo W. Cram, St. Louis, Mo.—This invention consists of an apparatus attached to a switch lever, and provided with a bolt which when thrust into one of the holes in the switch frame, holds the lever fast, and may be locked so as to prevent the moving of the lever, and may also be unlocked and withdrawn from the hole in the switch frame, in order to the changing of the lever.

FLOOD GATE OR FENCE.—S. Rowland and T. C. Tipton, Williamsport, Ohio—This invention has for its object to furnish an improved flood gate or fence to be used in streams or in low lands subject to being overflowed, and which shall be simple in construction, and effective in operation, yielding to allow drift wood and other floating substances to pass freely, and again rising into a vertical position.

CARRIAGES.—Charles N. Dennett, Amesbury, Mass.—This invention has for its object to furnish an improved turn-out seat and extension front for light carriages, which are desired to be used sometimes with one and some times with two seats, which may be applied to open buggies, covered on top buggies, and four-post carriages with equal facility, and which shall be simple in construction and easily operated.

APPARATUS FOR MOVING HAY, ETC.—John H. Violett, Goshen, Ind.—This invention has for its object to furnish an improved apparatus for carrying the hay fork in moving hay from one part of a barn or other building to another, especially in unloading hay, and which shall be simple in construction and effective in operation.

SEWING MACHINE TABLE.—E. L. Morgan, Rivesville, W. Va.—In the Official List of Patents and in a notice of Mr. Morgan's invention, which appeared in our issue of November 12, Riversville in the address should have been Rivesville.

Official List of Patents.

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FOR THE WEEK ENDING Nov. 15, 1870.

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Patent Solicitors, No. 37 Park Row, New York.

