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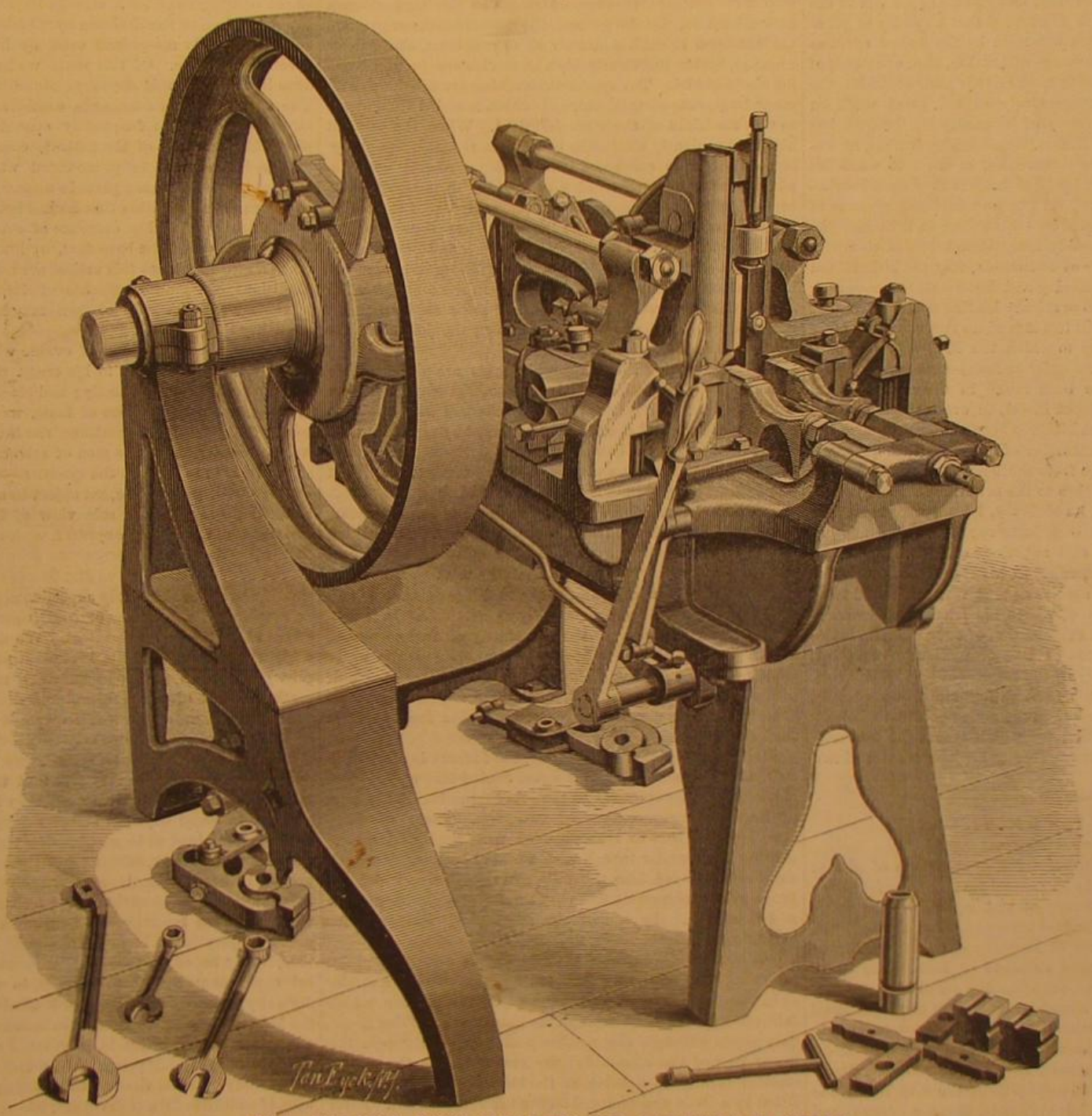
The Burdict Bolt Heading Machine.

Our engraving represents a view of the Burdict bolt forging or heading machine, of which Messrs. Plumb & Burdict, of Buffalo, N. Y., are proprietors. Thirty of these machines have been put in operation during the past fifteen months, and used by bolt makers, car and locomotive builders, railroad companies, etc. They are particularly adapted to the manufacture of square heads, but capable of making any desired style of head. One has lately been put up with twenty-four and one with thirty-six changes of dies. It is claimed by the manufacturers of these machines that they will do more and better work than any other.

We shall not enter into a description of its details of construction, as this would entail the use of auxiliary engravings, and require far too much space. We will content ourselves with a brief summary of the well demonstrated capabilities of the machine, which is put up in the best manner, and requires but little power. It is quickly adjusted from one size or length of iron to another, and can head bolts of any length. Unlike others, where the blanks are held horizontal, the blank in this machine remains stationary until the head is completed.

Other machines clamp the blanks tightly with the holding dies, and at the same time turn one quarter or one half around, thereby reducing the size of the rod directly under the head where the dies strike it. In this machine the end of the blank rests against a stop, and the holding dies simply close on the iron, and remain so until the head is completed. The stock for the head is upset by a plunger, which recedes, and the forging dies acting simultaneously on the four sides form the head to the required size and shape, thus producing heads uniform in size and retaining the full strength of the rod. It is so arranged that it makes four, six, or eight revolutions—each head receiving twenty, thirty, or forty blows, according to the finish desired—and stops to discharge the bolt and receive another blank. The working parts of the machine are in operation only while the bolt is being headed, thus reducing the wear in proportion to the work done.



THE BURDICT BOLT HEADING OR FORGING MACHINE.

The capacity of this machine is such, that in a contract with Messrs. James Wood & Co. Pittsburgh, it was required that 4,000 one half inch bolts should be headed in ten hours, and 3,500 five eighths inch bolts in the same time. The first number was finished in eight hours, and the second in less than nine hours. In their own works, the manufacturers state, that 4,500 three fourths inch T-headed bolts have been made in ten hours.

The dies can be reversed, which greatly prolongs their usefulness, and when worn are readily sharpened by grinding. Four sizes of the machine are furnished, adapted to head from one fourth inch to two and one half inch iron.

The machine is covered by two patents, dated respectively Sept. 3, 1867, and Nov. 30, 1869. For further information address Plumb & Burdict, corner Clinton and Adams streets, Buffalo, N. Y.

THE DANGERS OF SEWAGE IRRIGATION.

From a pamphlet by James Alexander Manning, referred to in a recent editorial on the "Sewage Question," we extract further particulars, showing the dangers arising from sewage irrigation. He says:

"The late Marquis of Salisbury, only three or four years ago, joined his neighbors, near Tottenham, in a petition to the Privy Council, against the practice of sewage irrigation, which had proved not only fatal to many, but universally disgusting to all the inhabitants of the vicinity, and must ever be so on stiff clay land, where, as soon as the surface is covered, the sewage must run off into the ditches, and, while creating the most offensive odors, rendering life insupportable, must contaminate the land springs, and render the water totally unfit for culinary or ordinary domestic purposes. The whole system of sewerage is vicious, as proved by the high death rate in all our large manufacturing towns, and the frightfully increased poor rates; and it is now admitted by the scientific world that upwards of 100,000 lives are annually lost in this country, which might be saved by attention to sanitary requirements. As far as the sewers of towns are concerned, I am satisfied that the purposes to which they are now devoted will ere long undergo a very important modification, and as science advances it will be found indispensable to the health of the inhabitants that they shall be maintained only for surface drainage—that is, rainfalls and household slops, leaving the solid and fluid human excreta to pass into proper receptacles, where, by chemical treatment, they will be rendered innocuous to man and invaluable to agriculture. At the present moment, all I can suggest as a substatnial benefit to the inhabitants of this great metropolis, though I am fully aware that it will meet with powerful opposition, is the effectual trapping of the gully holes and the street gratings, as well as the water closets and sinks in every house, and their being liable to periodical police supervision to keep them in good order. Ask the medical faculty the cause of the disease, squalid misery, and deaths of thousands of the poorer, and hundreds of the wealthier classes of London in every year. They must reply that the contamination of the air in the confined spaces they occupy, and the mephitic emanations from the sewers and water closets, the pipes of which, owing to an imperfect system of regulation, are ever charged to the utmost with the foulest gases, which rush into the closet the moment the plug is raised, and continue filling the chamber with poison until the valve is again closed and jointed, as it is called, with water, as well as from the kitchen or scullery sinks, where, in ten cases out of twenty, in the dwellings of the poorer classes, the traps are either defective or deficient. Many folio volumes might be written on this subject in proof of all I have advanced without once repeating either my argument or the few facts I have adduced, but I cannot close this part of my subject without referring to the dreadful mortality in Brussels during the cholera outbreak of 1866, which, it is now universally admitted, was, if not positively produced, greatly aggravated by the contamination of the atmosphere, both externally and internally, by reason of sewage miasmas, caused by the condition of the river Senne, which intersects the town, a considerable portion of which was open, having been used as a common sewer to receive all the house, hold drainage of every description.

Statistics speak for themselves; thus, by the report of the Registrar-General, it appears that the deaths from cholera in Great Britain and Ireland in that year, out of a population of twenty-eight millions, amounted only to little over 6,000, while upwards of 6,300 were carried off by that frightful scourge in the small city of Brussels alone, containing at that period a population only of 250,000; and that out of a population of between four and five millions, of which the whole kingdom of Belgium is composed, upwards of 30,000 victims succumbed to the malady in that year. I have frequently discussed the subject with eminent Belgian physicians, and not one has ever disputed the theory I laid down, as to the cause of such frightful ravages. I have also called their attention specially to the great annual mortality prevailing in almost all the agricultural districts of that kingdom, arising from the use of liquid sewage supplied to their fields by means of the barrel cart and scoop.

"During the manuring season of each year, as soon as this practice commences, the rural population, and particularly children, are afflicted with swollen glands, and a fever called by the faculty 'la fièvre milliare,' which soon places a whole village in mourning, and no stronger proof as to the cause can possibly be adduced than is to be gathered from the fact that in the Walloon districts of Belgium, Mons, Charleroi, Jemappes, Ath, etc., etc., where no such practice prevails, the inhabitants are entirely free from these fatal attacks. I recommended to the Burgomaster of Brussels the trapping of all the gully holes of that city, as well as the passing of a

law, or some police ordinance, rendering it obligatory on the inhabitants to trap their sinks and water closets. I thought the opportunity for effecting this object had then arrived, as Mr. Doulton, the drain pipe manufacturer, was then in high favor with the municipal authorities of Brussels, and I further advised the town council that the contemplated improvements by the covering in of the river Senne, of which speculation Mr. Doulton was one of the chief promoters, would effect no real sanitary improvement unless the gully holes of the city were trapped, and that I was quite satisfied that Doulton's earthenware traps would, while being the cheapest that could be employed, answer all the desired objects. I had some years previously made a similar suggestion to Dr. Letheby, the medical officer of London; but though he fully approved of such a step in the right course, he felt that, on the ground of cost, it would meet with substantial opposition, and this was probably the view taken by the Burgomaster of Brussels. I will now refer to more recent discoveries which have created a serious feeling of alarm and apprehension in the minds of many of the learned and eminently scientific members of the faculty, in the event of the adoption in this country of any general system of sewage irrigation, or even its application on a large scale. One of the most eminent members of the faculty of medicine, Dr. Spencer Cobbold, after devoting many years of his life to the study of Entozoology, has discovered that a species of parasite, so small as to escape detection by the naked eye, has been introduced into the sewage of London, and, of course, of other towns, by our colonists from certain parts of Africa, the Mauritius, etc., etc. Irrespectively of his great work on 'Entozoa,' in the pure cause of humanity Dr. Cobbold has also published, through Messrs. Groombridge & Sons, of Paternoster Row, a sixpenny pamphlet, in order to warn the British public against the horrible dangers they must inevitably encounter should any of the contemplated systems of sewage irrigation be carried into operation; in it he graphically describes the miserably insignificant insect to whom thousands, and hundreds of thousands, may yet be indebted for long years of acute suffering and death—all the reasoning and conclusions of inductive science leading to the conviction that sewage irrigation will introduce into this country a more horrible disease than any to which the British flesh is heir. These—apart from their enmity to man—most contemptible insects in creation, have been found in the states of ova, larvæ, or the fully developed insect, in every portion of the London sewage which has hitherto been analyzed by him and his colleagues in the examination of this important question; he describes their passage from the body of the patient into the water closet, from thence to the sewers, and finally to the river and the sea; there, he observes, let them remain, they can do no harm to any one; but once let them reach our fields, then the misery and sufferings of humanity will be terribly augmented. According to his statement, this insect is of precisely the same species as that which is found from the overflowing of the Nile, where his friend, Dr. Grunnenstein, in the post-mortem examination of 300 peasants, found that the deaths of upwards of 100, or more than one third, had been occasioned solely by the ravages of this little insect. They are swallowed in the food, either animal or vegetable, when not sufficiently exposed to the action of fire to destroy them in their several states, for which reason he earnestly recommends our abstinence from underdone meat and raw vegetables.

PLASTER OF PARIS MANUFACTURE.

The quarrying of gypsum and the manufacture of plaster are important industries in Paris, and we (*Engineering*) have recently taken the opportunity of visiting one of the establishments of this kind, the best arranged—that of M. Morel, at Montreuil. The plaster of Paris, or gypsum, consists, as is well known, of hydrated sulphate of lime. The water being removed by roasting, the stone is ground into powder. When this is afterwards mixed with water it combines itself again, and forms a solid mass, which is employed in an infinite variety of ways. The abundance of gypsum at Montmartre, Pantin, Menilmontant, Belleville, Charonne, Montreuil, &c., all close to Paris, even within the city limits, the good quality of, and the large demand for, the plaster, and the ease with which it is employed, have caused the development of this great industry in the capital. The plaster of Paris has a European, and even a still more extended reputation. It is employed everywhere, and is put to the most varied uses. It is molded into hollow bricks, and tubular blocks, in building up partitions and walls, for paving slabs, and for smoke conduits to chimneys. One sees, even in the neighborhood of the quarries, houses of three and four stories, which are built in molded stones of plaster, or made in plaster in such a manner that they form a monolith.

The bed of gypsum worked at Pantin is horizontal: it has a thickness of 37 feet 2 inches. There is also a small bed adjacent, and of little thickness, but this is not quarried as a rule. The gypsum of this bed is almost entirely crystalized, and there are found there, in abundance, those beautiful specimens called *fers de lance*, on account of their form. These fragments split with ease into thin transparent leaves, and when the apparent limit of diversibility has been found with the blade of a knife, if one takes one of the leaves, which has less than 1-80th inch of thickness, and heats it, it exfoliates into more than twenty films as the water it contains is heated and disengages itself in steam.

The bed of gypsum that is excavated is covered by some 40 feet of earth, consisting of calcareous deposits, and marl and clay. It is excavated, for the most part, by subterranean galleries, but it is sometimes found more economical to work from the surface, in spite of the great thickness of superincumbent earth, because there are numerous situations where the excavated material employed to fill elsewhere can be made a source of revenue, while the limestone can be sold to make lime, and the clay to make earthenware, or bricks.

It is thus that the quarry of Eprisette, worked at first in galleries by M. Morel, is changed at the present time into open excavation.

The gypsum is extracted by blasting. Holes are pierced in the rock, which, for the most part, is sufficiently soft for a workman to drive in less than an hour a hole from 4ft. 6in. to 6ft. deep and 2ft. in diameter. After a blast, the rock is struck with crowbars, which divides it into blocks from 30 to 40 meters cube, advantage being taken of the numerous faults in the material, which the workmen learn to recognize at a glance, and which they call "*maillances*." A heavy blow, or the introduction of a pick, at the right spot, divides easily the largest blocks into convenient fragments.

These fragments are loaded upon trolleys, which follow the face of the gallery or cutting or tramways, and which lead up to the eight furnaces composing the factory. These kilns, or furnaces, are of the simplest form. They consist of an end wall 15 ft. long, and of two side walls of the same length. The three walls are also 15ft. high, and the square hearth that they surround, carries perpendicularly to the end wall, five gratings, through which passes the air necessary for combustion. On the ground, the largest blocks of gypsum are arranged in such a manner as to construct, above these gratings, arches sufficiently high to receive the fuel for burning the material. The spaces intervening are filled up with other fragments of rock, more of which is added from above so that the hight of the mass is raised. When the greatest hight conveniently attainable by hand is reached, the charging of the kiln is continued from trolleys brought upon inclined planes which are also supplied with rails. This is carried on until the hight of the charge is equal to that of the walls of the kiln. All the interstices are then carefully packed with small fragments of the stone, and the front of the furnace, which is raised by a low wall, receives a movable cover of plate iron intended to prevent the loss of heat by radiation; and to retain such morsels of stone as become detached during the operation of baking; the joints in the front of the kiln are luted.

Everything being then prepared, fagots are placed within the arches and lighted, and when the embers are in full glow and the arches half empty, they are charged with *briquettes* of artificial fuel, and the fire is so managed by regulating the access of air, that the baking of the mass is effected equally throughout without any extremes of excessive or imperfect burning. The operation is complete in 24 hours.

The employment of *briquettes* is one of the improvements introduced by M. Morel into his establishment. The baking was generally done with wood, and the substitution of coal has effected a saving of two thirds of the total quantity produced. There is a comparatively small loss of heat in this apparatus, so simple and apparently so primitive. In calculating the calorific power of the quantity of fuel consumed and the amount of heat necessary to evaporate all the water contained in the gypsum, it is found that he utilizes one half of the available heat, which is certainly a satisfactory result considering all the various losses inseparable from an identical enterprise.

After the calculation is complete, the furnace is allowed to cool, and the burnt gypsum is again loaded into wagons and carried off on the tramway to the grinding mills. This part of the manufacture consists of two parts. There are millstones in cast iron or stone, banded with rings of iron and turning in a circular trough with a grated bottom. The calcined stone is fed into the mill, and those parts which are ground down extremely fine pass through its gratings. The rest is removed by a suitable mechanical appliance for grinding.

One of the mills carries a most ingenious arrangement for screening the fine powder. Below the grate there is a strainer in the form of a truncated cone. Of the powder which falls upon this strainer through the base of the annular grate, part passes through the meshes and escapes through the lower part of the apparatus; the rest slides on the conical strainer falling on a table at the bottom, and is constantly lifted by a chain and replaced on the table of the mill. After the powder is sufficiently ground, it is conveyed below into a storehouse where it is placed in bags. The machines are driven by a 12 horse steam engine.

The whole of this establishment is ably arranged and managed, from the quarries to the plaster depôt; and the working out of all the practical details does honor to the able proprietor who created them, and who still works daily to improve them.

Mr. Crookes on the "Psychic" Force.

With a boldness and honesty which deserve the greatest respect, Mr. Crookes has come forward as an investigator of those mysterious phenomena which have now been so long before the public that it is unnecessary to name them, more especially as their generally received name is very objectionable. Two things have contributed to retard our knowledge of these strange events. In the first place, until lately, few men of name have been associated with their occurrence, so that outsiders have not had the facts put before them in a proper manner. In the next place we are inclined to indorse the remark of Mr. Crookes, that men of science have shown too great a disinclination to investigate the existence and nature of these alleged facts, even when their occurrence had been asserted by competent and credible witnesses.