109,166.—CHICKEN-COOP.—J. R. Achenbach, Saddle River, assignor to himself, Thomas Terhune, and P. O. Terhune, Hoboken N. J.
109,167.—STEAM ENGINE.—Herman F. Ambos, Columbus, Ohio.
109,168.—TESTING INSTRUMENT FOR BREWERS AND DISTILLERS.—Moritz Augenstein, Brooklyn, N. Y.
109,169.—ELEVATOR.—C. W. Baldwin, Boston, Mass.
109,170.—WATER WHEEL.—William Blake (assignor to himself and C. H. Parkton), Buchanan, Mich.
109,171.—MACHINE FOR MAKING SCREWS AND SCREW NAILS.—Reinhold Boeklen, Brooklyn, N. Y., assignor of one half his right to Henry Torstrick, New York city. Antedated November 10, 1870.
109,172.—PIANO.—Ole Bull, New York city.
109,173.—FURNACE FOR DEOXIDIZING IRON ORE.—A. H Brainerd, Rome, N. Y.
109,174.—PLANE.—Lewis Bundy, Mooers Forks, N. Y.
109,175.—FRUIT CRATE.—George Clapp, Geneva, N. Y.
109,176.—HAY BINDER.—Augustus R. Clark, Onondaga, N. Y.
109,177.—APPARATUS FOR BLEACHING THREADS, YARNS, ETC.—J. E. Clarner, Pawtucket, assignor of one half his right to B. F. Green and Horace Daniels, Smithfield, R. I.
109,178.—SEWING MACHINE.—J. C. Clime, Philadelphia, Pa. Antedated November 11, 1870.
109,179.—ROTARY ENGINE.—James Constantine, Mansfield, La.
109,180.—ROCKING CHAIR AND STEP LADDER.—William H. Cook, Bergen, N. J. Antedated November 5, 1870.
109,181.—GUN CARRIAGE.—Thomas Coughlan, Newton, Mass.
109,182.—LOCK FOR RAILROAD SWITCHES.—A. W. Cram, St. Louis, Mo.
109,183.—STEAM TILLER.—Robert Creuzbaur, Williamsburgh, N. Y.
109,184.—SHEAVE.—Alvin Matthew Cushing, Lynn, Mass.
109,185.—MACHINE FOR SPINNING AND DOUBLING SILK, ETC.—T. N. Dale, Jr., and George Kralnk, Paterson, N. J.
109,186.—MACHINE FOR SQUEEZING PUDDLERS' BALLS.—Samuel Danks (assignor to himself, Joseph C. Butler, and Lewis Worthington), Cincinnati, Ohio.
109,187.—OVEN PLATE FOR COOKING STOVES.—W. C. Davis, Cincinnati, Ohio.
109,188.—DUMPING CAR.—Peter K. Dederick, Albany, N. Y
109,189.—CARRIAGE.—C. N. Dennett, Amesbury, Mass.
109,190.—MITER-BOX.—Justin Devoge, Meadville, Pa.
109,191.—FAUCET.—C. A. Douglas, Franklin, N. Y.
109,192.—DEVICE FOR CUTTING AND SHEARING METALS.—Isaac Dubois, Boonesborough, Iowa.
109,193.—ELECTRO-MAGNETIC APPARATUS FOR PROTECTING SAFES.—William Duncan and C. C. Rowell, Lebanon, N. H.
109,194.—DOVETAILING MACHINE.—J. P. Flanders, Vergennes, Vt.
109,195.—STEAM BOILER.—Daniel Flynn, Fall River, Mass.
109,196.—MILL FOR POWDERING ROOTS, ETC.—H. D. Garrison (assignor to Garrison & Murray), Chicago, Ill.
109,197.—STRAW CUTTER.—George Sutton Garth, Mill Hall, Pa.
109,198.—GATE.—Wm. Gause, Indianapolis, and J. C. Curryer, Thorntown, Ind.
109,199.—FEED-ROLL FOR ROSSING MACHINES.—Charles Gilpin, Cumberland, Md.
109,200.—CLOTHES DRYER.—Joseph Gnau and Wm. Gnau, Louisville, Ky.
109,201.—BEE HIVE.—L. L. Goodwin, Toronto, Ind.
109,202.—CHAIR AND LOUNGE.—Edward Hagan, New York city.
109,203.—HORSE AND CATTLE LINIMENT.—H. H. Hanmer Nashville, Tenn.
109,204.—TOY BALL.—George Hartz, New York city. Antedated November 3, 1870.
100,205—ATTACHING DICING-STONES TO WHEELS FOR POLISHING LEATHER.—Hector C. Havemeyer and David P. Burdon, New York city.
109,206.—OIL-CAKE PACKING APPARATUS.—Washington Hawes, Port Richmond, N. Y.
109,207.—GRAPE TRELLIS.—William M. Heath, Wataga, Ill.
109,208.—ADVERTISING APPARATUS.—William Hebdon, New York city.
109,209.—SPOOL STAND.—Edwin C. Heywood, Worcester, Mass.
109,210.—RAILWAY RAIL-JOINT.—Noah Hill, Leavenworth City, Kansas.
109,211.—POTATO DIGGER.—George M. Hoag, Muscatine, Iowa.
109,212.—BOTTLE STOPPER.—Wm. L. Hoefer, Jeffersonville, N. Y.
109,213.—PORTABLE BOOK CLAMP.—C. W. Holbrook and E. F. Butler, Windsor Locks, Conn.