Before adverting to the results obtained by Mr. Crookes, a few words may be said about our mode of procedure in accepting testimony.

Let us suppose that a man comes before us as a witness of some strange and unprecedented occurrence. Here it is evident that we are not entitled to reject his testimony on the ground that we cannot explain what he has seen in accordance with our preconceived views of the universe, even although these views are the result of a long experience; for by this means we should never arrive at anything new. Our first question is manifestly one regarding the man's moral character. Is he an honest and trustworthy man, or is he trying to deceive us?

Let us assume that we have convinced ourselves of his honesty; we are then bound to believe that *he thought he saw* what he described to us; not necessarily, however, that the occurrence which he described actually took place. Convinced, already, that he is not deceiving us, the next question is whether he may not be deceived himself. Let us, however, assume that, upon investigation, the circumstances are such that collusion of any kind is out of the question, and that the man is neither trying to deceive us, nor that it is possible that he himself can have been deceived by others. Even yet we have an alternative in our judgment of the event. The phenomenon may be *subjective* rather than *objective*, the result of an action upon the man's brain rather than an outstanding reality. For nothing is more certain than the occasional occurrence of such strange impressions; and that the cat or the dog, or the skeleton by which the patient is haunted, is frequently recognized even by himself as having no external existence. Of late years we have been able to produce instances of this depraved consciousness almost at will. The author of these remarks considers it certain that the electro-biologist has frequently caused them. The unimpeachable character of the patient, combined with the fact that he has sometimes pronounced water to be wine, or a snow storm to be taking place in a room, can only be accounted for on the supposition that he has been put into a peculiar state, during which his evidence of events is utterly worthless. But beyond the bare fact, we know next to nothing of the laws that regulate this action, nor can we tell under what conditions one man is capable of influencing another, or whether a man or body of men may not be capable of influencing themselves.

To come now to the class of events which Mr. Crookes has witnessed. It is greatly to his credit that he has come forward so frankly and honestly; and since he has begun to investigate the peculiar class of facts, we are sure that he will consider it his duty to continue the investigation in such a way as to convince those men of science who may not themselves be able to take up the question—outsiders in fact. Mr. Crookes will, we are sure, not object to a few critical remarks honestly made with the sole view of finding out the truth, and we would therefore express a wish that, in order to facilitate operations the experiments should, in future, be conducted by only such men as Mr. Crookes himself, and that it should always be absolutely superfluous to investigate whether machinery, apparatus, or contrivance of any sort, be secreted about the persons present. We should thus start from a higher platform, and the investigation would gain in simplicity, although perhaps something might be lost in the marked nature of the results obtained.

Allowing, however (as we are disposed to allow), that things of an extraordinary nature are frequently witnessed on such occasions, yet we are by no means sure that these constitute external realities. The very fact that the results are uncertain, and that, as far as we know, they have never yet been obtained in broad daylight before a large and unbiassed audience, would lead us to suspect that they may be subjective rather than objective, occurring in the imaginations of those present rather than in the outward physical world. Nor can this doubt be removed by any precision of apparatus; for what avails the most perfect instrument as long as we suspect the operator to be under a mental influence of the nature, it may be, of that which is witnessed in electro-biological experiments? The problem is, in fact, one of extreme difficulty, and we do not see how it admits of proof, provided the influence cannot be exerted in broad daylight and before a large audience. There is, however, a cognate phenomenon which admits of easy proof. We allude to clairvoyance, and have in our mind at the present moment a man of science who, if not himself a clairvoyant, has yet the power to command the services of one who is. Now, were he at once to communicate to a journal such as *Nature*, in cipher if necessary, the knowledge derived through the influence, giving the proof afterwards when obtained in an ordinary manner, the public would soon be in a position to judge whether there is any truth in the influence or not.

It is, in fact, somewhat hard upon the writer of these remarks and some others who are disposed to allow the possibility of something of this nature, but have not the opportunity of investigating it, that those who have will not satisfy the public with a convincing proof.—*B. Stewart, in Nature.*

Lace Manufacture in Brooklyn, N. Y.

There is now in course of construction on Park avenue, near Hall street, a large brick structure, to be 60 by 140 feet in dimensions, and five stories high, surmounted with a Mansard roof, which is to be provided with the most approved modern machinery for the manufacture of Nottingham lace and also of fine silks. A large amount of capital is invested in the undertaking, and, if successful, additional buildings are to be erected on the adjoining lots. It is said that when the works are in full operation, a thousand females, and nearly as many males, will be employed in the establishment. The first story of the main building is now up, and the work progresses as rapidly as the weather will permit. One reason for selecting Brooklyn is that the Ridgewood water is chemically well adapted for dyeing purposes.

TEETH.

Chamber's Journal.

Every dentist insists upon it that he, above all others, is the one who has made the most felicitous discoveries in odontology. We hear very little about dentist failures; because those unhappy beings who require a new mouthful of teeth shrink from saying much about it. A good box of ivories is a precious treasure when real, and a costly one when artificial. We ought to have our fair proportion of incisors, to bite through the beef and mutton; and of other teeth, to break and to crack harder substances, by means of saw-like serrations and file-like roughnesses. Professor Owen tells us that the teeth of the lower animals perform many more kinds of work than those of man—weapons of offence and defence, aids to locomotion, means of anchorage, instruments for uprooting or cutting down trees, and apparatus for the transport and working of building materials. As to our own species, he proceeds to say that the milk teeth or children's teeth ought to be twenty in number; comprising four front teeth, or incisors; two dog teeth, or canines; and four double teeth, or molars, in each jaw. When we come to man's estate, however, (or woman's), the permanent teeth should be thirty-two in number, to enable us to seize, tear, divide, pound, and grind our food—four incisors, two canines, four premolars, and six true molars, in each jaw. It is rather mortifying to learn that a pig (who is his own dentist) beats us hollow in this respect; since he has no less than forty-four teeth.

Some old folks cut their teeth when far advanced towards centenarianism. An old woman named Dillon, living near Castlerea, in Ireland, cut an incisive tooth in the lower jaw when seventy-five years old; it confirmed a strange hallucination with which she had long been possessed—that she had been dead, and was come to life again, with the usual infantine career of teething, etc. Mrs. Fussell, living at Acton, about a dozen years ago, cut an entirely new set of teeth when about eighty years old, after having been many years toothless. In 1732, Margaret White, of Kirkcaldy, in Scotland, cut eight new teeth in the eighty-seventh year of her age—thus winding up a toothless period of many years. Mrs. Page, a dame of Southwark, after being toothless from seventy to ninety years of age, cut several new teeth. The Rev. Samuel Croxall, translator of Æsop's *Fables* from the Greek, "died of fever, occasioned by the pain he underwent in cutting a new set of teeth at the great age of ninety-three." Edward Progers, aged ninety-six, died in 1713, "of the anguish of cutting teeth, he having cut four new teeth, and had several ready to cut, which so inflamed his gums that he died thereof." The late Sir George Cornewall Lewis was very skeptical as to people ever living to the age of a hundred; he would probably, therefore, have pooh-poohed the story of Robert Lyon, of Glasgow, who cut a new set of teeth at the age of a hundred and nine; and still more that of James Hook, of Belfast, who, in the time of Queen Elizabeth, and at the age of a hundred and twelve, "gott a new set of teeth, w^ch has drove out all y^e old stumps."

As if to take revenge for the duplications, or rather triplications of teething, nature sometimes requires us to dispense with dental apparatus altogether. At Gayton le Marsh, in Lincolnshire, there is the following epitaph: "Elizabeth Cook, a poor woman, aged 86, and who never had a tooth, was buried June 11, 1798." On the other hand, some folks greatly exceed the orthodox number of thirty-two. Dampier, in his account of the Philippine Islands, says: "The next day the Sultan came on board again, and presented Captain Read with a little boy; but he was too small to be serviceable on board, and so Captain Read returned thanks, and told him he was too little for him. Then the Sultan sent for a bigger boy, which the captain accepted. This boy was a very pretty, tractable boy; but what was wonderful in him, he had two rows of teeth, one within another, in each jaw. None of the people were so; nor did I ever see the like."

The "pearly teeth" of the poet and novelist would not be valued by some of the Eastern and Polynesian nations. The Chinese blacken their teeth by chewing the fruit of the areca, or betel nut. The Tonquinese and Siamese gents and belles, in bringing about the same result by nearly the same means, almost starve themselves for three or four days, while the dyeing is going on, lest the food should disturb the dye. The Sunda Islanders sometimes blacken all the teeth but two with burned cocoa nut; covering the two excepted teeth with thin plates of gold or silver. The Macassar people sometimes pull out two front teeth, in order to supply their place with teeth of pure gold or silver! Two Italian girls, twins, have been known to have natural teeth of a light red rose color—both the milk teeth and those which succeeded them.

The charms, omens, signs, panaceas relating to the teeth constitute quite a formidable item in folk lore. In some parts of Sussex there is a superstition that if you put on your right stocking, right shoe, and right trouser leg before the left, you will never have toothache. To drink out of a skull taken from a graveyard; to take a tooth from such a skull, and wear it round the neck; to apply the tooth to your own living but aching tooth; to put a double nut in your pocket; to pare your finger nails and toe nails, and wrap up the parings in paper—all are charms against the toothache. If you catch a mole in a trap, cut off one of his paws, and wear it as a charm; you will "soon see the effect," provided a right paw be used for a left tooth, and *vice versâ*. When an aching tooth is extracted, mix it with salt, and burn it. There is in Norfolk a custom of calling the toothache the "love pain," for which the sufferer is not entitled to any commiseration; whether he (or she) fully assents to this, may perhaps be doubted. Many other items of tooth lore have no connection with toothache. For instance: if the teeth are set wide apart, there will be good luck and plenty of traveling for the fortunate possessor. When a tooth is drawn, if you refrain from thrusting your tongue into the cavity, the new tooth to grow in its place will be a lucky one. Lady Wentworth, in a letter written in 1713, to her son Lord Strafford, spoke of the efficacy of wolves' teeth set in gold to assist children in cutting their teeth: "They are very lucky things; for my twoe first one did dye, the other bred his very ill, and none of y^e rest did, for I had one for al the rest." Bless the good lady; her grammar and her logic are about on a par!

Why do some people's teeth come out more readily than others? The reasons for this are probably many. About the middle of the last century, Peter Kalm, a Swede, visited America, and wrote sensibly about what he saw. He observed a frequent loss of teeth among settlers from Europe, especially women. After discussing and rejecting many modes of explanation, he attributed it to hot tea and other hot beverages; and came to a general conclusion that "hot feeders lose their teeth more readily than cold feeders." Mr. Catlin, who some years ago had an interesting exhibition of Indian scenery, dresses, weapons, etc., noticed that North American Indians have better teeth than the whites. He accounts for the difference in this strange way—that the reds keep the mouth shut, whereas the whites keep it open. The teeth, he says, require moisture to keep their surfaces in good working order; when the mouth is open, the mucous membrane has a tendency to dry up, the teeth lose their needed supply of moisture, and thence come discoloration, toothache, tic-douloureux, decay, looseness, and eventual loss of teeth. Mr. Catlin scolds the human race generally for being less sensible than the brutes in this respect, and the white race specially in comparison with the red. We keep our mouths open far too much; the Indian warrior sleeps, hunts, and smiles with his mouth shut, and respires through the nostrils. Among the virtues attributed by him to closed lips, one is excellent—when you are angry, keep your mouth shut.

There is reason to believe that the Greeks and Romans knew something about false teeth. Martial, in one of his epigrams, said that Thais's teeth were discolored, while Lecania's were white. Why? Because the former wore her own teeth, whereas the latter wore those of some other person. There was an old Roman law, which allowed the gold settings of false teeth, or the gold with which they were bound, to be buried or burned with the deceased. There is also some indication that the Greeks were wont to extract teeth, and to fill up decayed teeth with gold. Dentistry was certainly known in England three centuries ago. Blagrave's *Mathematicall Jewel*, published in the time of Queen Elizabeth, tells us that "Sir John Blagrave caused his teeth to be all drawne out, and after had a sett of ivory in agayne." Ben Jonson, in his *Silent Woman*, published in 1607, makes one of the characters say: "A most vile face! and yet she spends me forty pound a year in mercury and hog's bones. All her teeth were made in the Blackfriars!" An almanac for the year 1709 makes mention of one John Watts, who was a maker of artificial teeth in Racket Court, Fleet street. The Sunda Islanders at the present day are in the habit of employing their old women to dress up the teeth of the youths and maidens at wooing time; the canine teeth are filed to a fine smooth edge, and the body of the tooth made concave, or they will notch the edge of the teeth like a fine saw, as an additional means of beautifying. An imperial toothache once made the fortune of a poor barber. The present Sultan of Turkey, Abdul Aziz, having a touch of toothache one day, sent for the court physician; he was hunting, and could not be found. The domestics hurried about Constantinople, and at length found a poor, ragged barber surgeon; they took him to the palace, and furbished him up. He drew the offending tooth, and soothed the pain of the Commander of the Faithful. Whereupon a nice house and sixteen hundred piastres a month were awarded to him.

During the days of the resurrectionists or body snatchers, when grave yards were subjected to pillage for supplying anatomists with subjects for dissection, the teeth from the dead bodies formed a frequent article of sale to dentists. Sometimes graves were opened for the teeth alone, as being small and easily concealed articles. Mr. Cooper, the surgeon, relates an instance of a man feigning to look out a burial place for his wife, and thus obtaining access to the vault of a meeting house, the trap door of which he unbolted; at night he let himself down in the vault, and pocketed the front teeth of the whole of the buried congregation, by which he cleared fifty pounds! Mention is made of a licensed sutler or cantineer during the Peninsular war, who "drew the teeth of those who had fallen in battle, and plundered their persons. With the produce of these adventures, he built a hotel at Margate. But his previous occupation being discovered, his house was avoided, and disposed of at a heavy loss." He afterwards became a dealer in dead men's teeth.

The making of artificial teeth is a trade in which a large amount of ingenuity is displayed, both in the adaptation of new substance, and in the modes of shaping and finishing. When artificial teeth began to be made, instead of using the natural teeth of dead persons, they were made of bone, or the more costly kind of ivory, from the tusks of the elephant, rhinoceros, hippopotamus, walrus, or narwhal. If only a single tooth were wanted, it was customary to cut a bit of bone to the proper shape, and tie it to the next tooth by a ligature of wire. It is still found that tusk bone possesses the best combination of properties. It combines, as a learned authority in the dental world, tells us, "lightness, strength, and solidity, with a natural appearance and a certain congeniality to the mouth, possessed by no other material, which render both partial pieces and entire sets at once the most useful substitutes for the lost natural teeth."

The mechanical dentist must be a genuine workman. When he is about to make bone or ivory teeth, he cuts a tusk into pieces, and shapes each piece by an elaborate series of mechanical processes. Sometimes for a customer who has plenty of guineas to spare, he will make a whole set, upper or lower, as the case may be, out of one piece. He saws his block of ivory roughly to the size; and then, with infinite patience, files and graves it into shape. He has at hand a model of the patient's gum, and works to that model with exactness. The teeth are not separate pieces; they are cut into apparent rather than real separation, like the teeth of a comb. An artistic workman will take care that the teeth shall present some of that irregularity which our natural grinders always exhibit; a learner falls into the mistake of making them too good. Many persons do not like to wear dead people's teeth; there is something uncomfortable in the idea; there is also frequently a germ of decay in such teeth; and these two reasons led to the custom of making artificial ivory teeth. Ivory, however, with all its excellences, becomes discolored; and hence the chief motive for making teeth of certain mineral or vegetable compositions. There is, in fact, a sort of triangular duel always going on among the ivory dentists, mineral dentists, and vegetable dentists, each class fighting stoutly against both of the others.

Whether your dentist really makes the teeth which he inserts in your cranium, is a question he does not deem it necessary to answer. In truth, he very rarely does anything of the kind. There are certain dealers who sell sets of teeth, half-sets, twos or threes, singles or doubles, front or back, top or bottom, finished or unfinished; as well as all the apparatus and tools required for the dentist's art. And some of these dealers themselves are supplied by manufacturers, who conduct operations on a considerable scale. There is one firm in the metropolis at the head of the trade, who built a really beautiful factory a few years ago, replete with steam engines, tool making shops, and all the appliances for a well organized staff of two hundred operatives. How many incisors and canines, premolars and true molars, such an establishment can turn out in a year, we will leave Cocker to calculate.

Our American cousins, it appears, are not at all behind us in this art; while they are, perhaps, still more ready than ourselves to apply steam power to its development. A recent computation makes the number of artificial teeth fabricated in the United States as high as three millions annually—symbols (according to some folks' notions) of three million attacks of toothache. In one of the largest and most complete factories, where mineral teeth are made, the chief ingredients comprise felspar, silica, and clay; those of subsidiary character are sundry metallic oxides, to produce those tints of discoloration which are necessary to make the imitation a good one. The felspar, silica, and clay are ground to an impalpable powder under water, then dried, and made into a paste. The teeth are cast in brass molds, varied in size and shape to suit the requirements of the mouth. A special kind of paste, to form the enamel, is first put into the mold with a small steel spatula; the platinum rivets, by which the teeth are to be fastened, are adjusted in position; and then the paste forming the body of the tooth is introduced until the mold is filled up. Next ensue powerful pressure and drying. When removing from the mould, the tooth goes through a process called biscuiting (analogous to a particular stage in the porcelain manufacture), in which state it can be cut like chalk. It is then sent to the trimmer, who scrapes off all roughness and unnecessary projections, and fills up any depressions which may have been left in the operation of molding. A wash called enamel is made, by selecting various ingredients more fusible than those of the tooth, grinding them to a fine powder with water, and applying the thick liquid as paint, by means of a camel hair pencil. The tooth then goes to the gummer, who applies a gum comprising oxide of gold and other ingredients. At length heat is applied. The tooth, when dried, is put into a muffle, or enameller's oven, where it is placed on a layer of crushed quartz strewed over a slab of fire resisting clay. After being exposed for a time to an intense heat, the tooth is taken out, and cooled—and there it is, beautiful for ever.

A SPONTANEOUS EXPLOSIVE.—Some experiments recently conducted at the Philadelphia High School developed the fact that when a strong solution of phosphorus in bisulphide of carbon is poured upon finely powdered chlorate of potassa resting on paper, and the mixture exposed to air, upon the evaporation of the bisulphide of carbon, the phosphorus being left in a very finely divided state, intimately mixed with the chlorate of potassa, the mixture presently explodes spontaneously, with a loud detonation. The explosion in this instance is analogous to the case of phosphorus and chlorate of potassa when struck or rubbed together, the mixture of the two substances in the present case being, however, much more perfect than can be obtained by any mechanical means.

MR. DAVID OLMSTED, of St. Anthony's Falls, Minn., having read the correspondence on the subject of the relative value of coal and zinc, as power producers, suggests the employment of water power to produce electricity, which can be conveyed by wire to less fortunate localities. Mr. Olmsted's idea of sharing the advantages of the city in which he lives with others not so favored is very generous; and if the inhabitants of St. Anthony's Falls will erect a turbine to convert the eighteen foot fall of the Mississippi into power, the neighboring villages could easily erect shafts to convey it into their factories; while a magneto-electric machine, of the requisite size, could produce currents for the supply of manufacturers at a distance. But the first step towards these desirable results is to erect the turbine.

THE ROAD STEAMER AND OMNIBUS.

The attention of mechanical engineers and men of business has lately been turned to the use of common roads for haulage by steam power. The difficulty of transporting heavy weights where no railway exists, the increased price and scarcity of horses and of their fodder, the development of productive industry both in India and the colonies, and the preference shown by many farmers at home for steam instead of animal power, have led the English public more especially to take great interest in traction engines and road steamers.

Steam engines were made to run along the common roads many years ago, but have never yet become a commercial success; nor have they been used, with a few exceptions, for transporting goods and passengers to and from towns, or as feeders to main lines of railway, from villages and towns not large enough to support a branch line of rails.

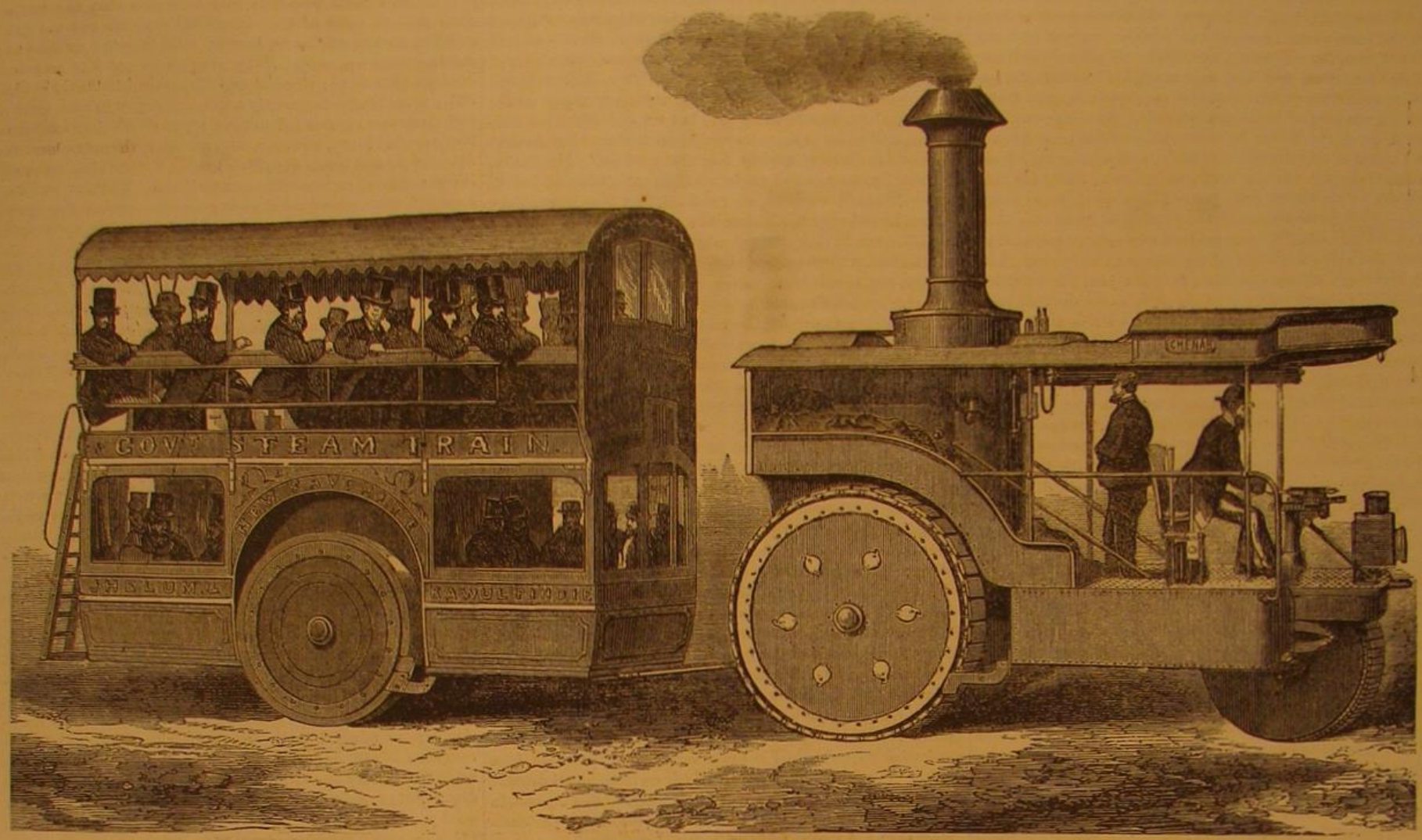
The first designs were simply the adaptation of some well known form of mechanical arrangement to the end of transmitting the rotary motion of the crank shaft of an ordinary portable engine to the road wheels. But, from a variety of circumstances, these engines were not applicable for the purposes of general haulage on common roads. It was not until a completely new engine was designed by Mr. R. W. Thomson, of Edinburgh, that the object was practically attained. These engines have been described in our pages on a former occasion. Their principal feature is the adoption of rings or tires of india rubber round the driving wheels, which are flattened by the weight of the engine, giving the wheels a greater surface of contact with the ground, and consequently more adhesion, than the cast iron or wrought iron wheels usually employed in traction engines, especially on sandy and rough roads. Besides this, the engine is placed on three wheels, instead of four, giving it a smaller wheel base, and enabling it to turn in its own length, and to manœuvre in narrow and crooked roads. All the various parts are of steel or wrought iron, which renders the engine much lighter than the cumbrous machine hitherto seen on roads.

Our illustration shows one of these engines with its omnibus. It was built by Ransome, Sims, and Head, from the designs of Mr. Thomson and Lieutenant Crompton, appointed by the India Government. It is designed to run, with three more such engines and omnibuses, from Rawul Pindee to the Jhelum, in the Punjaub, a distance of about sixty-eigl t miles, for the conveyance of passengers and mails, and occasionally of troops and baggage.

These engines and carriages are complete, with all the newest improvements that engineering science could devise. The following are their principal dimensions:—Diameter of cylinders, 8 inches; length of stroke, 10 inches; revolutions per minute, 172; working pressure, 140 lbs.; diameter of main road wheels, 6 feet; width of india rubber tires, 14½ inches; their thickness, 4½ inches; fast speed of engine, ten miles, slow speed, three miles an hour; capacity of water tank, 370 gallons; that of coal bunkers, one tun; weight of engine, in complete working order, with water tank and coal bunkers full, about twelve tuns.

The omnibus will carry about sixty-five passengers, in addition to luggage and mails. It is fitted with the usual steel springs; and, as the wheels are surrounded with india rubber tires, the movement is so easy, at a speed of ten miles an hour, even on a rough road, that it is quite possible to write perfectly when sitting inside.

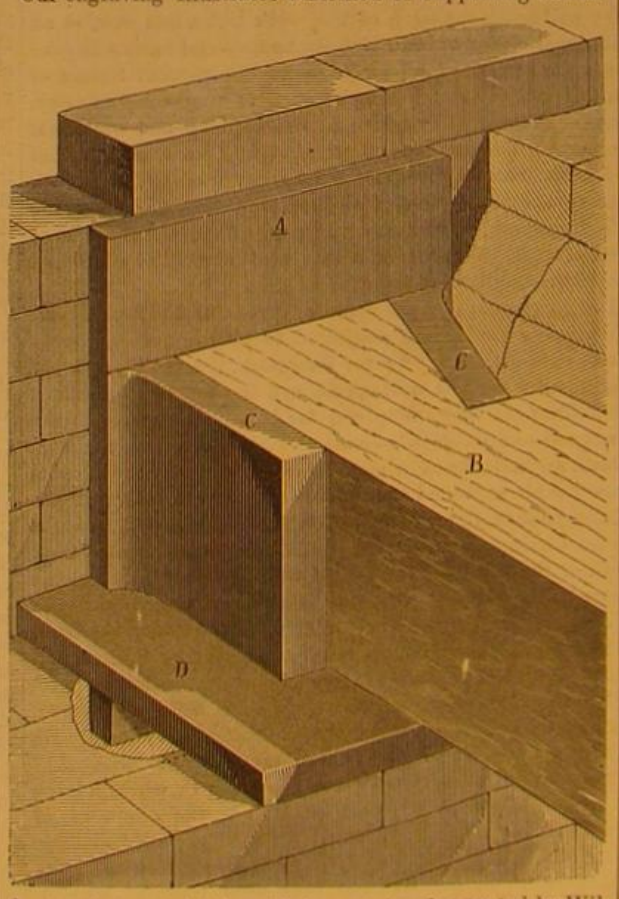
About the end of May a trial of the first of these engines, with its omnibus, took place at Ipswich. A large company sat in the omnibus attached to the road steamer, and traveled at the rate of three miles and a half an hour to the racecourse, a distance of about a mile and a half. The road lay through one of the most crowded parts of the town, but the engine and omnibus turned sharp corners with the greatest facility, mounting an incline half a mile long, with a varying gradient of from 1 in 12 to 1 in 25. Having arrived at the racecourse, the engine was started at full speed, running along the course at the rate of twelve miles per hour; then mounting, with the greatest ease, a hill representing a gradient of 1 in 10, while all the passengers were delighted with the pleasant movement of the vehicle and freedom from noise of the engine.



ROAD STEAMER AND OMNIBUS.

ANCHOR BEAM SUPPORT FOR BRICK WALLS.

Our engraving illustrates a method of supporting and anchoring beams to brick walls, invented and patented by William W. Goodrich, of Rondout, New York, Nov. 22, 1870.



The method consists essentially in casting the supporting and anchoring devices together in a single casting, the parts of which are as follows:

A is a vertical flat plate which is placed between the outer course of brick and the inner ones. The beam, B, rests upon a horizontal plate, D, cast with the vertical plate, A. The end of the beam is dovetailed as shown, the dovetailed portion fitting the recess between two vertical plates, C, cast together with A and D.

In this way the plate is anchored to the wall, and the beam is firmly held to bind opposite walls together. It will be seen that the method is cheap, substantial, and practical. For further information address Mr. Goodrich, as above.

The Preparation of Fancy Soaps.

Fancy soaps, which are made in great variety for the toilet, are usually scented with some aromatic oils. For this branch of the trade the ordinary commercial soaps are used, after undergoing a process of refinement; or a soap is specially made for the purpose from almond oil, or the like. Much taste is shown by the best London makers in the selection and combination of the perfumes, which, along with the coloring matter, such as vermillion, yellow ocher, aniline, etc., are usually boiled up with the soap. To facilitate this operation, as a well dried soap does not readily melt, it is usually cut up into fine shavings, and after boiling is well worked under rollers until it presents a uniform appearance. If the soap is intended to be highly scented, or very extensive perfumes are to be employed, the cold process is adopted, as much of the strength of the scent is lost by boiling. In this case the soap is shredded as before, and the perfume and coloring matters well amalgamated with it by being worked in a mortar with a pestle. It is then divided into lumps, and roughly molded with the hand into something of the shape it is finally to assume. After being left on a rack to dry for about a week, it is pressed into a mold, which imparts to the cake the form and device which may be required, and when taken out, the edges are trimmed and the surface polished with the hand.

Oil Proof Rubber for Steam Packing, etc.

James M. Flagg, of Providence, R. I., has invented an improved preparation of rubber for carriage washers, gaskets, belting, and other purposes, where rubber comes in contact with oil, so prepared that the oil will not affect the prepared rubber. The invention consists in combining aluminous clay with vulcanized rubber. The clay which is preferably used, contains by analysis about thirty-nine per cent of alumina, forty-six per cent of silica, thirteen per cent of water, and about two per cent, or a mere trace, of iron, magnesia, and lime. Any appreciable quantity of these last mentioned substances would defeat the object in view, since they would lump and form a gritty surface, and their particles would not contact with sufficient closeness to exclude oil. In preparing the rubber the clay is mixed with the caoutchouc and sulphur, which mixture is then prepared and vulcanized in the ordinary manner, according to the particular use to which it is to be applied. Plumbago may be added to the mixture, or not, according to the use to which the rubber is to be applied. For carriage washers the compound is vulcanized upon an arbor, and washers of the desired thickness are afterward cut off.

This seems an important improvement, and, if it does what the inventor claims, will supply a want long felt.

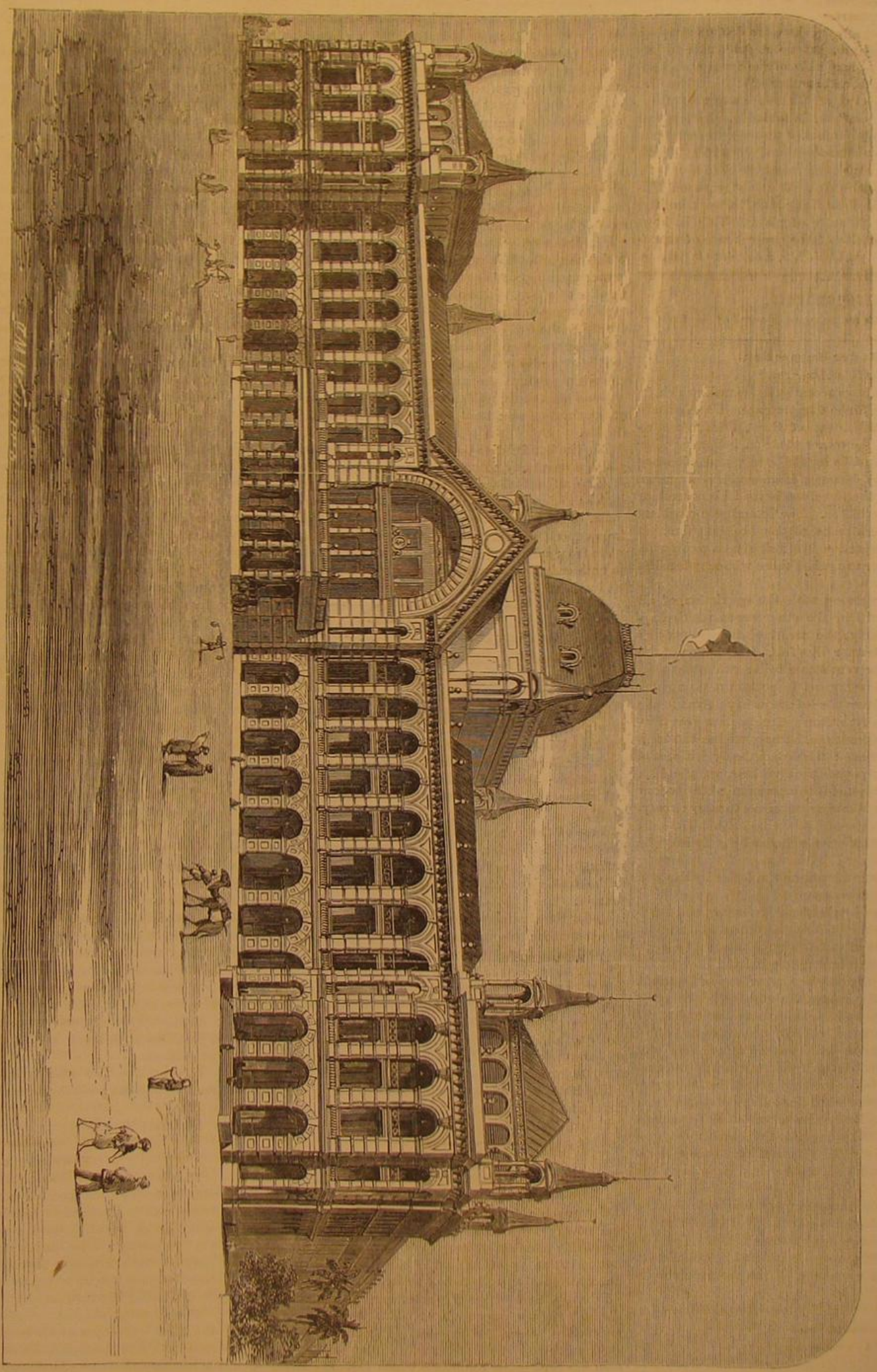
RECENTLY as a train on the Mount Holly Railroad, near Merchantville, was going at full speed, the engineer saw far ahead a little girl running along the track. He reversed steam and whistled down brakes, but the grade being downward, it was impossible to stop in time to save the child's life. Meantime the fireman, Lewis Ebertson, ran out to the front of the locomotive. Standing on the cow catcher, he caught the child as the locomotive touched her garments, and lifted her out of danger.

THE NEW HOTEL, CAIRO, EGYPT.

As the opening of the Suez Canal is turning men's minds towards Egypt, our readers may be glad to know something of the Oriental Hotel Company's new hotel at Cairo, in Egypt, which has recently been opened for the convenience of travelers to the Nile, and by the overland route to India, as also for the reception and accommodation of the many invalids who find benefit from a winter residence in Cairo. We give a view of one front of it.

The hotel is beautifully situated, facing the gardens of the Ezbekiah and the Rue de Boulaac, and commands a good view of the Pyramids. The foundation stone was laid with great ceremony by his Excellency Nubar Pasha, Minister of Public Works, on the 10th of January, 1865, being the anniversary of the accession of his Excellency the Viceroy.

The hotel, when completed, is intended to form a quadrangle (with large open gardens in the center), of which only the principal front, facing the Boulevard d'Ezbekiah, and a portion of the return fronts facing the Rue de Boulaac and the new street, have been as yet erected. The building is Franco-Italian in style, and has been erected from the designs and under the superintendence of Mr. Christopher G. Wray, of London, who, from a long residence in India as an officer of the Public Works Department, had knowledge that enabled him to arrange an hotel suitable to the requirements of the climate.



THE NEW HOTEL, CAIRO, EGYPT.

It is constructed with stone from the neighboring quarries, with terra cotta enrichments, which were sent from London, as also were all the woodwork and fittings. The portion at present built has a frontage towards the Boulevard d'Ezbekiah of about 400 feet in length, and returns about 86 feet towards the Rue de Boulaac, and about 140 feet facing the new street, and it is about 70 feet high. It contains upon the ground floor a *café*, 61 feet by 36 feet; *table d'hôte* room, about 80 feet by 30 feet; bazaar, 61 feet by 36 feet; billiard room and suites of public offices, all 21 feet high; as also a grand staircase, 60 feet by 23 feet; and at the rear a kitchen department, serving rooms, and other offices.

The hotel is surrounded on all floors by wide verandahs, affording a passage way around the building, and supplying a comfortable lounge. The *table d'hôte* room is supplied with an orchestra for evening entertainments, and is laid with parquetrie, so as to afford a dancing floor.

Upon the first floor are a ladies' *salon*, 41 feet by 21 feet, and 20 feet high; nine private sitting rooms, with bedrooms *en suite*; and forty-two bedrooms, besides various serving rooms and W. C.'s, which are numerous, and conveniently arranged, those for ladies being entirely separate, and approached through their own retiring rooms. The bath rooms are fitted with large baths, and shower baths over all, supplied with hot and cold water, the whole of the apparatus and fittings being of the best London manufacture.

The second floor is somewhat similarly arranged, and contains fifty-nine bed rooms, besides ladies' rooms, serving rooms, baths, etc., as on the floor below, and all 15 feet high. The floors are variously laid with parquetrie, marble, and stone paving, bordered with Maw's encaustic tiles, which give a rich effect. The various apartments throughout are supplied with Bregnet's patent electric bells. The total cost of the portion of the building already erected has exceeded £100,000.

Tea and Milk.