109,214.—WELL AUGER.—James Ingels and T. J. Ingels, Atchinson, Kansas.
109,215.—ADJUSTABLE DRAFT DEVICE FOR PLOWS.—C. L. Jackson, Millersburg, Ill.
109,216.—MEDICAL COMPOUND FOR CURE OF RHEUMATISM.—A. J. Jenkins, Virginia City, Nevada.
109,217.—POTATO DIGGER.—William Joseph, Quincy, Mich. Antedated November, 5, 1870.
109,218.—BREECH-LOADING FIRE-ARM.—B. F. Joslyn, New York city.
109,219.—CLOTHES DRYER.—John Kaspar, Pomeroy, Ohio.
109,220.—COMBINED LOCK AND LATCH FOR SLIDING DOORS.—Edward J. Kehoe (assignor to W. A. Hopkins and F. Z. Dickinson), New York city.
109,221.—SCAFFOLD BRACKET FOR ROOFING.—J. R. Kennett, Geddes, N. Y.
109,222.—COTTON-SEED PLANTER.—John C. King, Spring Place, Ga.
109,223.—(Suspended.)
109,224.—PAPER-FEEDING MACHINE.—Margaret E. Knight, Boston, Mass.
109,225.—CORN PLANTER.—Hermann Koeller, Camp Point, Ill.
109,226.—COMBINED AGRICULTURAL IMPLEMENT.—Leopold Lehmann, Monee, Ill.
109,227.—MACHINE FOR ATTACHING STUDS OR TUBULAR-SHANKED BUTTONS TO FABRICS.—J. H. Lewis, Providence, R. I., assignor to A. R. Field, Greenfield, Mass. Antedated Nov. 5, 1870.
109,228.—COFFEE-ROASTER.—Nicholas Linden, Chicago, Ill.
109,229.—CULTIVATOR.—Isaac Low, East Fairfield, Ohio, assignor to himself and Ephraim Phillips, Cross Cut, Pa.
109,230.—DRY GAS METER.—Geo. Lowen and S. H. Goldthorp, Pittsburgh, Pa.
109,231.—ARTIFICIAL FUEL.—P. Miott McGill, Washington, D. C.
109,232.—ELEVATOR.—George McKenzie, Zanesville, Ohio.
109,233.—DEVICE FOR DELIVERING MAIL BAGS TO CARS.—J. B. McLain (assignor to H. M. Wyeth), Newark, Ohio.
109,234.—DRYER.—John P. Miller, Somerville, N. J.
109,235.—MATCH BOX.—John Monaghan, Tuckahoe, N. Y.
109,236.—WATER ELEVATOR.—A. A. Moulton, Providence, R. I.
109,237.—MODE OF PREVENTING THE HEATING OF AXLES OR JOURNALS.—E. D. Murfey, New York city.
109,238.—SPINDLE STEP.—E. D. Murfey (assignor to "The Manhattan Packing Manufacturing Co.,") New York city.
109,239.—MATERIALS FOR BEARINGS AND JOURNALS.—Eliza D. Murfey (assignor to "The Manhattan Packing Manufacturing Co.,") New York city.
109,240.—CLOTHES POUNDER.—James W. Norton, Pioneer, Pa.
109,241.—CURTAIN FIXTURE.—James Lloyd Oliver, Boston, Mass.
109,242.—PISTON PACKING.—William Ord, Brooklyn, Ohio.
109,243.—BOLSTER FOR WAGONS.—J. W. Pearman and J. F C. Lutz, Holden, Mo.
109,244.—CUTTER HEAD.—Daniel W. Perry, Wilkesbarre, Pa.
109,245.—MANUFACTURE OF VARNISH.—J. B. Pollock, Port Richmond, N. Y.
109,246.—ROOFING CEMENT.—Oliver Porter, Waterford, Me.
109,247.—CULTIVATOR.—John Rebman, Binkley's Bridge, Pa.
109,248.—PROPELLING CANAL BOATS.—James Reid, Catskill, N. Y. Antedated Nov. 3, 1870.
109,249.—PAPER-CUTTING MACHINE.—I. L. G. Rice, Cambridge, Mass.
109,250.—PLOW.—L. W. Richardson, Roscoe, Ill.
109,251.—DITCHING MACHINE.—J. W. Roberts, Hartford City, Ind.
109,252.—FLOOD GATE.—Samuel Rowland and Thomas C. Tipton (assignors to themselves and G. W. Wiggins), Williamsport Ohio.
109,253.—PAPER FILE.—William W. Russell, Malden, Mass.
109,254.—ROOFING COMPOSITION.—Albert Ruttkay, New York city.
109,255.—BREECH-LOADING FIRE-ARMS.—E. L. Sargent, Watertown, N. Y.
109,256.—EXTENSION PLATFORM STEP LADDER.—George A. Schachtel, Newark, N. J., assignor to himself and R. B. Sanderson.
109,257.—FOUNTAIN PEN.—Fridolin Schifferle, St. Louis, Mo.
109,258.—SHINGLE MACHINE.—Charles Shelmidine, Summit N. Y.
109,259.—WASHING MACHINE.—H. E. Smith and G. F. Speer (assignors to M. J. Smith), New York city.
109,260.—TACKLE BLOCK.—R. J. Smith, North Haven, Me. Antedated Nov 5., 1870.
109,261.—HAY-RACK FOR WAGON.—S. J. Smith, Farmington N. Y. Antedated Oct. 29 1870