The Chinese have always despised European tea drinkers for disguising the fragrance of the sacred herb by the admixture of milk, and the Celestial nation would appear to have reason on their side, for, it is asserted, that on mixture the albumen of the milk unites with the tannin of the tea, and forms minute flakes of that material which is, or ought to be, the main constituent of a pair of boots. There may be nothing like leather, but a leather lining to one's stomach is hardly a specimen of the eternal fitness of things. When we, ourselves, so vitiate the cheering cup, we can hardly wonder that the "Heathen Chinee" considers the leavings of his own decoctions quite good enough for us, and we can have no reason to complain of shipments of re-fired leaves, but it is another matter when the process goes a step further, and takes the form of 'Maloo' mixture, a delicate euphuism for willow leaves and maggots, iron filings, and plumbago.—*London Milk Journal.*

Medicine and Medical Practice in China.

The following remarks occur in Dr. Dobell's "Reports on the Progress of Medicine." They are contributed by F. Porter Smith, M. B., of Hankow:

The medical system of China is like a penny piece, it has a head and a tail, both very plainly superscribed, with a heavy, thick mass between them—the substantial support of both—not worthy of the name of a body. There is, on the one hand, the great medical college at Pekin, which is really the office of Imperial physician put into commission; and, on the other, the profitable calling of the druggist, whose shop is always the smartest in the street, exercised all over the empire with much dignity and more profit. Between these two terminal points, of not very elevated position, there is a long line of disorderly representatives of the "noblest of professions," who practice upon the people of China "the vilest of trades." These ignorant, mercenary practitioners divide themselves into the "literary," the "hereditary," and the "knowing" doctors.

There are as many as thirteen specialties of practice allowed by the Pekin College of Physicians, as it is called by some; but the departments of external (surgery), internal (medicine), ophthalmic, female, infantile, and small pox practice, are the most frequent divisions of the medical profession, leaving out the traveling quacks.

There is also a division, recognized by that excellent digest of law, the Tartar code, into the "ordinary" or general practitioner, and the "notable" or physician. There are midwives, who have the sense to confine themselves to their plain duties of "receiving the born," as their name signifies in the Chinese vernacular.

There is no teaching or training, or any qualification but presumption required of those who essay to heal the sick man in China. A bundle of prescriptions, and the hereditary possession of secret and empirical methods, are the surest grounds of success in the medical line, in populous and credulous China. The power of looking grave over the dignified operation of "regarding the pulse," as they call it, combined with the plentiful use of terms drawn from the dual philosophy of the *Ying* and the *Yang*, are important accomplishments.

Any foreign student who devotes his leisure to a brief study of the pharmacology, which is the great branch of their medical literature, may puzzle the greatest wiseacre of the whole lot of Chinese doctors. And yet it would be very unwise, unkind, and untrue to say that these men, ignorant of the correct anatomy of the body, to say nothing of other sciences, are altogether without availing themselves of the splendid resources of a varying climate and a vast country, which provide a copious *materia medica;* they secure the relief or *euthanasia* of many of their faithful patients. Chary in the use of mineral and metallic preparations, which they nevertheless know how to prepare with some skill, they stick to the safer remedies of the vegetable kingdom, which rules so royally over all their empire. Cautious, like all Oriental peoples, in invading the mortal territories of the human system, they bring to bear all their force upon the safe surface of the body, which they pierce with needles, burn with lamps and moxas,

and scarify with rude cupping instruments. Some few are bold enough to use the dreaded knife, and bleeding, incision of abscesses, and removal of growths, have been known to be attempted with some deserved success. Malpractice is provided against by the Tartar code, which inflicts temporary or perpetual prohibition from practice, upon the finding of such a verdict by medical assessors. Instances of vexatious actions at law against bold and enlightened practitioners who have been unsuccessful in their departure from routine have come under the writer's notice. Veterinary doctors have been in existence for 3,000 years in China, and they possess a formal literature. We even hear of cattle plague statistics being kept at that early period.

As to the public medical service, there are doctors attached to the staff of general officers, but no regimental appointments. There is a medical mandarin, of the ninth rank, connected with each prefecture, and another of still lower grade, connected with each district city. These are a sort of medical tutors, who often undertake, in addition, the medical charge of the jails, or they are locked up with the students in their protracted triennial examinations. The oldest medical works were written by the early monarchs Shin-nung and Hevang Ti, of alarming antiquity. The best work on Chinese medicine is the "Pun Tsau Kang Muh," a work in fifty-two volumes, with three volumes of plates. This is, however, above the comprehension of the present race of practitioners. It was written by Li-Shi-chin, a district magistrate.

Correspondence.

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

Steam Boiler Inspection.

To the Editor of the Scientific American:

Two important events have recently happened, which, in the future, will be of the highest importance. The Commission appointed by the Parliament of Great Britain has reported in substance that the owner of steam boilers or other machinery must be responsible for the safety and efficiency of the same, and must pay damages if an accident happens, unless he can prove that the same was beyond his control, or in spite of all known precautions. The Commission considers inspection of steam boilers to be of the highest value, but considers Government inspection insufficient as a guarantee, and a shield for the owner as against those who may lose life or limb by an explosion.

That this report is in harmony with the conviction of all unprejudiced men is shown by the other event which happened in New York, namely, the arrest of the owners and officers of the ill fated steamer *Westfield*. This action of the coroner will do more to prevent steam boiler explosions than all the labor of all the Government Inspectors combined, including even all such jobs as the lockup safety valves. It is placing the saddle on the right horse; for, to show that Government inspection is a mere sham, let us examine the testimony of Inspector Matthews: "I tested the boiler of the *Westfield* at South Ferry, on the Brooklyn side, on the 12th day of June last, and subjected it to a pressure of thirty-four pounds to the square inch, allowing the vessel to carry twenty-five pounds of steam."

"That pressure was put upon a boiler by a hydrostatic pump."

Question: "Was the pressure put on the boiler by the boat pump, or did you use your own pump?"

Answer: "It was put on by the Brooklyn water, and regulated by the stop cock on the dock; the hydrant had a pressure of about sixty pounds; I tested it by that water."

Question: "In testing this boiler, how did you prevent the full pressure coming on, or going beyond what you required?

Answer: "By regulating it from the supply."

Now, who can read this and not be satisfied, first, that the pressure was not put upon the boiler by a hydrostatic pump; second, that if it was filled with water the pressure was "about sixty pounds" the instant it was full; and, third, that it is impossible to test a boiler to thirty pounds on the square inch by hydrostatic pressure when the column of water from which the pressure is received presses "about sixty pounds on each square inch?" What must be the conclusion if the boiler was tested as stated? That it must have been seriously injured by the test, and such injury may have been the cause of the explosion.

If, on the contrary, the Inspector was deceived and the pressure not put on the boiler as stated, the cause of the explosion must be traced to careless inspection.

The question I should like to see ventilated is, can a boiler be tested as stated in the testimony of the Government Inspector?

Boston, Mass. JOSEPH A. MILLER.

Acoustics.

To the Editor of the Scientific American:

The construction of a piano by substituting steel in some form for strings, has been a vexed problem for more than a hundred years. All attempts in that direction have hitherto been disastrous failures, because the inventors mistook mechanical ingenuity for inventive genius, and lacked knowledge of acoustics. I shall endeavor to show why those inventors failed, in the hope of deterring others from wasting their time, labor, and means on impracticable schemes.

This class of inventors had only four tracks to pursue, four different sound mediums to try. Either of them looks promising enough to inexperienced inventors, but failure has been universal, not even leaving a foundation for succeeding inventors to build upon. No practical results originated from these experiments.

The first principle is the free bar, so called because it gives its tone without the aid of a sound board, and does not require to be fastened in some particular manner. Strips of glass or metal, square plates, bells, disks, triangles, etc., are all modifications of one and the same principle. It gives its tone freely, and that is about the only thing in its favor. On the other hand, its compass is limited to the highest three octaves known; its tones, although loud and clear, are unpleasant to a fine ear on account of their harmonics, and it occupies more space in an instrument than the keyboard would allow.

II. The tuning fork with its varieties is not much better adapted to a musical instrument. It is true that its tones are pure and sustained, and it gives four or five octaves of the lower and middle tones, if brought into connection with a sound board or resonant cavity, and that it occupies no more space than an ordinary keyboard. But as the two prongs cause interference with each other, the ordinary pianoforte action will not start the vibration of the prongs. And as the forks will not transmit their vibrations through a metal plate, but must be planted directly and loosely on the sound board, they act as mutes to each other, besides developing an unpleasant stroke of the hammer on the sound board. To develope their tones by means of a resonant cavity is equally impracticable, as each of them requires a separate one, according to its individual pitch.

III. The reed or tongue (principle of the music box) of which the coiled bell wire, jew's harp, etc., are modifications, is much more promising than either of the other principles mentioned above. It transmits its vibrations through metal, thus leaving the sound board free and unincumbered. It furnishes the full compass of six to seven octaves, and occupies no more space than the key board. But the tone of the reed is naturally weak and short; if the reeds are made large enough to produce the amount of tone required, the action will not start them, unless it be a picking or snapping action, and such a one would not repeat; there it would be impracticable.

IV. The bar fixed on both ends has not been tried enough yet to warrant any conclusion in regard to it. The mechanical difficulties in constructing a piano on that principle are such as to deter any inventor almost from venturing on that track. Such an instrument could never be cheap. To judge from experiments, it would be very much like an instrument made from steel tongues. The coiled spring wire, fastened on both ends, is only a modification of this principle.

Cincinnati, Ohio. H. DREWER.

Paine's Motor.

To the Editor of the Scientific American:

Having read the articles *pro* and *con* upon Paine's electro-motor, I am in doubt which to be most astonished at, Paine's impudence or your patience.

Under the date of July 8th, you print a letter from H. A. Rowland, giving an account of a visit to examine the Paine engine. I, as well as probably most of your readers, do not know Mr. Rowland, and do not remember of ever hearing of him before; but his letter contains a plain, straightforward, and apparently truthful statement of what he observed and heard.

Some of the "great inventor's" friends utter doleful complaints of that letter, and protest against the inference he naturally draws; but not one contradictory statement do they or he make against the truthfulness of the facts given therein.

Under the circumstances, an impartial reader of the articles cannot help more than suspecting Mr. Paine of wilful deception; and that they do so is his own fault, for, to say nothing about his theories, if his assertions and statements in regard to the power of his machine are true, it would be very easy for him to satisfy the public of the fact, and until he does so, I am confident a majority of your readers will agree with me in thinking that he and his friends have occupied about enough of the valuable space of the SCIENTIFIC AMERICAN with elucidating (?) their side of the question.

The letter of B. D. in your last number I must say caps the climax for absurdity and nonsense. A. F. KELLY.

Slatersville, R. I.

Psychic Force.

To the Editor of the Scientific American:

I hope that Professor Crookes and his associates will push their "psychic force" investigations with that thoroughness and energy for which they are noted, until they arrive at something more satisfactory than that reported in the SCIENTIFIC AMERICAN of August 12th, and until mankind shall know about all there is to be known of this mystery.

I have witnessed many phenomena of this nature within the last twenty years, some of which were, as evidences of mysterious power, far more startling and conclusive than those related by Professor Crookes. But much that I have seen has been under conditions which seriously impaired its value as proof of mysterious agency.

The experiments of Professor Crookes and his friends with the medium Home were of course conducted with the utmost fairness and with a simple eye to truth.

But why must the accordion be caged up beneath a table? Surely the cage and table can have no agency in playing the instrument; why cannot Mr. Home play the accordion just as well if held in the same way at arm's length out of the cage and away from the table, and in such a position that all of the investigators may see at the same time?

If the cage is needed for the battery experiment, let it be used for that alone.

Investigators of these mysteries should not allow themselves to be hampered with senseless conditions.

Worcester. F. G. W.

The Darwinian Theory.

To the Editor of the Scientific American:

In your able article entitled "Objections to Darwinism," in your last week's issue, there is, I think, a misconception of the meaning of the term "stronger," as connected with "survival and persistence." Mr. Howorth has fallen into the same error in his letter to the editor of *Nature*, published in the number of that periodical dated July 13th.

It will be admitted on all hands that fertility is seldom united with a repleted body; and that accidental or intentional deprivation of the sexual powers leads to increased size, and to increased volume of flesh. But "strength" in this connection does not mean size nor even muscular strength, but vitality.

The vitality of an animal is assuredly diminished by inability to perpetuate his race; and all medical officers of assurance companies are well acquainted with the correlative truth that the disqualification is a good ground for believing that the life of the subject will not be prolonged to the average duration. And we must all be aware that luxury of diet, and the inactive life of the over civilized nations, and its concomitant vices, may contribute to much flesh and blood, but are anything but conducive to muscular power, and are destructive of vitality. The Indian savage, poorly fed and clothed, has more vitality than enough, till he acquires the vices of civilization, a term paradoxical in appearance, but lamentably a proper one to use.

The power of living a long time, and of perpetuating the race that it may survive his own generation, are the best proofs of the existence of vitality in an animal, and therefore the survival or persistence of the strongest, is not a theory, but an axiom.

The pruning a tree or the castration of a colt directs the vital power from one channel to another. The first operation diverts it from the increasing of size to the organs of fecundation; the latter has a reverse effect. But in neither is there a decrease of strength. In the case of the tree there is an increase of vitality, as I understand it; in the other case, the vitality is seriously interfered with for the purpose of increasing the flesh forming power of the animal. The superior muscular strength of the bull over the ox is not to be denied, although, as I have before stated, it is no proof of the superior vitality of the animal; and the increased flesh positively diminishes both muscular strength and vitality.

It is admittedly true that the most prolific people are frequently the shortest lived; and this proves that vitality or strength of a race may be dissociated from vitality or strength of an individual. And indeed there is good reason to believe that the absence of the excessive flesh and blood originated by high living is directly contributory to the efficiency of the generative organs. But these facts, interesting and important as they are, must not be construed as contradictory of the doctrine of the "survival of the strongest." They are, if I understand Mr. Darwin aright, additional evidence of the truth of the old adage, that, in races as well as in individuals, "the weakest go to the wall," which is Darwinism in six words. D. B.

New York city.

Cure of Rheumatism in Horses.

To the Editor of the Scientific American:

I give you the following recipe for rheumatism in horses; and I will preface it by saying that I am indebted to an Englishman (Mr. R. Jackson) for the same; also, that I have used the recipe upon my horse (whose age is fifteen years) with perfect success—driving him, daily, twelve miles, in all sorts of weather (thermometer from 10° below 0° Fahr. in the winter, to 104° in the shade, in summer), rain or snow. About two months ago, he was so stiff he could not walk; now he is as active as a cat. The recipe is:

Crude coal oil, 1 pint; strong vinegar, ½ pint; turpentine, ½ pint, mixed, and well shaken. To be rubbed on mornings and nights.

If you think this will be any benefit to your numerous readers, you can publish the same.

MACKLOT THOMPSON.

St. Louis, Mo.

Tanning in Vacuo.

This invention of William Masek, of Nashville, Tenn., consists in an improved mode of operation by means of an oscillating rack in an air tight tanning box having a pump for withdrawing the air, a vat for supplying the liquid on the top by opening a valve, and a liquid distributing apparatus inside. The box is also provided with openings, closed air tight by glass, for watching the progress, and a vacuum gage for indicating the vacuum.

The air being pumped out of the box opens the pores of the skins, whereby they are prepared to be most thoroughly saturated with the liquid, which, being let in upon the hides in this condition in a distributed way, is, together with the agitation of the hides in the liquid by the oscillating frame, calculated to very greatly accelerate the work. This the inventor claims to have demonstrated by practical tests, in which sheep skins were completely tanned in six hours; calf skins in twenty-four hours; cow hides in thirty-six, and ox hides in sixty hours. Moreover, the quick saturation of the hides with the liquid, is claimed to make the leather more even in quality inside and out. The quality is also improved; for the fibers on the outside are not damaged by the too great action of the tanning liquid, as in the old and slow process, in which it is necessary to expose the outside too long in order that the liquid may penetrate to the interior

THE more out door air and cheery sunshine we have, the longer will we live.

OCCASIONAL NOTES.

BY G. E. H.

LONDON CITY RAILWAYS.

London, July, 1871.

While New Yorkers are arranging themselves either for underground "quick transit," or quick transit overground—warmly discussing the respective merits of Smith's ingenious "combination" of *one* third coal tar to two thirds ashes *versus* Brown's patented proportion of "*two* thirds coal tar and one third ashes," "as described and explained" for the "coming" universal pavement, or anathematizing their jolting horse cars—conservative old London, brushing centuries of dust from her ancient spectacles, is thoroughly testing the many facilities which modern engineering affords for transporting her millions of population, between the limits of her city walls and the immense outlying suburbs, by rail, tram and road.

The "Metropolitan" underground railway has lately extended its southern arm nearly to the portals of the "Old Lady of Threadneedle Street," thus giving still further convenience of rapid and cheap transit for the "city" man of which our "down town" *habitué* of the New York overcrowded tramways, traversing the "blocked" line of Church or Chatham Streets, can form scarcely an idea.

This completion of what may be termed the "inner circle" of railway communication between the suburbs and the heart of the city of London, was duly commemorated by an "official opening," and one of those liberal and magnificent banquets peculiar to "city" feasts, at the Mansion House Station, which was largely attended by many of the prominent and influential members of the parliamentary, civic, social, and engineering world.

The station was tastefully decorated for the occasion, though one could but notice the unfinished condition of the walls through the hangings, which the hasty erection of the building, within three weeks, readily excused.

This last extension of the line from "Blackfriars" has not only been the most expensive, but of a difficult character, unprecedented even in metropolitan railway experience. To the courtesy of the resident engineer we have been often indebted, and, from the facilities afforded by him, are enabled to present a condensed description of the work.

The station itself is principally built under the new "Queen Victoria" street; and as the space under that street had been devoted by the "Board of Works" to the construction of vaults 12 ft. in depth, and two 8 by 8 ft. subways with sewers (of 3 ft. 6 in.) under the subways, the railway works had to be adapted to their conditions.

This was effected by keeping the railway below the vaults and subways, carrying these works on a tier of heavy wrought iron girders, and the street itself on another tier above the subways. As additional to these enormous weights, that of a portion of the buildings to be erected on the southern side of the street will rest on the girders. They are sustained upon massive wrought iron columns, built of square section, under the girders wherever practicable, each column calculated to a breaking weight of 4,000,000 pounds.

Wrought iron columns were adopted in order to lessen the risk of accident should a train leave the metals, though as a further precaution a heavy brick and timber buttress surrounds each column, three feet high.

In extending the railway under the church of St. Nicholas, the process adopted was to sink narrow shafts at intervals in front and under the church wall, and to fill in with solid brick work in cement to a depth of 40 feet and below the railway level. A tall chimney stack on the opposite side, and several immense warehouses, were similarly proceeded with.

At one point, while passing through the old Lutheran chapel burial ground, the soil to a depth of eighteen feet consisted of little else than skulls and bones; while at the eastern end of the station a very perfect pointed arch passage of the 14th century was discovered, twenty feet wide, and quite large enough to swallow up the houses of the unsuspicious inhabitants above.

Within 280 yards from the terminus, 150,000 tuns of earthwork have been carried away, and 50,000 tuns of new material brought on the ground, within three months, by 2,000 workmen employed night and day.

An estimate of passengers for the year 1871 exceeds 65,000,000, which can only be accommodated by the running of 25 to 30 trains per hour. This the "block" telegraph system allows with perfect safety.

The Metropolitan Railways have been constructed under the direction of John Fowler, Engineer-in-chief, ably seconded by Mr. Baker and Mr. Cooper; and to these gentlemen we are indebted for many favors and much information regarding the works.

In the general railway world, the narrow gage system of from 2 ft. 7 in. to 3 ft. 6 in. is promising a revolution in railway practice; and much credit is due Mr. Fairlie for his strenuous advocacy of the 3 feet gage, and the invention of the locomotive, which bears his name, to profitably work the system. Let him have due credit.

Again, after a long rest, has the "Euphrates Valley" route been revived in Parliament, and seems likely to be ordered. This railway, rivaling the Pacific in its capital of $40,000,000, and intended to shorten the route between England and her Indian possessions by 1,000 miles, is to connect the Mediterranean Sea and Persian Gulf by crossing Asia Minor, and linking in its iron chain many of those ancient cities most familiar to our ears from Bible history, or the "Arabian Nights Entertainments."

But "all aboard" for Babylon, and "this way for accommodation train for Bagdad and Bussorah," will soon lose its novelty; and our children traveling "express" in "Pullman" cars past the cradle of human history, Chaldea, Mesopotamia, Nineveh, shall rest themselves on the site of Paradise, and daughters of Eve discuss the latest Paris fashion on the very spot where their mother's curiosity cost them and us so much.

We have just passed through a tramway struggle, in which American conveniences, having assiduously approached the city limits, have recently failed in their attempts to push their way into the crowded retail streets of the West end; and while the English tramway, with its neat grooved rail, sunk flush with the road, giving the minimum of obstruction to passing vehicles, and the rule which forbids carrying more passengers than can be easily accommodated with seats, are model points which should be rendered as imperative in America, yet we agree with the outcry which objects to those "old men of the sea" from establishing a "right of way," such as their New York prototypes have assumed.

The success of the London tramways has brought out companies with aggregate capital of $7,500,000 for extending their beneficies to those cities of the old and new world not yet provided with such luxuries. But this is not to be regarded so much in the light of overwhelming evidence of their advantages as that of the present speculative mania which is capitalizing every thing, from a silver mine in Utah to a bonded warehouse on the Thames.

The battle of the Asphaltes still goes bravely on. The "Val de Travers" or Swiss Company have laid the "Poultry," "Cheapside," "Old Broad," and "Gracechurch" streets; and although, as a rule, the work is well done, yet its surface is not even, and a slight shower renders it so slippery that many horses are thrown.

The "Limmer" Company, last year, laid a heavy traffic street in the "Borough" which has worked admirably, and have lately completed Lombard street with their material, which is procured from the German States. The process of paving with the "Limmer" is simpler, and does not necessitate the employment of "expert" workmen like the Swiss to "lay" a street. The German Company claim, moreover, that the surface is more even, that no mastic is used, no joints are visible, and that it is not slippery in wet weather; and a company has been formed to monopolize all the asphalte mines in Germany, which is to work the mines, and supply the mineral to the "Limmer" and other concerns.

The relief from the noise and roar of the stone pavements is such, that every street in the city is petitioning for asphalte; and that it will be the "coming" pavement, there can be no doubt.

The feeling here in regard to town travel is, that all the city streets should be laid with asphalte, which gives a smooth, noiseless tramway for all vehicles, while the monopolizing rail tramway should only be allowed to run from the suburbs to the verge of the crowded thoroughfares; which, as combining the maximum of general convenience with a minimum of monopoly, is recommended to the earnest attention of the American citizens.

Information regarding Canals.

There having been many inquiries relative to the dimensions, number of locks, etc., of the Erie and Oswego Canals, we append the following table:

DIMENSIONS OF THE ERIE AND OSWEGO CANALS AND THEIR STRUCTURES.

CANALS.

Length of Erie Canal	351·78 miles
Length of Oswego Canal	38 "
Width at surface of water	70 feet.
Width at bottom:	
With Slope Wall, 1 to 1	56 "
With Slope Wall, 1½ to 1	52½ "
With Bench Wall	42 "
Depth of water	7 "

LOCKS.

No. of Locks on the Erie Canal: Double, 57; Single 15	72
No. of Locks on the Oswego Canal	18
Length of Locks, 110 feet between hollow quoins, admitting the passage of boats 96 feet in length.	
Width at surface of water of lower level	18 feet.
Width on botom	17 feet 4½ inches.

Experiments made in 1848 and 1849, with a single enlarged lock in good repair, and with full attendance, demonstrated that lockages could be m de as follows:

For boat to enter lock, snub and shut the gates	1½ minutes.
To open valves and empty the lock	1 "
To open the gates and get the boat out	1½ "
Total average time consumed	4 minutes.

BRIDGES.

Hight in clear above water line	12 feet.

AQUEDUCTS.

Width about	50 feet.

The light weight of first class boats navigating the canals is from 60 to 65 tuns.

By the regulations of the Canal Board, no boat drawing more than six feet of water shall be cleared after the first day of June, 1864, by any collector on the Erie, Oswego, and Cayuga and Seneca Canals; and it is the duty of every collector, superintendent, inspector and weighmaster, to cause every boat found violating the regulation on this subject, to be so far unloaded as to bring it within the prescribed limits; and in every case where a boat s so unloaded, the fact must be entered on her clearance, with a statement of the portion of cargo taken off; and in every case where a boat shall be found drawing more water than six feet, the master or owner is subjected to a penalty of twenty-five dollars, to be imposed and collected by any and every collector, superintendent, inspector and weighmaster, who may at different times and places detect such overdraft, and it is the duty of every collector to enter upon the clearance the draft of water of every boat at the time of such clearance.

No boat or other craft whose hight or distance from the water line exceeds eleven feet and three inches, and no loaded boat or other craft whose cargo, or any part thereof, is so arranged or placed on such boat or craft, that the top or extreme hight of the same exceeds eleven feet and three inches from the water line; and no steamboat, tug or other craft propelled by steam, whose hight, from the top of the deck, machinery, fixtures or other apparatus exceeds eleven feet and three inches, is allowed to navigate the Erie, Oswego, and Cayuga and Seneca Canals.

All boats propelled or drawn by steam, together with the boats in tow thereof, have preference at the locks over other boats and floats, except as otherwise provided by statute.

A Gift to the People of England.

Mr. John Ruskin, author and art amateur, of Denmark Hill, near London, has recently given a sum of five thousand dollars to the public. Of the many thousand admirers of this gentleman's works, there can scarcely be any who will not predict that his donation was announced in terms remarkable for beauty and originality (perhaps eccentricity), with a strong coloring of Utopian imaginative powers. Mr. Ruskin, moreover, hopes to receive contributions for the prosecution of his idea, from other wealthy and generous men. We give the eminent critic's own words, extracted from the last number of his serial work, *Fors Clavigera:*

"I will tell you a little more of what we are to do with this money as it increases. First, let whoever gives us any be clear in their minds that it is a gift. It is not an investment. It is a frank and simple gift to the British people; nothing of it is to come back to the giver. But, also, nothing is to be lost. This money is not to be spent in feeding Woolwich Infants with gunpowder. It is to be spent in dressing the earth and keeping it—in feeding human lips, in clothing human bodies, in kindling human souls. First of all, I say, in dressing the earth. As soon as the fund reaches any sufficient amount, the trustees shall buy with it any kind of land offered them at a just price in Britain. Rock, moor, marsh, or sea-shore—it matters not what, so it be English ground, and secured to us. Then, we will ascertain the absolute best that can be made of every acre. We will first examine what flowers and herbs it naturally bears; every wholesome flower that it will grow shall be sown in its wild places, and every kind of fruit tree that can prosper; and arable and pasture land extended by every expedient of tillage, with humble and simple cottage dwellings under faultless sanitary regulation. Whatever piece of land we begin work upon, we shall treat thoroughly at once, putting unlimited manual labor on it, until we have every foot of it under as strict a care as a flower garden; and the laborers shall be paid sufficient, unchanging wages; and their children educated compulsorily in agricultural schools inland, and naval schools by the sea, the first indispensable condition of such education being that the boys learn either to ride or to sail; the girls to spin, weave and sew, and at a proper age to cook all ordinary food exquisitely; the youth of both sexes to be disciplined daily in the strictest practice of vocal music; and for morality, to be taught gentleness to all brute creatures, finished courtesy to each other, to speak truth with rigid care, and to obey orders with the precision of slaves. Then, as they get older, they are to learn the natural history of the place they live in—to know Latin, boys and girl both—and the history of five cities: Athens, Rome, Venice, Florence and London. Now, to what extent I may be able to carry this plan into execution I know not; but to some visible extent, with my own single hand, I can and will, if I live."

This is a beautiful picture of an ideal colony, and might be well attempted on a larger scale that even the generous gift of Mr. Ruskin, largely as it may be augmented, will admit. We hope the donor will live to see at least part of the realization of his dream; for all who know him and his books will be sure that it would be the due reward of a man of goodness and genius.

Durable Sensitive Photographic Paper.

At a recent meeting of the Berlin Photographic Society, the President exhibited a specimen of silvered albuminized paper, the advantages of which are here explained.

In six ounces of distilled water is dissolved one ounce of nitrate of silver (free from acid), and in another similar quantity of water one ounce of chemically pure citric acid. When both compounds are completely dissolved in their respective liquids, the latter is poured into the former, the combined solution being well shaken, and subsequently filtered. Finally, one ounce of alcohol is added.

It is quite sufficient if the paper is allowed to float upon the liquid for the space of a minute, or, at any rate, until it swims evenly upon the surface in all parts. Coagulated paper presents more brilliancy, when printed and finished, than that which is not coagulated.

Upon the purity of the citric acid depends the clearness of the bath, for if the acid is at all impure, a grayish precipitate is formed—probably citrate of silver. At the same time, if this precipitate is filtered off, the results obtained are still of a favorable character. The bath will remain perfectly clear and transparent, even after considerable use.

The durability of the sensitive albuminized paper produced in this manner appears to be quite unlimited, for some sheets of the material which were prepared some nine months back are as white and fresh now as when first sensitized.

The advantages entailed by the employment of the citrate-silver bath are not to be despised, for besides the convenience of always having sensitive paper ready at hand, there is obviously less chance of loss from the paper becoming yellow and useless during a lengthened period of unfavorable weather.

Lubricator for Cylinders of Steam Engines.

In the use of tallow or oil in large quantities, more especially tallow, which is often rancid, it is well known that piston heads, followers, and other internal parts of steam engines are more or less corroded, and often are changed into a state resembling plumbago in physical character, from the combination of carbon, from the decomposed grease, with the iron work. The best oils for this purpose are lard, castor, sea-elephant, and walrus oils; but even with these least objectionable lubricating substances, it is very desirable to have some means by which they can be fed economically, uniformly, and sparingly to the interior of the cylinder.

These desiderata are, it is claimed, secured by the use of the invention we illustrate herewith, the essential parts of which are lettered in the engraving as follows:

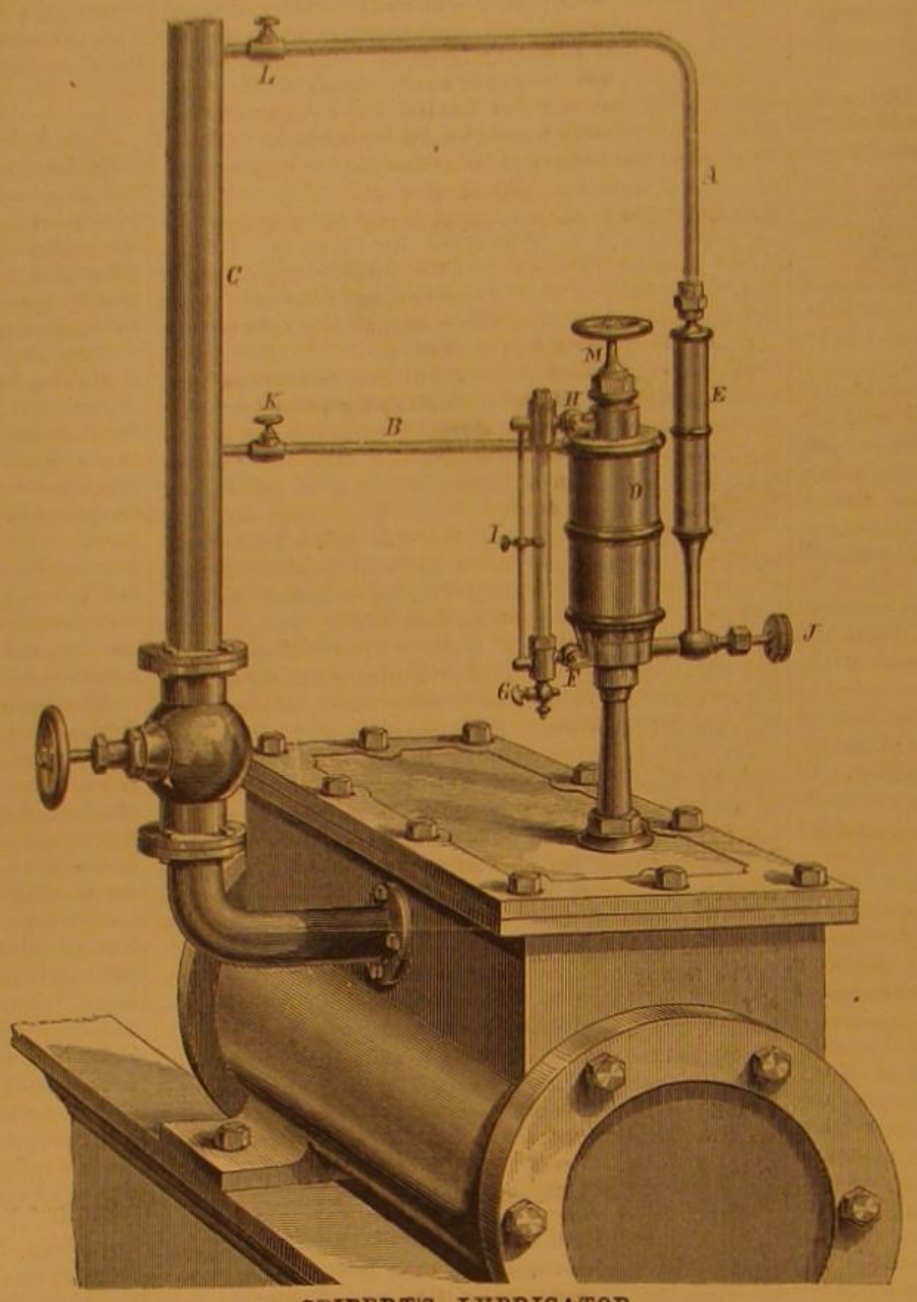
A is the condensing pipe; B the discharge pipe; C the steam pipe from the boiler; D the oil cup; E the reservoir; F a stopcock; G the waste cock used in cleaning the glass tube and removing residuum from the oil cup; H a stopcock; I the sliding gage on the glass tube; J the feed valve; K the valve to shut off the supply of oil when the engine is stopped; L the valve to admit steam into the condensing pipe; and M the valve through which oil is supplied to the cup. There is also a check valve, not shown, on the discharge pipe, B, to prevent steam from entering the cup.

The action of this arrangement is as follows: When the condensing pipe, A, and discharging pipe, B, are connected with the steam pipe, C, the pressure in both the first named pipes is equal; but the condensing pipe has a perpendicular hight above the discharge pipe, and contains a column of water which gives the pressure to force the oil out of the cup, B.

This lubricator is suitable for any engine, either high or low pressure, large or small. In all cases the oil should be discharged in the steam pipe above all the valves. The directions given by the manufacturers for putting up and operating the instrument, are to "stand the cup, where convenient, no matter at what distance from the steam pipe or engine (unless in cold climates, when it is best near the engine). Make the connections as seen in the annexed engraving, as near as circumstances will permit If the steam pipe is copper, punch a small hole—then enlarge it with a tapering punch to receive the tap. The perpendicular pipe on the reservoir, E, must not be less than ten inches above the discharge pipe, and as much higher as may be convenient; when too high, it requires the feed too fine, and when too low, there is not pressure enough to force the oil out of the cup. It takes three inches of water above the check valve to balance it. The best hight is one foot above the reservoir. Care should be taken to make tight joints, as a leak here and there would be enough to oil the engine. The joints where the cup and pipes couple should be sheet lead. If the cup is to be used as soon as put up, fill the reservoir with clean water, also put a little in the cup, enough to show in the glass tube; shut the feed valve to keep the water in the reservoir; put in the oil, and screw down the plug; open the valve to admit steam in the condensing pipe, then start the feed valve, J, a very little, and next the discharge valve, K. It is not necessary to open any of the valves much; the less they are worked the longer the packing will last, and the feed valve need not be open more than just a mere leak. Care must be taken not to feed too fast, as that would force all the water out of the reservoir, E, and it would not work properly; the reservoir and part of the condensing pipe must contain water; feed about one sixteenth of an inch per hour, more or less, by the glass tube. If at any time the oil in the glass tube does not seem to rise, it would indicate that the passage from the glass to the cup was stopped, and should be cleaned out by taking out the cap above the glass tube. Care must be taken, when put back, to hold a wrench in the left hand, against the pressure, while screwing in with the right, so as not to break off the tube arm.

By means of the glass tube the engineer can at all times see just how fast he is consuming oil, and thus is enabled to control the action of the instrument perfectly. The advantages of this method must be so obvious to engineers as to render their enumeration superfluous.

Patented, Feb. 14, 1871, by N. Seibert, whom address, for further information, San Francisco, Cal.



SEIBERT'S LUBRICATOR.

Quiet Ebullition of Liquids.

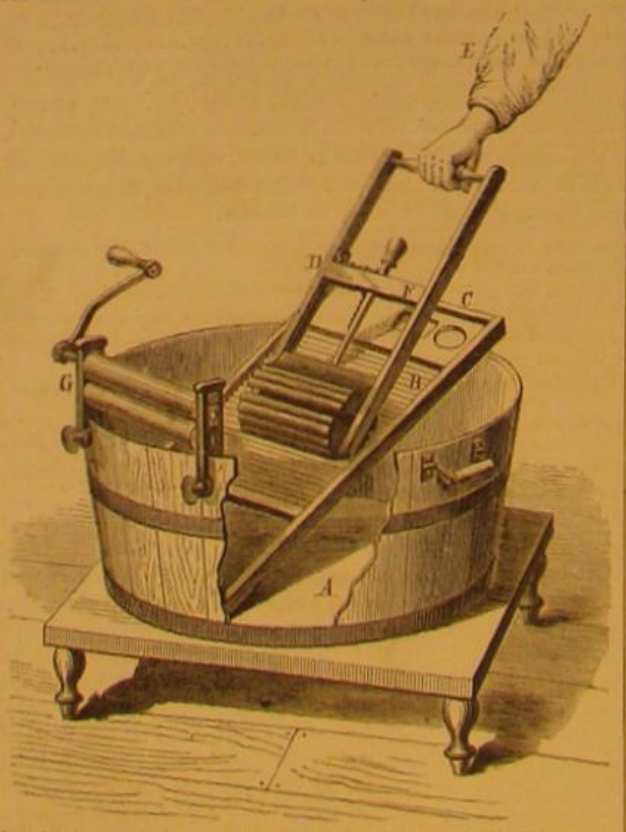
It is of great importance in many analytical and technical processes, that the liquids with which one is operating should boil quietly and with regularity, without that fitfulness and bumping with which all are familiar. It is in this connection that attention is directed to a communication of Th. Schumann, according to which this object may be accomplished in most cases by the following method:

A glass tube about ⅛ inch in diameter is taken; this is melted shut at one end, and bent into the form of a hook, while the other end is left open. The tube, which should be about an inch shorter than the distance from the stopper to the bottom of the retort, is then hung by a string from the tubulure. As the liquid is heated, the air in the tube expanding gives rise to bubbles, which regularly ascend; and when the boiling point is reached, vapor of the tension of the atmosphere is formed at the open end of the tube, and the process of ebullition is carried on for days with regularity and quietness. When an operation is interrupted, or the retort filled with fresh material, it is necessary to remove the tube from the liquid, and then to introduce it afresh.