109,262.—Washing Machine.—Thomas Snow, Social Circle, Ga.
109,263.—Tag.—T. J. Southworth, Rochester, and W. H. Lawton, Elmira, N. Y. Antedated Nov. 3, 1870.
109,264.—Feeding Hydrocarbon Liquids to a Hot Gas Retort.—Theodore G. Springer, St. Louis, Mo. Antedated November 8, 1870.
109,265.—Mosaic Floor.—Joseph Stegmillier (assignor to himself and L. H. Rueckenbag), New York city.
109,266.—Curtain Fixture. — John Stephens (assignor to himself and Jairus Collins), Fairview, Ohio.
109,267.—Ruling Machine.—James Stewart, Washington, D. C.
109,268.—Purifying Illuminating Gases.—W. H. St. John, and Peter Cartwright, New York city.
109,269.—Combined Harrow and Seeder.—Ezra Stoner, Greencastle, Pa.
109,270.—Steam Engine.—Charles Strong and A. W. Stickney, Lebanon, N. H.
109,271.—Window Shade.—William Strunk, Nettle Lake, Ohio.
109,272.—Molded Carriage Top.—G. L. Swett and J. P. Lockey, Leominster, Mass.
109,273.—Rotary Pulverizer.—John Thompson, Louisville, Ky.
109,274.—Hook for Dumping Tub.—J. R. Thorn, Waldoborough, Me.
109,275.—Elevator.—Gustavus C. Timpe, New Orleans, La.
109,276.—Earth Closet.—Elias W. C. Vanderveer, Linden, N. J.
109,277.—Breech-loading Fire-arms.—Frederick Vetterlin, Neuhausen, Switzerland. Antedated Nov. 11, 1870.
109,278.—Hoisting Apparatus.—John H. Violett, Goshen, Ind.
109,279.—Washing Machine.—Horace Warner, Ridgway, Pa.
109,280.—Machine for Making Cigar Bunches.—Wendelin Weis, St. Paul, Minn.
109,281.—Door Stop.—L. C. Wemple, Rockford, Ill.
109,282.—Roach and Bug Trap.—Thomas Williams, Tompkinsville, N. Y.
109,283.—Measuring Can.—A. G. Wilson, Chicago, Ill. Antedated Nov. 5, 1870.
109,284.—Rotary Puddling Furnace.—Enoch Wood (assignor to himself, Edward Perry, Richard Perry, William McPherson, and Edward Williams), Pittsburgh, Pa.
109,285.—Grate Bar.—James Yocom, Jr., Philadelphia, Pa.
109,286.—Paddle Wheel.—Samuel Bateman, Asniere, near Paris, France.
109,287.—Washing Machine.—Wm. B. H. Beach, Naples, N. Y.
109,288.—Filter.—John Bean, Hudson, Mich.
109,289.—Combined Thrashing Machine and Corn Sheller.—John Bowman, Princeville, Ill.
109,290.—Plow.—T. E. C. Brinley, Louisville, Ky.
109,291.—Plow.—T. E. C. Brinley, Louisville, Ky.
109,292.—Connecting Fire Detector with the Alarm.—H. L. Brower (assignor to C. D. Fredericks), New York city.
109,293.—Machine for Cutting Loaf Sugar.—Adolphus Brown and Felix Brown, New York city.
109,294.—Hand-drag Rake.—Edward Brown, Kennebunk, Me.
109,295.—Machine for Cutting Loaf Sugar. — Felix Brown, New York city.
109,296.—Machine for Cutting Loaf Sugar.—F. Brown, New York city.
109,297.—Combined Cane and Whip.—C. L. Bushnell, Cherry Valley, Ohio. Antedated Nov. 5, 1870.
109,298.—Combined Latch and Lock for Sliding Doors.—Jacob Capron, New York city.
109,299.—Friction Clutch.—Thomas Coldwell, Newburgh, N. Y.
109,300.—Apparatus for Trimming Heels of Boots and Shoes.—Louis Cote, St. Hyacinth, Canada.
109,301.—Harvester Rake.—A. G. Crane and W. T. Johnston, Ottumwa, Iowa.
109,302.—Canceling Stamp.—C. E. Donnellan, Indianapolis, Ind.
109,303.—Apparatus for Burning Paraffine and other Hydrocarbon Oils.—H. H. Doty, London, Eng.
109,304.—School Desk.—W. E. Doyle, Eaton, Ohio.
109,305.—Horse Hay Fork.—Alvin T. Dunbar and James H. Fellows (assignors to A. T. Dunbar and George H. Dewey), Alba, Pa.
109,306.—Sad Iron.—T. G. Elswald, Providence, R. I.
109,307.—Mop Wringer.—Homer L. Ennes, Birmingham, Ohio.
109,308.—Stone Truck. — Washington Evans, Ontario, Ohio.
109,309.—Skirt-supporting Hook for Corsets.—David H. Fanning, Worcester, Mass.
109,310.—Railway Car Wheels.—J. N. Farrar, Pepperell, Mass.
109,311.—Water Engine. — Russel Francis, Woodstock, Wis.
109,312.—Railway Car Spring.—Heman Gardiner, New York city. Antedated Nov. 12, 1870.
109,313.—Brick Mold.—Gottlieb Graessle, Hamilton, Ohio, assignor to himself and L. E. White.