C. Wilkelhofer recommends for the same object that an artificial generation of gas should be kept up in the liquid during the operation, which he accomplishes by passing a galvanic current through it. The action of one of Bunsen's elements, of ordinary size, is said to be sufficient for the purpose, the wires being of copper or of platinum, as the nature of the boiling liquid may require. It is plain, however, that this plan can have but a limited application in practice.

DUGDALE'S UNIVERSAL CLOTHES WASHER.

This device is calculated to do away with that disagreeable concomitant of clothes washing, the excoriation of the hands through the combined action of the hot alkaline suds and friction. As it also allows much hotter suds to be employed than can be used in ordinary hand rubbing, it reduces the amount of rubbing necessary, and thereby lessens the wear upon the fabric. These advantages are important, and are practically secured by the (if we may so describe it) substitution of artificial for natural hands.



The clothes are held during the process of rubbing between the two ribbed portions of a rubber, which, when brought together by the action of the hand screw, F, hold the clothes securely, and present a rounded contour, between which and the washboard, B, the clothes are rubbed, without the necessity of placing the hands in the suds.

The board, B, is attached to the tub, A, by a screw at C. The frame, D, which carries the rubber, is grasped by the hand in the manner shown at E.

A wringer, G, may be attached to the tub as shown, and then this simple apparatus is complete.

Perhaps an even more important advantage than either of the above named is the avoidance of the danger to health arising from the overheating of the arms and hands, and their sudden exposure to cold in hanging out clothes to dry. This sudden and violent change is a fruitful cause of disease which the employment of the device described would wholly obviate.

Patented through the Scientific American Patent Agency, January 18, 1870, by James Dugdale, who may be addressed for further information, or to whom orders may be sent, at Whitewater, Ind.

The Author's Rage for Titles.

The following remarks from the *Indiana Journal of Medicine*, will apply to authors in general, but more especially to all technical authors, as well as to writers on medical subjects.

"In modern times the Pacha of many tales has given place to the many-tailed Doctor; for if the latter writes a book or an article for publication, he generally appends a long announcement of fellowships, memberships, professorships, and lectureships in various societies and colleges, winding up the tiresome task by writing *etcætera, etcætera*, at the end, as if to imply that he could tell us more if he only would, or had the time and breath. We see no reason why a physician should do this *unless he means it as an advertisement of his specialty*, for it certainly cannot lend any value to a book that the author was Toe-nail Extractor-Extraordinary to His Majesty the King of the Cannibal Islands; nor does it add to the intrinsic merit of the work that it was written by one who is a member of the Society for the Restoration to an Upright Posture of Accidentally Overturned Tumble-bugs.

Testing by means of the Blowpipe.

According to the *Chemical News*, M. F. Jean states that sulphuret of sodium is one of the best blowpipe tests, if used in the following manner:—First, a bead is made with borax and the substance to be tested, and this bead, having been made very fluid within the reduction flame, there is added to it some dry and pulverized polysulphuret of sodium, and the bead again heated in the reduction flame. If the substance under investigation can form a sulpho-acid, there will be formed a soluble sulphosalt and a clear bead; but when no such salt can be formed, with lead, for instance, an opaque bead will be formed. Iron, lead, bismuth, nickel, cobalt, palladium, thallium, silver, copper, uranium, &c., fused in a bead of borax, to which, afterwards, sulphuret of sodium is added, will yield a black or brown colored opaque bead; zinc yields a white opaque bead; cadmium, while yet hot, scarlet red, and yellow after cooling; manganese, a dirty chestnut brown; gold and platinum, a clear, transparent, mahogany brown bead; tin, a clear, transparent, yellowish brown bead; chromium, a green bead; arsenic and antimony, colorless clear beads; vanadium and iridium, blood red beads; a slight excess of the sulphuret of sodium is required, and the bead should be heated carefully, but steadily, and with a good blast in the reduction flame.

Orange Wood.

Mr. George W. Moody, of Waxahachie, Texas, has obligingly sent us a specimen of orange wood, sometimes called *Bois d'arc*. He informs us that it is indigenous to Texas, and is there valued highly for carriage and wagon building. Changes of weather never affect it, and wheels made of it have been in use for ten or fifteen years without needing repair, while other wheels in the same locality require to have the tires shrunk once a year. Vehicles built of this wood command higher prices by thirty per cent than those of ordinary timber. Land with this timber growing on it can be bought for from three to five dollars per acre. The wood yields a beautiful orange dye, for which the sawdust, now valueless, can no doubt be used. Mr. Moody anticipates that, when railroads are extended to his section of the country, one stick of this timber will be of more value than an acre of the land is now.

MR. J. L. DENNEY, of Christiana, Pa., has had struck an artistic medal for patentees. An engraving of the exact size and shape of it may be seen in advertising page. The emblems are appropriate, and the whole design is artistic.

Scientific American.

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VOL. XXV., NO. 10 . . . [NEW SERIES.] *Twenty-sixth Year.*

NEW YORK, SATURDAY, SEPTEMBER 2, 1871.

Contents:

(Illustrated articles are marked with an asterisk.)

STANISLAS SOREL.

With characteristic modesty, Sir Walter Scott, when at the zenith of his literary fame, distinctly assigned to literature a lower place than that occupied by science. He once wrote to Joanna Baillie that "men like Watt, or whose genius strongly tends to invent and execute those wonderful combinations which extend in such an incalculable degree the human force and command over the physical world, do not come within ordinary rules."

One of these men passed away from earth on the 18th of last March, the very day the Communist insurrection began to rage in Paris. His name was Stanislas Sorel; and few men have more completely filled the terms of Scott's definition, as quoted above, than he. His inventions for saving life, for simplifying and facilitating labor, and, in fine, for "extending the human force and command over the physical world" have given him an honorable place among the world's benefactors.

Stanislas Sorel, the son of a poor clock maker at Putanges, in the department of Orne, France, was born in 1803. He received no education, but at an early age began to toil at the paternal trade. Under the discouragements of ignorance and the indifference to intellectual and material progress which characterized the community of which he was a member, his native genius asserted itself, and he early won a local fame as an ingenious and skillful artisan. He married, at the age of twenty-one, a young woman of his native town, and assiduously labored at his bench until 1829, when, no longer able to endure the restraints of his seclusion, he boldly set out for Paris.

Friendless and almost penniless he entered the great city, and for several years endured such hardships as only the strongest natures are able to survive. Obliged, in order to gain a bare subsistence for his family—a wife and two children—to toil steadily at his trade, he yet found opportunities of gathering knowledge, and of unconsciously fitting himself for his grand career. He attended lectures on scientific subjects, experimented as he could, and finally produced some inventions which may be said to have foreshadowed his subsequent achievements. Among the most important were the solar lamp and thermostatic siphon.

In 1838, he discovered and perfected in detail the process of galvanizing iron, and his invention was cordially recognized by the Society for the Encouragement of National Industry, which awarded him a gold medal. From this success his advance was rapid and brilliant. Not a year passed in which he did not produce some original discovery or some important improvement in practical science.

He invented the alarm whistle attached to the safety apparatus of steam boilers; improvement in the manufacture of oxide of zinc, now generally adopted; the waterproofing of woven fabrics; the oxychloride of zinc cement, the cheap filling for teeth now used by dentists under various names, but which for general purposes was superseded by his last, and, as M. Sorel always claimed, greatest discovery, the oxychloride of magnesium cement. And it was upon the multitudinous applications of this new and wonderful compound that he was engaged when overtaken by death.

For those inventions and discoveries he received a score of prizes, gold and silver medals, the Montyon prize twice, the decoration of the Legion of Honor, and the "Marquis of Argenteuil Prize" of 12,000 francs, or $2,400 in gold, which prize is given by the Academy of Sciences for discoveries only of the greatest value, and which had been awarded to but two persons before, Messrs. Vicat and Chevreul.

The names of these discoveries will suffice to indicate to the intelligent reader the extent and value of his services to the world.

So numerous and varied are the articles made from galvanized iron that it has ceased to be a novelty. Doubtless in a few years the same will be true of magnesium cement, to which we called attention in connection with the articles made by the Union Stone Company, of Boston, in the SCIENTIFIC AMERICAN of October 22, 1870, and April 29, 1871.

M. Sorel, dying amid the distractions of a terrible civil war, lacked those grateful tributes of honor which in happier times his great services to science and humanity would have elicited; but it is not too late for America, who, in common with, France has shared his benefactions, to revive and freshen the memory of his genius and his works.

NEW YORK POLICE INSPECTION OF BOILERS.

The public alarm, caused by the *Westfield* explosion, has aroused the sanitary police to activity, and five engineers are now employed in the examination of boilers throughout the city. Up to the 23rd August, they had, according to report, inspected one hundred and twenty-six boilers, and had pronounced seventeen defective. The steam gage was defective in ten, the safety valve in three. Two boilers were totally condemned. Both these boilers were under ground, one in a cellar, and another in a vault. Various other defects were found; flues, steam drums, and shells leaking, etc., etc. We trust these inspectors are doing thorough work. They certainly are proceeding in hot haste. They have averaged at least twenty-five boilers apiece in twenty-three days, according to this report, counting in Sundays.

In view of the explosion of the boiler of the steam tug *Starbuck*, which had only a few days previous been inspected, the public is not satisfied with merely the announcement that inspection is going on with rapidity. We wish to know whether the inspectors go inside of the boilers, or whether they are too fat to get in. We wish to know whether the sitting down to a champagne supper, or being asked to step behind the cabin door a moment, constitutes an inspection or not. We wish to know whether an old boiler well greased over till it shines is passed for a new one, when there are private reasons for so doing. We all "want to know, you know," and intend to be troublesome unless we get the information we seek. Let the "Tite Barnacles" heed the fact that people are thoroughly aroused upon this subject, and are not to be satisfied with fables.

The facts relative to the explosion upon the *Starbuck* are these:

In towing three canal boats from Port Johnson, N. J., to this city on Saturday, August 19th, she exploded her boiler when in the channel separating Staten Island and New Jersey, and about half way between Port Johnson and New Brighton. There were five persons on the tug at the time. The fireman was standing directly in front of the furnace when the boiler gave way, and was so badly scalded by the hot water and the steam that he died in a few minutes. The engineer was talking with the deck hand, outside the engine room, when the noise of escaping steam was heard. They ran aft, but the deck hand returned, and succeeded in reaching the lever by which the boat was stopped. The captain, in the meantime, sprang upon another boat. No one but the fireman was injured.

As we have said, this boiler had been recently inspected: that is, it had undergone the ceremony usually styled inspection, but which the public is resolved shall no longer be called by that name.

In the testimony taken by the coroner, it was sworn by Mr. McMurray, whose testimony in the *Westfield* case we published last week, that there were only two sound stays in the boiler; that in some places the boiler was only one sixty-fourth of an inch in thickness, that the steam gage indicated ten pounds too much, and that the safety valve was set at seventy-two pounds; also that the boiler was patched to an unusual extent. According to Captain Roder's testimony, the inspection occupied only from one half to three fourths of an hour. Mr. McMurray also testified to the worn out condition of the furnace.

The jury rendered the following

VERDICT.

We find that George Williams was scalded to death by the bursting of the boiler of the steamtug H. G. Starbuck, on the 19th of August, 1871.

We find the United States Inspector, E. Platt Stratton, and the Engineer, Charles H. Mills, guilty of manslaughter in the third degree; and censure the owners of the steamtug for carelessness in running said vessel while in an unfit condition, and also Inspector Matthews, for granting a certificate as engineer to said Charles H. Mills.

A few more such verdicts as this, and inspectors will find the people are in earnest.

STEAM BOILER LEGISLATION IN ENGLAND.

The management of steam boilers is, for reasons sufficiently obvious and painful, the question of the day with us; and the report of a select committee of the British House of Commons, just issued from the press, will be interesting to all our readers. Its chief noticeable features may be described as follows: The numerous voluntary associations for the inspection of steam boilers are highly spoken of by the committee as being useful in preventing explosions. But the difficulty in inducing many obstinate and ignorant boiler owners to join these associations, combined with the facts that many boilers are placed in cellars, under doorways, in the midst of crowded dwellings on public thoroughfares, and with the notorious truths that many of these boilers are most faulty in design, construction, and equipment, and are run by men ignorant of this special work, and untrustworthy in their characters, indicates the necessity for stringent legislation on this most important subject.

Evidence was given before the Committee to the effect that there are at least 100,000 boilers in the United Kingdom, in use for generating steam for stationary and agricultural engines; the enormous number of locomotives, marine engines on vessels in the harbors, and boilers for heating purposes, etc., worked at a pressure, are omitted from this estimate. The average number of boiler explosions is fifty per annum, and of lives lost from these causes, seventy-five. The majority of these calamities are due to carelessness, either in original construction, as to repairs, or to inattention on the part of users and their servants. The Committee admits that many explosions take place from causes, the existence of which cannot be detected by inspection; and does not recommend compulsory inspection, as it would tend to "lessen the responsibility of owners, who are best able to ascertain the condition of their boilers, and the competency of men employed to work them." The Committee puts its views into a practical shape by the following recommendations;

"That it be distinctly laid down by statute that the steam user is responsible for the efficiency of his boilers and machinery, and for employing competent men to work them; that, in the event of an explosion, the *onus* of proof of efficiency should rest on the steam user; that in order to raise *primâ facie* proof, it shall be sufficient to show that the boiler was at the time of the explosion under the management of the owner or user or his servant, and such *primâ facie* proof shall only be rebutted by proof that the accident arose from some cause beyond the control of such owner or user; and that it shall be no defence in an action by a servant against such owner or user being his master, that the damage arose from the negligence of a fellow servant.

"That whenever an explosion happens to a boiler, whether such explosion is or is not attended with loss of life or injury to person or damage to property, it shall be the duty of the user to report the same to the coroner of the district; and the coroner to whom the accident is reported, or in failure of such report, on the fact coming to his knowledge, shall hold an inquiry, and apply to the Board of Trade, and the Board of Trade shall thereupon direct one of their competent practical surveyors of boilers, or some other practical person, to assist the coroner in the investigation."

The objection to compulsory inspection is reasonable, apart from the well known English dislike to government meddling with trade and commerce. The recommendation to make the owner of an exploded boiler personally responsible, to throw on him the *onus probandi* as to the entire efficiency of the boiler in all particulars, and to make him pecuniarily liable for damages, even when the disaster is caused by the acts of his servants, cannot be too highly commended. No action of any government will do so much to raise the quality of steam boilers, or the average of knowledge of engineers and firemen, as the conviction, forced upon the boiler owners and steam users, that a faulty utensil and an incapable servant are the most dangerous possessions to have in a factory, as the evil they do touches the vital part of all commercial existences—the pocket.

IS THE WORLD ROUND OR FLAT?

About a year ago, an eccentric philosopher of London, England, named John Hampden, having convinced himself beyond all peradventure that the world was flat, not round, as commonly supposed, undertook the arduous missionary work of converting mankind to his way of belief. Not making much progress by following the ordinary methods of private preaching, he resorted to the expedient of offering a bet upon the subject. He made a public announcement, offering to stake $2,500 against $2,500, to be put up by any scientific man, that he could prove that the earth was flat, and not round, as every body else believed.

No one appears to have taken immediate notice of this absurd offer, whereupon Hampden came out with another announcement, in which he boldly declared that scientific men knew they were guilty of an imposition in propounding the round theory, and that, in consequence, they were afraid to take up his challenge, and stake $2,500 as he proposed.

But the challenge having come to the notice of Mr. Alfred Russel Wallace, a gentleman of high reputation, and a member of several scientific societies, he accepted the conditions, and put up his $2,500. This amount, together with a similar sum put up by Hampden, was deposited, subject to the order of the referee, Mr. Walsh, editor of the *Field* newspaper, who was to pay over the $5,000 to the winning man.

The mode adopted for settling the question was planned by Hampden, the advocate of the flat theory, and the experiment appears to have been conducted in all respects as he desired. The ground selected was a six mile level, on the Bedford Canal. Three long poles of equal length were provided, and planted at equal depths, and at distances of three miles apart. A telescope was then employed, through which it was clearly and unmistakeably perceived that the central pole was five feet above the level line of the telescope, which at once proved that the earth was not flat but rotund. Mr. Hampden expressed himself satisfied that he had lost the bet, and the money was accordingly paid over by the referee to the winner, Mr. Wallace.

The experiment and the telescope were level, but not so the head of Hampden. He that's convinced against his will, is of the same opinion still. It was not long before Hampden woke up to the mortifying conclusion that he had made a blunder, or that in some way he had been befogged. His reason told him that the earth was still *flat*, not round, as

that lying telescope and those fibbing poles had affirmed. He concluded, also, that Wallace was a thimble rigger, a pickpocket, a liar, and a swindler, and went about proclaiming these libels in the most unblushing manner. This so annoyed Wallace that he brought suit for libel against Hampden, and the jury lately mulcted him in $3,000 damages, making a sum total of $5,500 cash paid out on account of his theory that the earth is flat. Poor Hampden is indeed a martyr to science.

THE GRAHAMITE ASPHALT PAVEMENT.

Near the "Battery," at the lower part of the city of New York, a piece of pavement has recently been laid, which, only four inches in thickness, resists remarkably the wear to which it is exposed from very heavy trucking, omnibuses, and lighter traffic combined. The location is a trying one for any roadway, and the fact that the pavement referred to is a new claimant for public favor, has attracted our attention. We visited it, and tested the quality of its surface, as we have all the other kinds of pavement laid in the city, and found our interest so much hightened by our experiments that we have taken the pains to gather all the facts we could concerning it. We now, as a matter of great public importance, lay these facts before our readers.

This pavement is now being laid in Central Park, the ease and facility with which it can be put down permitting it to progress at the rate of from six hundred to eight hundred yards per diem. It is here that its beauty is shown most perspicuously, and where its history as a successful pavement may be said to have fairly begun. While in the Park it will not be put to as severe a test as it receives at the Battery, it will attract the attention of the thousands who visit that celebrated place of resort, and will add much to the attractions of the place.

Let the reader imagine an entire avenue evenly graded and covered with a single slightly and gracefully arched wrought slab of dark gray slate, and he will gain some idea of the appearance of this pavement as laid in the Park. To imagine its texture to be like the slate it resembles in color, would, however, be very erroneous, for the material used is not only slightly flexible and elastic, but if we use a hammer to batter its surface, we discover that we may indent it a little as we might a slab of lead, and also that by hammering about the indentation we may smooth and fill the little hollow again so that it is not noticeable. We may say, therefore, that this material is malleable. We find, also, that by taking a small piece of the material, and brushing the surface of the roadway clean, we may, by hammering, weld the fragment to the surface. This tough plastic character is one of the most valuable qualities of the pavement. The surface indents just enough to give the requisite foothold for horses and these indentations are continually filled by the action of the wheels of vehicles so that the surface integrity is constantly maintained.