109,314.—Apparatus for the Manufacture of Sugar.—J. W. Hahn, San Francisco, Cal.
109,315.—Corn Sheller.—Jonathan R. Hamilton, Kingston, Minn.
109,316.—Stump Extractor.—Samuel Harman, La Porte, Ind.
109,317.—Apparatus for Transporting Loads on Wire Ropes.—Charles Hodgson, Richmond, England.
109,318.—Clothes-line Reel.—George Holman, Waterville, N. Y.
109,319.—Journal Bearing.—D. A. Hopkins, Jersey City, N. J.
109,320.—Railway Car Wheel.—Lewis B. Hunt, New York city.
109,321.—Buckle.—J. C. Hyde (assignor to the West Haven Buckle Co.), West Haven, Conn.
109,322.—Mowing Machine. — Benjamin Illingworth, Le Roy, Minn.
109,323.—Muff and Collar Box.—G. L. Jaeger, New York city.
109,324.—Fire Kindler.—Jeremiah Kenney, Sr., Baltimore, Md.
109,325.—Machine for Grinding and Polishing Lenses, etc.—H. D. Knight, Elgin, Ill.
109,326.—Opening and Shutting Device for Railroad-Car Window.—J. F. Lash, Toronto, Canada.
109,327.—Ink for Writing.—R. G. Loftus, Chelsea, assignor to himself and O. W. Farrar, Boston, Mass.
109,328.—Detaching Hook.—J. A. Lord, Jr., Middletown, Conn.
109,329.—Shutter Fastener.—Ira O. Luey, Bernardston, Mass.
109,330.—Vessels' Hatch.—J. P. Maddox, Belfast, Me.
109,331.—Elevator.—W. K. Marvin, New York city.
109,332.—Pipe Coupling.—J. H. McGowan, Cincinnati, Ohio.
109,333.—Concrete Pavement.—A. B. McKeon, Rutherford Park, N. J. Antedated November 5, 1870.
109,334.—Corn and Cotton Scraper.—George Milliorn (assignor to himself and P. T. Raiford), Pyhalis, Miss.
109,335.—Water Wheel.—J. A. Morgan, Navasink, N. J.
109,336.—Die for Forging Carriage Clips.—F. B. Morse (assignor to himself and H. D. Smith & Co.), Plantsville, Conn.
109,337.—Screw Pile.—T. W. H. Moseley, Boston, assignor to R. P. Moseley, S. R. Moseley, and A. M. L. Moseley, Hyde Park, Mass.
109,338.—Air Engine.—David Myers, Chicago, Ill.
109,339.—Off-bearing Truck for Brick Machines.—Walker Olds, Albany, N. Y. Antedated November 5, 1870.
109,340.—Plow.—Ornan Osborn, Erie, Pa.
109,341.—Manufacture and Application of Colors for Printing and Dyeing.—Alfred Paraf (assignor to E. S. Renwick), New York city.
109,342.—Door Catch.—R. V. Phillips, Council Bluffs, Iowa.
109,343.—Sawing Machine.—R. J. Poston, Mainville, Ohio.
109,344.—Shaft Coupling.—W. M. Pratt, Chicago, Ill.
109,345.—Take-up Detaining Pawl.—George Richardson, Lowell, Mass.
109,346.—Wood and Coal Dumper for Railways.—R. B. Robbins, Adrian, Mich.
109,347.—Railway-Car Bumper and Draw-Head.—Alexander Ross and John Arthur, Freeport, Ill.
109,348.—Take-up Nut.—Thomas Ross and W. W. Graham, Rutland, Vt.
109,349.—Pump.—Alonzo Sherman and J. W. Sheaffer, Sterling, Ill.
109,350.—Apple Parer, Corer, and Slicer.—James Shobe, Upper Principio, Md.
109,351.—Sawing Machine.—F. D. Smith, Chicago, Ill.
109,352.—Plow.—Hugh Smith, Moline, Ill.
109,353.—Draft Device for Harvester.—J. M. Smith, Jerseyville, Ill.
109,354.—Machine for Separating Magnetic Iron Ores from other Substances.—J. Y. Smith, Pittsburgh, Pa.
109,355.—Furnace and Process for Treating Iron and other Ores.—J. Y. Smith, Pittsburgh, Pa.
109,356.—Blast Apparatus for Furnace.—R. A. Smith, Newburyport, Mass.
109,357.—Window Fastening.—Hiram St. John, Wilton, Conn.
109,358.—Spring for Railway-Car Truck.—W. M. Taylor, Newburgh, Ohio.
109,359.—Fluid Meter.—Franzis Wagner, New York city.
109,360.—Funnel.—Albin Warth, Stapleton, N. Y.
109,361.—Grinding Mill.—J. M. Westmoreland, Danville, Texas.
109,362.—Sash Holder.—E. H. Wheeler, Scranton, Pa. Antedated November 5, 1870.
109,363.—Cultivator.—B. F. Young, Toulon, Ill.
109,364.—Flavoring Compound.—William Zeigler and J. H. Seal, New York city.
109,365.—Cartridge Box.—J. R. King (assignor to W. M. Tileston), Washington, D. C.
109,366.—Binding Attachment for Sewing Machine.—W. N. Martin, Boston, Mass.