The ease and facility with which the pavement is laid has already been alluded to. We may add, that in an hour or so after the material has been put down, the surface is ready for travel. It may be swept as easily as a stone slab, and will dry when washed even quicker than stone, as it does not absorb water in the least, and has little or no adhesive attraction for moisture. As a consequence, after heavy rains the sun is no sooner out than the road is dry. So that ladies might walk upon it with the thinnest slippers, without danger to health. The advantage of this in the employment of the new pavement for walks in pleasure grounds, footways in streets, etc., need not be dwelt upon.

The objection made to most water tight pavements that they kill shade trees in streets through the exclusion of water and air from the roots, does not obtain in this case, as during the summer months, when the roots need moisture and air, an opening of suitable size can be cut out about such trees, and sealed during the fall rains and frosts of winter, if necessary, in soils liable to upheave in freezing. The opening may be cut out without difficulty and closed at a trifling expense.

In short, while affording the requisite resistance to wear, and to softening by heat, the material is altogether the most tractable and manageable of anything we are acquainted with except the Seyssel Asphalt, of which the celebrated drives of Paris are constructed. While it has all the valuable properties of the last named material, it will not soften in a sun heat of from 100° to 120° Fahr., as the Seyssel asphalt roads do. In fact, by suitable tempering, any requisite degree of hardness may be attained, so that it will resist even a temperature of 800° Fahr. without fusing.

The reader will by this time be impatient to know what this remarkable material is. When first discovered it was thought to be coal, and was analyzed as such by Dr. Doremus of this city. Subsequent examination by Professor Wurtz, editor of the *American Gas Light Journal*, showed that it was completely soluble in various well known *menstrua*, and he pronounced it a mineral resin. Professor E. J. De Smedt claims that it is in character similar to the Seyssel asphalt, but that it contains a larger proportion of asphaltene, which is difficultly fusible, and a very bad conductor of heat. He therefore in a communication to the SCIENTIFIC AMERICAN of March 5, 1870, called it the "*American Asphalt*," and pronounced it far superior to the Seyssel asphalt for road making.

The extensive and almost inexhaustible deposit of this material was discovered in Ritchie county, West Virginia, in 1857 or 1858. The title of this property became ultimately chiefly vested in Messrs. James Lorimer Graham of New York, and John A. Graham of Maryland; and the mineral has been introduced to the scientific world by Prof. Wurtz under the name of Grahamite, in honor of the gentlemen who have done so much to develope its utility.

A wealthy company has been formed to use this valuable substance, either alone or in combination with other asphalts, in paving walks and streets, but this application is only one of many to which Grahamite is adapted. For the present, however, the proprietors are bending their energies to combat the prejudices begotten by the humbug pavements of the period, and to demonstrate to the American public that the "coming pavement" has come. This company, named "THE GRAHAMITE ASPHALT COMPANY," has an office at Brown Brothers' building, Wall street, New York, room No. 6; Mr. James Lorimer Graham is President. The company now laying the pavement described is known as the Grahamite Asphalt Pavement Co., of the city of New York, and the office is at 229 Broadway; Gen. W. W. Averell is the President. This company acts under license from the one above mentioned.

The raw material undergoes a process of preparation for road making, in which a valuable oil is extracted. About 14 per cent of the prepared asphalt is then mixed with sand and put down hot in a layer of from one and one half to four inches in thickness, according to the nature of the service to be exacted. This feature is secured by letters patent in this country and abroad. Very simple implements are employed of a similar character to those illustrated and described by us for laying the French roads, in our issue of February 12, 1870. The road is as easily taken up and repaired as the French asphalt roads, and is undoubtedly superior to the latter in several respects.

In conclusion, we may add that the opinion we expressed in the article last referred to, seems to be verified, and the possibility of a composition combining the advantages of the Seyssel asphalt, without its defects, demonstrated.

SCIENTIFIC INTELLIGENCE.

OXYGEN FROM THE ATMOSPHERE.

The economical preparation of oxygen gas on a large scale, for use in the arts, has long attracted the attention of chemists, and several ingenious suggestions have been made looking to a solution of the difficulty; among the most recent of which is the one by Mallet, in Paris, who has devised a plan for obtaining the gas from the atmosphere by taking advantage of the greater solubility of nitrogen in water than oxygen. If air be passed through water, more of the oxygen is absorbed than nitrogen; and it is only necessary to repeat this operation a number of times to arrive at an atmosphere from which nearly all of the nitrogen has been eliminated. It is difficult, without the aid of wood cuts, to convey an idea of the apparatus which has been constructed for accomplishing this result, but it is chiefly composed of a series of cylinders, to each of which is attached a force pump for drawing in the air and passing it from one vessel to another. The moment the pressure is removed from the water, the gas escapes just as it does from a soda fountain. The following table gives the results of careful comparative experiments, which were made to test the accuracy of the method:

Common air is composed of	Composition after passing through 8 Cylinders.							
	1	2	3	4	5	6	7	8
Nitrogen. 79	66·67	52·5	37·5	25	15	9	5	2.7
Oxygen. . 21	33·33	47·5	62·5	75	85	91	95	97·3

This exhibit shows that after the air has been passed through eight cylinders, there remains less than three per cent of nitrogen—a quantity which may be disregarded in most technical operations. Mallet's method may be called the mechanical to distinguish it from the chemical process of Tessié du Motay. Not half the noise has been made about it as there has been in reference to the latter process, and yet it seems likely to supersede all others.

There are many metallurgical operations in which powerful blasts of air are employed to increase the force of combustion, where experiments ought to be instituted to ascertain if the quantity of oxygen could not be increased by the intervention of a drum or some kind of receiver for water. If this could be done without interfering with the requisite supply of air, it is probable that greater heat, with a large saving of fuel would be the result.

LEAD FOIL FOR BANDAGES.

Doctor Burggraefe, of Geneva, recommends thin lead foil bandages, in cases of wounds and broken limbs. The sheets of lead are kept in place by adhesive plaster, and are said to offer the following advantages: 1. The lead remains soft and cool in contact with the wounds. 2. It enables the physician to dispense with lint, which is the constant occasion of heat and infection. 3. The sulphur compounds which form prevent the decomposition of the parts and growth of organisms. 4. After the bandage is made, the wound can be washed and refreshed with cold water without removing it. It would be well to have a supply of this foil on hand in machine shops where large numbers of workman are employed.

PRINTING ROLLERS FOR PHOTOGRAPHERS.

Soft and elastic rollers suitable for photographers use, can be prepared as follows:

Three parts of common glue are left to soften in cold water for two days, the pieces then removed and wiped with a dry cloth, then melted at gentle heat without any further addition of water, and one part of sirup, previously boiled, added, and the mixture well boiled; and when ready poured into a polished copper mold, the interior of which has been oiled, and in which is a wooden axle with handles on the ends, around which the glue will set. After it is removed from the mold, it is washed with alcohol and left a few days to dry in the open air, then laid into a solution of tannic acid, rinsed with water, and again dried; the roller is then ready for use.

OXIDATION OF AMMONIA.

To exhibit the rapid oxidation of ammonia, Hoffmann puts a tuft of platinized asbestos in the middle of a combustion tube, places red litmus paper before and blue paper behind it, and conducts a current of air impregnated with ammonia over the heated point. The formation of nitrates and nitrites is immediately shown by the reddening of the blue litmus paper, and in the cool part of the tube, white fumes of salts are deposited. If the operation be continued for some time it is easy to fill a flask with the ammoniacal nitrates.

AUTUMNAL FOLIAGE.

The micro-spectroscope enables us to test coloring principles in mixtures without the necessity of isolating them. The coloring matters of leaves may be studied in this way, and can be appropriately divided into five groups:—*chlorophyll*, *xanthophyll*, *erythrophyll*, *chrysophyll*, and *phaiophyll*. The first two are insoluble in water, but soluble in alcohol and bisulphide of carbon, the last three are soluble in water but insoluble in bisulphide of carbon. Leaves generally contain colors belonging to several groups, and frequently more than one of the same group. Green leaves are colored mainly by chlorophyll, the tint of which is modified by the presence of members of the xanthophyll and chrysophyll groups. The change of color which takes place in autumn foliage is due to the disappearance of the chlorophyll, rendering the remaining colors visible; most frequently these are yellow. When the leaves turn red, it is indicative of diminished vitality, and by stopping the growth of the plant, the intensity of the red color is increased. The gold and green tint may be considered characteristic of the complete vitality and growth of leaves, the red and yellow of low vitality and change, and the brown is the *humus* of death and decomposition. Tender leaves, creeping vines, half girdled trees, and exposed foliage are the first to change their tints as the cold weather approaches, and the first acts upon the coloring principle; and the gradual change from the green through yellow, red, and brown, at once indicates the progress of the decay. We are indebted to Dr. Sorby for valuable researches with the micro-spectroscope, some of the results of which are given above.

ANHYDRO-SULPHURIC ACID.

The compounds of Nordhausen sulphuric acid may be considered as salts of a peculiar acid, to be called anhydro-sulphuric acid, and to which, under the new system, may be assigned the formula of $H_2S_2O_7$. Only the salts of the alkali metals have been known up to the present time, but recently Schultz-Sellack has succeeded in preparing the corresponding barium and silver compounds. The silver salt affords colorless crystals, and the barium compound hisses when water is added to it.

The solvent properties of the mixture of oil of vitriol and anhydrous sulphuric acid have long been applied to the solution of indigo, but further than that the subject has not been sufficiently studied. It is probable that the salts of silver and barium now first made by Schultz-Sellack may ultimately prove of value in the arts, and increase the use of anhydro-sulphuric acid.

TO RENDER FABRICS UNINFLAMMABLE.

The best ingredients for this purpose are a mixture of borax and sulphate of magnesia, or a mixture of sulphate of ammonia and sulphate of lime.

UTILIZATION OF FURNACE SLAG.

Numerous propositions have been made for the utilization of iron slag, but they have generally proved unavailable, in consequence of the cost of working them. It seems a pity, however, that something should not be done to avoid the enormous waste that may be seen at any time near our large blast furnaces; and it appears to us that metallurgists devote too little attention to the subject. One reason why so little progress has been made is manifestly to be traced to the fact that very few chemists are to be found connected with blast furnaces, who might be supposed to be possessed of sufficient knowledge to enable them to analyze the slag, and point out the purposes for which it is best adapted. Where the ore to be smelted requires the employment of an aluminous flux, we have a slag which is capable of being worked up into alum; it is also admirably adapted to the preparation of cements. Where limestone is used as a flux, the slag is an impure glass capable of being employed in the construction of buildings, walls, and roads. Instead of allowing the cinder or slag to run away in rivulets, it would be possible to have it cast in iron molds of any required size, and after gradual cooling, by which it is annealed, it could be piled up ready for transportation. We have seen in Germany the gardens near a blast furnace, and even farm lands, surrounded by walls laid up of rectangular blocks of slag, which were thus cast at the mouth of the furnace; and there was another application of these blocks which we have never witnessed in this country, namely, as soon as the casting was made, the mold was put upon an iron wheelbarrow and hastily wheeled to the kitchen by one of the workmen, where it was dumped upon the hearth, and served for heating the house and cooking the dinner. Each workman was entitled to a certain number of these blocks, and after they were cool they were either used in making a wall around his garden or in constructing a house. The rectangular iron molds were placed in the track of the overflowing lava, and there appeared to be no practical difficulty in thus economizing the heat of the cooling mass, and of subsequently employing the blocks as indicated above. We suggest to some of our iron masters an imitation of this operation.

THE DIAMOND DISTRICTS OF THE CAPE OF GOOD HOPE.

Mr. Warrington Smyth has recently paid a visit to the diamond bearing districts of the Cape of Good Hope, an account of which he has submitted to the Geological Society of Lon-

don. The geological structure of the country between Cradock and Middleburg is very uniform, showing few traces of upheavals. The rocks are chiefly sandstones of various degrees of fineness, with alternating beds of red or blue marl. Near Hope Town there are immense tracts of sand, and it is here that an active trade in diamonds is carried on. The tract of country between the Orange river and Vaal river, called Albania, is very barren of geological interest, being chiefly a sandy waste with a few low hills, dykes of green stone, trap, etc., and occasionally an outcrop of hard blue schist. The true diamond district was at the Griqua Mission Station. Here was observed the outcrop of a hard conglomerate, sometimes assuming the aspect of a *breccia*, composed of angular and rounded pebbles and blocks of quartz and jasper of all sizes; overlying this was a highly ferruginous soil containing numerous pebbles of quartz, jasper, and iron ore in which the diamonds had been found. A great deal of unstratified limestone was observed, in which diamonds were said to have been found with limestone adhering to them. Beneath this limestone, when cleaned away, a ferruginous clay makes its appearance, and is searched by the natives for diamonds. The diamonds were everywhere obtained from the ferruginous soil, and the spots which had been searched were always near the river. As many as 500 diamonds were seen in the possession of one person, some weighing as much as fifty carats. There was one fragment of a stone which must have originally been at least as large as the Koh-i-noor. Mr. Smyth considers that the reports of the number of diamonds found have been greatly exaggerated.

Hardening Rails.

Want of room at Demitoff's rail mill, at Salda Nischne, caused, some years ago, a lot of red hot rails to be removed to outside of the building where the ground was covered with snow, when it was found that the iron had been wonderfully hardened by the sudden cooling process it had undergone. A government commission, by careful examination, satisfied itself on this point, and since that time all the Russian mills have adopted the plan of suddenly cooling the rails by means of water. The rails are plunged into cold water immediately on leaving the saws, except at the works of Von Patilow, near St. Petersburg, where rails with heads of mild puddled steel are allowed to cool sufficiently to lose their luminosity before receiving the cold bath. Rails so treated are found to be perfectly reliable in the severe winters of Russia, so that there can be no question of their service in other and less rigorous climates. "The degree of fracture in good hardened rails depends," says a cotemporary, "obviously on the degree of hardness, and this depends not only on the amount of carbon present in steely irons, but on the temperature at which the hardening is effected; and there can scarcely be any tenable ground why rails should not be hardened while many other articles are, in which fracture is equally to be feared. The hardening effected by sudden cooling is indisputably less dangerous than that imparted by phosphorus; and, in case of iron free from impurities, when we compare rails hardened on the one hand by the addition of carbon (approaching steel in composition), and on the other by sudden cooling, the advantage of safety would undoubtedly be in favor of the latter—to say nothing of the expense of manufacture.

EDITORIAL SUMMARY.

THE *Phrenological Journal* gives an account of the case of James T. Anderson, whose body, by a severe injury to the cervical region of the spine, has become entirely useless to him, except for purposes of digestion, while his brain retains its normal force and capability. Unable to move or to act except with his head, and with the increase of activity of the mind that his helpless condition has induced, Mr. Anderson has already become proficient in the art of writing by holding the pen in his mouth, and is even practicing drawing by the same means. The case is a remarkable one, being a proof that injury to the cervix may extend, from its seat, in the direction of the body, without traveling in the other direction, towards the brain. Some of our physiologist readers may be able to explain a fact so much at variance with current belief.

A HUGH ELECTRO-MAGNET.—Wallace & Sons, of Ansonia, Connecticut, have just delivered to the Stevens Institute of Technology a magnet which weighs in all about 1600 pounds The coils are wound on eight brass spools, each 9¼ inches high by 11¼ inches external diameter. About 400 pounds of copper wire, ½ inch thick, are wound on these spools, which are of course split and filled in with vulcanite. The cores are hollow, and six inches in diameter by 3 feet 3 inches in length. The lifting force of this magnet is estimated at between 30 and 50 tuns. It will be five times as powerful as the one used by Faraday and Tyndall in their famous researches.

DECORATION OF METALS.—Dr. Puscher recommends a solution composed of a mixture of 3 parts of hyposulphite of soda and 1 of acetate of lead, for the purpose of decorating metallic surfaces. When heated to about 100° C., this solution deposits a layer of sulphide of lead upon any metallic surface in contact with it—the effect of the peculiar color of the metal beneath being to produce a great variety of tint.

THE commencement of a systematic traffic through the Mont Cenis tunnel is announced for September 15th, on which day a formal inauguration of the colossal work will take place.

MR. T. W. WOODWARD, of Winnsborough, South Carolina, writes to us, with a few suggestions as to a method of causing the descent of rain at will. Stimulated by necessity (the district in which he lives suffering from a very severe drought), and having observed that heavy cannonading during war has brought down rain, he suggests that a keg of nitro-glycerin or gunpowder should be exploded, to arrest the moisture which the clouds are carrying away to some more favored region, and to bring it down to the thirsty fields and gardens amidst which he lives. The idea is a good one, and can very easily be tried at a small cost.

GALLEIN, A NEW DYE.—The crystals of gallein are first produced, and these are converted into gallin by means of zinc and dilute sulphuric acid. On subsequently treating the gallin with concentrated sulphuric acid at 200° C., a substance named cörulein is obtained. This dissolved in anilin forms a rich indigo blue, and with alkalies it gives a fine green, while, if mordanted with iron compounds, a fine brown is imparted to the goods. These colors are readily imparted to cloth, and are of considerable permanence, resisting the action of soap.

THE works of the Belcher sugar refinery, of St. Louis, occupy a frontage of upwards of 1,400 feet, covering nearly four squares of the city, the buildings being from six to ten stories in hight; and where streets intervene they are connected by tunnels under the street or bridges overhead. To show the rapid and continual growth of the business of this establishment, we may state that the amount of refined sugar sold by Belcher's refining company in 1864 was 7,000,000 pounds, while in 1870 it had increased to 25,500,000 pounds.

IT is intended to make a tunnel through the mountains of Nevada, to serve the double purpose of the Pacific Railroad and the Lake Tahoe Water Company. The latter corporation intends conveying the water from Tahoe lake in the mountains, and have agreed with the railroad company for the making of the tunnel, which will be five miles long, through a granite rock. The water company has charge of the execution of the work.

Examples for the Ladies.

Mrs. M. Leary reports her earnings with a Wheeler & Wilson Machine $700 a year for shop-work, and $340 more for custom work, besides her family sewing for 6 persons.

NEW BOOKS AND PUBLICATIONS.

THE ROAD MASTER'S ASSISTANT, AND SECTION MASTER'S GUIDE. A Manual of Reference for all having to do with the Permanent Way of American Railroads, and containing the Best Results of Experience, and Minute Directions for Track Laying, Ballasting, and Keeping the Track in Good Repair. By William S. Huntington. Railroad Gazette Series. Chicago: A. N. Kellogg, 110 and 112 Madison Street.

This is a timely and useful little treatise; one which, as a practical guide, leaves little to be desired. It should be carried in the pocket of every Road and Section Master in the country.

PHRENOLOGICAL JOURNAL. Published by Samuel R. Wells, 389 Broadway, New York.

The number of this highly popular magazine for September has a table of unusually interesting contents. Among the most readable is an article entitled "Life in a Head Only:" an autobiographical account of a remarkable case wherein a blow being received upon the back of the neck, all use of the body below the point of injury was lost, yet the mental faculties were retained, the injured person learning to write with a pencil held in the teeth. A fac-simile of this mouth writing is given with the article.