REISSUES.

4,177.—Ice-Cream Freezer.—B. G. Martin, Williamsburgh, N. Y.—Patent No. 100,366, dated March 1, 1870; antedated February 14, 1870.
4,178.—Division A.—Brick Machine.—James Sangster, Buffalo, N. Y.—Patent No. 59,080, dated October 23, 1866.
4,179. — Division B.—Brick Machine. — James Sangster, Buffalo, N. Y.—Patent No. 59,080, dated October 23, 1866.
4,180.—Bed Bottom.—Edward Yeoman, Waukegan, Ill.—Patent No. 67,698, dated August 13, 1867.

DESIGNS.

4,465, 4,466.—Bracket.—J. H. Bellamy, Charlestown, Mass., assignor to S. D. Niles and B. A. Ward. Two Patents.
4,467.—Lock Front.—F. W. Brocksieper (assignor to Sargent & Co.), New Haven, Conn.
4,468.—Piano.—Ole Bull, New York city.
4,469.—Stove Shelf.—W. C. Davis, Cincinnati, Ohio.
4,470.—Face Plate of a Sash Lock.—C. H. Eccleston, Oxford, N. Y.
4,471.—Box for Putting up Paper Cuffs.—George Faul, Boston, Mass., assignor to S. F. Hilton, Providence, R. I.
4,472.—Door Bolt.—Ferdinand Fogelstrand (assignor to Sargent & Co.), New Haven, Conn.
4,473.—Thumb Latch.—Ferdinand Fogelstrand (assignor to Sargent & Co.), New Haven, Conn.
4,474.—Car Lock.—William Gorman (assignor to Russell & Erwin Manufacturing Company), New Britain, Conn.
4,475.—Sad Iron.—W. M. Griscom (assignor to Harbster Brothers & Co.), Reading, Pa.
4,476.—Spoon and Fork Handle.—E. C. Moore, Yonkers, N. Y., assignor to Tiffany & Co., New York city.
4,477.—Show Case.—W. H. Grove, Philadelphia, Pa.
4,478 and 4,479.—Center Piece.—Samuel Kellett, San Francisco, Cal. Two patents.

TRADE-MARKS.

61.—Snuff.—Appleby & Helme, New York city.
62.—Cough Balsam.—William Maddox, Ripley, Ohio.
63.—Whisky.—C. P. Moorman, Louisville, Ky.
64.—Whisky.—C. P. Moorman, Louisville, Ky., and M. J. Hardy, New York city.
65.—Cigars, Tobacco, and Snuff.—J. C. Partridge & Co., Chicago, Ill.

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