SCRIBNER'S MONTHLY. Published by Scribner & Co., 654 Broadway, New York.

The number for September is remarkable for the beauty of its engravings. Its contents are also rich and varied. "Pictures from Canada," illustrated; "Mercator, the Path Finder of the Seas," with a fine engraving of Mercator; "The Co-Education of the Sexes," are the articles that have most interest for us; but there is variety enough to suit the popular taste, and altogether the number is one of the best that has yet appeared.

ECLECTIC MAGAZINE. Published by E. R. Pelton, 108 Fulton street, New York.

This always entertaining and highly instructive Magazine is out, and presents, as its frontispiece, a splendid portrait of the distinguished scholar scholar, thinker, and author, Max Muller. These portraits are a distinguishing feature of this magazine, and one of great value. We can hardly say too much in praise of its contents. The selections are admirable.

LIPPINCOTT'S MAGAZINE. Published by J. B. Lippincott & Co., 715 and 717 Market street, Philadelphia, Pa.

The September number of this Magazine is more than ordinarily good. The poem by Howard Glyndon is an exquisite piece of word painting, rarely excelled in American literature. "Scrambles among the Alps" is pleasant, and "Shall we Throw Physic to the Dogs," profitable reading. There are many other good things, which we have not space to name.

THE ATLANTIC MONTHLY. Published by J. R. Osgood & Co., Boston.

The number for September will not compare favorably with some of the former recent issues of this periodical. Still, there is enough to repay the reader for its price and the time spent in the perusal of some of its articles. We advise the reader to skip the weak story, "Twin Love," by Bayard Taylor, and the still weaker "Encylicals of a Traveler," which has little humor and less wit, and scarcely enough of readable description to fill a paragraph of moderate length.

"Among the live and progressive Institutions of the day is Geo. P. Rowell & Co.'s Advertising Agency, No. 40 Park Row, New York. The establishment is so systematized, and their facilities are so ample, that the public is sure of being served in the most complete manner."—*Boston Post.*

Answers to Correspondents.

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 must be by volume and page.

QUEEN BEES.—In reply to query 6, in your issue of the 12th inst., I would say that, during the swarming season, a number of queen bees are hatched, while probably only one is needed. When several are hatched at the same time, which is frequently the case, a royal war is at once commenced, and all the queens except one are dispatched, and the survivor then reigns supreme.—J. P. C.

WATER FOR AQUARIA.—In answer to G. W. G., in No. 7, page 107, query 3, I would say I have used both hard and soft water from wells in my aquaria, in which I kept our native and other fish, and they did well. The water never needs changing, if the aquarium be properly fitted up.—A. L. C., of Md.

CARBON AND COPPER IN BATTERY.—In answer to "Neutral," query 7, page 122, I would say: A carbon plate of equal surface gives nearly double the "intensity," and about the same "quantity" as a copper plate in bichromate solution. To put it more correctly, the electromotive force is increased while the internal resistance is not materially altered. The electropoion fluid of commerce is the same as the bichromate solution referred to. It is best made by dissolving two parts (weight) of bichromate of potash in ten parts water, moderately heated. When cool, add one part good sulphuric acid. It gives off no injurious fumes, except when exhausted by too long continued action without renewal.—F. L. P., of N. Y.

LEATHER POROUS CELL.—A. B., query 16, page 122, can use a porous cell made of soft leather, which will answer well, provided the seams are made tight.—F. L. P., of N. Y.

EXPANSION GEAR.—A. H. G.: If you use an eccentric of less throw, your steam ports will not open as much as they do now. Consequently your engine would "wire draw," and instead of making a saving, you would create a loss; for wire drawing steam is something like loading a horse, and then trying to force him to run, and holding him so as to force him only to walk, thereby making a double resistance. There is but one way to do it and do it right. If you have room enough in your steam chest between the steam ports and the ends of the steam chest, to use more lap on your valves, place an eccentric of more throw, instead of less. If you had stated in your query the lap now on your valve, and the distance from steam ports to ends of steam chest, I could tell you just how much more lap and throw of eccentric you could use. Some engines cannot be altered as there is no room.—G. A. T., of N. Y.

GEAR WHEELS.—I do not suppose you wish to cut anything but whole threads. My rule is very simple: Multiply the screw on your lathe, and the thread you wish to cut, by a given number. Say you wish ten threads to the inch, and the lathe screw is four threads to the inch; multiply by 8; 8 x 4 = 32 (driver), and 8 x 10 = 80 (screw). You can cut fractional threads by this rule without further explanation.—G. A. T., of N. Y.

SONOROUS STONE.—Let me inform W. S. R. that the musical property of stone is not unfrequently met with. Any substance that has very slight flexibility combined with tenacity will have regular and definite vibrations if struck, and these are the cause of musical sounds. That the stone loses this characteristic if removed from the spot is, I fear, a local tradition; it is certainly not to be accounted for by any book on acoustics that I have read.—D. B., of N. Y.

TURNING STEEL AXLES.—In answer to D. D. D., I would say he can turn his steel axles smooth with a square nosed tool whetted to a smooth edge, and adjusted so that the front corner only will cut; but the hind corner must only clear the work by the least possible distance. Run the lathe slowly. Better use no back gear, and put oil on the work. If careful, no polishing will be needed. I make them run this way to 4,000 revolutions per minute. Our principal business is making saw arbors of different kinds and planing machines, and I never allow a file to be put on a journal. I considered it very bad work to do so. Should D. D. D. want to turn iron he can run his lathe faster, and use water instead of oil.—W. W. T., of N. Y.

COMBUSTION IN BOILER FURNACE.—A. H. G. can improve combustion so that he can save tuns of fuel a year; and to explain the mode, I will describe how I do it. My ash pit is square; I fitted some ⅝ pipe to the shape of the ash pit with one piece through the center of the square; then I bored 1-16 holes, one inch apart, all along the pipe, connected it to a steam pipe, and just let enough steam pass through it to be visible. A. H. G. will be astonished at the result, and will burn his coal to ashes, and have a fine combustion.—G. A. T., of N. Y.

CUTTING TEETH OF WHEELS.—Let "Gear Wheels," query 4, page 107, multiply the number of threads per inch on the lead screw of his lathe, and the number of threads desired to be cut by the same number. The products will be the number of teeth in the two gears. Example: Lead screw is 4 threads to the inch, and it is desired to cut 13 threads to the inch. Take 6 for multiplier, and we have 4 x 6 = 24 teeth for spindle and 13 x 6 = 78 teeth for screw. Suppose it be desired to cut 3 threads to the inch: 4 x 12 = 48 teeth for spindle, and 3 x 12 = 36 teeth for screw. This is the simplest rule I have known—have used it in practice for 16 years. Easy to remember, and sure.—A. S. A., of Mass.

SETTING BOILERS.—To W. E. H.—It will be dangerous to place a two flue boiler alongside of tubular boilers, as the water in the latter would heat more rapidly and flow into the former, often overfilling it, and leaving the tubular boilers quite empty. Boilers working together should be of the same denomination and the fire as evenly under each as possible. Heating one boiler above the other creates the greater pressure in the boiler most heated, no matter how the steam drum is connected; this pressure will force the water into the boiler that has the least pressure.—J. E. E., of N. J.

VESSEL FOR COOKING TOMATOES.—I find a kettle lined with earthenware or porcelain the best for this purpose. Every hardware dealer keeps them.—J. E. E., of N. J.

TABLE CUTLERY.—To R. S. S. H.—Hot roasts and steaks will draw the temper on the edge of a carver. Hot water will not draw the temper of any tool; it has no effect on the razor though it may be constantly dipped in hot water for years, in shaving. I have dipped my razor in boiling water for years. Very highly carbonized steel is less liable to become softened in cutting hot meat.—J. E. E., of N. J.

SAND AND EMERY BELTS.—Use canvas belts strongly sewed or tied together at the ends. The threads may be so tied together as to leave the face on emery side of the belt perfectly smooth and level. Size the belt with a coating of thin glue and let it dry. Then hand the belt over two pulleys, so that it can be easily turned. Use the best of glue, about the consistency for glueing wood. Put it on hot with a brush, sifting on the sand or emery after the brush. Go around the belt as quickly as possible; then lay it on a smooth plank, and roll the sand or emery into the glue as hard as possible (an iron pulley loose on a mandrel is best); then hang up the belt to dry.—J. E. E., of N. J.

DRESSING SKINS WITH THE HAIR ON.—In answer to T. S. F.'s query 3, Aug. 19: Let him first soak the skin in cold water, so as to loosen the flesh; then break it on a fleshing beam until all the meat is removed. Then dissolve alum and salt in water, apply strongly and warm on the flesh side of the skin; then finish the same as white leather is done.—J. H. S., of N. Y.

E. F., of —.—Can you not see that if the circumference of a circle is not accurately determined, all calculations based upon it must be inaccurate? To measure a line by the application of some other assumed as a standard is enough for practice, but that is not a mathematical operation. The problem of squaring the circle is to determine *mathematically* the ratio between radius and circumference.

O. M. D., of N. J.—The same amount of dead pressure without shock will strain a boiler equally, whether the pressure be derived from hydrostatic or steam pressure. In the usual way of testing boilers by forcing water thereinto by a force pump, there is more or less shock which tries the boiler more than steady pressure would.

D. L. H. of Ky.—The opinions you express concerning the explosion of steam boilers have already been published in substance in the SCIENTIFIC AMERICAN.

W. S., of —.—Your query cannot be answered without diagrams, and is not of sufficient importance to warrant them. You should apply to a practical plumber.

S. S. M., of Mo.—A succession of electric sparks following each other with extreme rapidity will give the effect of continuous light light like that of the sun. A single spark would not illumine a moving object long enough to enable the eye to observe the motion of the body, unless the latter was moving with great rapidity.

F. G. W., of N. Y.—It is immaterial to which end of the right hand lever you attach the connecting rod of your steam cylinder. The power will be the same in either case.

E. F., of N. H.—If we understand your statement of the case, the check valve spoken of is necessary.

J. K. J., of Ark.—Your device will not work. Don't waste money upon it.

G. A. T., of N. Y.—Shall be glad to hear from you on the subject of lubricating oils for heavy shafting.

COLD IRON FLOATING ON MOLTEN IRON.—Is it not possible that cold iron floats on molten iron because it contains absorbed gases? Palladium is known to possess the property of absorbing hydrogen, and silver oxygen, and iron, may have a similar property.—H. R. R.

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.]

1.—ARTIST'S CANVAS.—Will some of the numerous readers of the SCIENTIFIC AMERICAN inform me how to prepare a good but cheap canvas for artist's use? Also how to stretch it on the stretcher, etc. ?—J. F. McC.

2.—HORSE POWER OF ENGINES.—What amount of horse power does a boiler develop when supplying a steam engine, sixteen inch cylinder, twenty-four inch stroke, making 100 revolutions per minute, with a pressure of ninety pounds to the square inch?—W. A. B.

3.—CONDENSATION OF STEAM IN LONG PIPES.—It is contended that steam passing through a horizontal pipe, the same being fully protected by a nonconductor of heat, will lose about one pound of pressure for every ten feet; therefore, steam of fifty pounds pressure through a pipe 500 feet long would be entirely condensed. Also that steam passed through a pipe downwards, under the same conditions, will nearly double this reduction of pressure, or drop out as condensed water at 250 feet. Please state if there is any or how much truth in the statement.—Y. S.

4.—DIMENSIONS OF A RIGHT-ANGLED TRIANGLE.—Can any reader give a rule for the solution of the following problem: Given the three angles and the length of the base, to find the length of the hypothenuse or the perpendicular of a right angled triangle.—C. E. C.

5.—FORCE OF FALLING BODIES.—Will some reader please inform me, through the columns of the SCIENTIFIC AMERICAN, what force will be exerted by a weight of one pound falling through a space of two feet, or give me a formula for finding the force of a given weight falling through a given space?—J. E.

6.—SUBSTITUTE FOR BORAX IN WELDING.—Does any one know of anything that will take a welding heat better than borax, on fourteen gage steel plate and thirteen gage iron?—J. B. McM.

7.—WEISS BIER.—Will some reader communicate a good, reliable formula for the manufacture of Weiss bier? I have got one recipe, but it does not give satisfaction.—H. H.

8. -SUBSTITUTE FOR BRASS.—Is there any metal or composition that will equal brass in strength and toughness, and can be melted in an iron ladle over a common coal fire, for casting?—F. W.

9.—BURNING BRICK.—Will some of your readers inform me about how much wood is required per thousand for burning brick in a kiln of ordinary size, and the best kinds of wood to use?—S. M., Jr.

10.—CLEANSING COTTON WASTE.—Will some of your readers give me the process of cleansing olley cotton waste in such a manner as to preserve the oils contained therein, and leave the waste in a condition to be used again?—F. O. B.

11.—DYEING STRAW HATS.—Can any of your readers tell me how to color straw hats the deep color which the best ones are made to assume? And how is the dye made?—O. P.

12.—REMOVING STAINS OF HAIR DYE.—Can any of your readers inform me what will remove stains of hair dye from shirts, etc.? I have tried oxalic acid and salts of tartar without success.—L. D.

13.—HARDENING VISE JAWS.—I should like to know the usual method of hardening vise jaws.—P. D.

14.—WEIGHT OF GAS FOR BALLOONS.—What quantity of the gas usually used in balloons is required to raise a pound weight?—T. J. W.

15.—GREEN PAINT FOR TINWARE.—What is the best and cheapest method of preparing green paint or varnish for tinware, and how should it be applied? Does it require to be dried in a furnace or oven?—W. C.

16.—MAD STONE.—What is a "mad stone?" How is it obtained, and will it cure bites of a mad dog, or of a snake?—G. W. M.

17.—COPPER SPIRAL SPRINGS.—In making springs for sofas, beds, etc., of copper wire, I find that in annealing the ends of the wire to prevent them becoming brittle, the copper turns black. Can any one tell me how to restore the color?—E. S. B.

18.—PLATED GOODS.—I want to know the best method of polishing plated goods, and the materials to be used. Any hints from a practical man on this subject will be gladly received.—PLATER.

Declined.

Communications upon the following subjects have been received and examined by the Editor, but their publication is respectfully declined:

ARTIFICIAL BUTTER—C. W.
AURORA BOREALIS—C. E. S.
CARBOXYGEN—C. W.
EXPLOSION OF STEAM BOILERS—D. L. H., J. E E.
FORMATION OF OZONE BY RESIN OILS—C. W.
FREEZING POINT OF GLYCERIN AND WATER—C. W.
MACHINIST'S TRADE—W. G. S.
MENSURATION OF CIRCLES—C. E. M.
POWER OF ELECTRICITY—J. E. W.
PROPULSION ON CANALS—W. J. M.
REAGENT FOR THE DETECTION OF BLOOD STAINS—C. W.
RESEARCHES ON THE FORMATION OF GALLIC ACID—C. W.
ANSWERS TO CORRESPONDENTS.—A. F. L.—G. B. D.
QUERIES.—A. S.—C. D. I.—C. D. K.—C. W.—D.—D. P.—F. E. H.—J. F. M.—J. H. R., Jr.—J. L. I.—M. B.—O. J. S.—S.

Recent American and Foreign Patents.

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

BILLIARD MARKER.—William Henry Newell, of Hudson city, New Jersey.—This invention consists, first, in arranging two pointers opposite to each other and directed towards the same line of figures or notations, so that, by moving the hindmost pointer at each count, and not touching the other, one party may always see exactly what has been last counted by the other, as well as the aggregate of game, which his opponent has made up to any point of time. Second, in combining a double U-shaped pointer with a two faced marking plate, so that the game must be counted simultaneously on both sides of the marking plate. It is a very neat and efficient device for this purpose.

FUNNEL.—Norman L. Price, of Lynchburgh, Va.—This invention consists in having a top or cover on the funnel with holes adapted for supporting the different measures used, bottom up, with the open ends entering said holes to drain and exclude flies and other insects and dirt.

ELEVATOR CUP.—Alfred A. Vitt, of Union, Missouri.—This is an improved elevator cup which shall be so constructed and attached to the belt that its rear side may have a smooth inner surface, and that it may be conveniently and quickly attached to and detached from the belt when desired, without disturbing the said belt. It consists of a hook shaped extension of the back of the cup to adapt it for detachable attachment to the back.

FENCE POST.—Charles Ayers, Farmington Center, Wis.—This invention is a new post for wire, board, or picket fences, and consists in casting the same of metal with a continuous flange, retaining rib, and of peculiar form, all with the object of making it light, strong, and inexpensive. The lower end of the post has the shape of a spear head. A flange serves to hold the fence rails or boards, if such are used, laterally in place, and is perforated to receive the fastening pins or the wires for a wire fence. The spur shaped lower end of the post enters the ground entirely, and serves to properly steady it in every direction. A projecting rib is formed on the face of the post between the flange on the spear, to add to the strength and stability of the device.

SPRING BED BOTTOM.—George Brownlee, Princeton, Ind.—This invention relates to a new and useful improvement in spring bottoms for beds; and consists in the use of side springs arranged to operate in connection with the slats of the bottom. The slats are supported by the end rails, or run lengthwise of the bed. Springs are attached to the side rails, or parallel with the slats; but the slats and the springs may be differently arranged and made to run transversely if preferred. The springs are attached at their middle to the rails of the bedstead in any suitable manner, and operate the same as an archer's bow. A cord connects the two springs together, and forms a medium by which the elasticity of the springs is imparted to the slats.

AXLE LUBRICATOR.—Henry S. Weaver, Irwin Station, Pa.—This invention relates to an improvement in a device for lubricating the axles or journals of loose wheels, designed more especially for wheeled vehicles, as wagons, carriages, etc., but applicable to other purposes; and it consists in a box or oil reservoir placed between the spokes or in connection with the hub of the wheel, so that the oil will pass from the reservoir to the axle or journal.

OMNIBUS BRAKE.—This is the invention of Henry Bothe, of St. Louis, Missouri, and it consists in a combination of levers and links, in connection with a foot lever, by which means the brake shoes are forced against the hind wheels with great power, and released very quickly at the will of the operator.

UTERINE SUPPORTER.—This is a new instrument intended not only to support the womb, but to act as a support to the abdomen and spine also. William S. Van Cleve, M.D., of Centralia, Ill., is the inventor.

COMBINED CULTIVATOR, MARKER, AND COVERER.—This is a simple combination of adjustable parts and devices, whereby the implement may be used for either of the purposes named. It is claimed to do its work well and thoroughly, and looks like a useful invention.

PROPELLER WHEEL.—Daniel S. Darling, of Brooklyn, N. Y.—Between the paddles of an ordinary side wheel propeller are placed plates of the same width as the paddles, but so placed as to enclose a rhombic space, the rhomb shaped compartment diminishing somewhat toward the center, the degree of diminution depending upon the diameter of the wheel. The inventor claims that this construction gives the wheel greater propelling power, while it obviates lateral currents and swells, making the wheel peculiarly adapted to use on canals.

PIPE COUPLING.—Joseph Andrews, of Nashua, N. H., is the inventor of this coupling. One end of the pipe is grooved annularly, and the groove is recessed at the bottom. A hole is then drilled from the outside of the pipe to communicate with the recess at the bottom of the groove, and provided with a screw plug. The opposite pipe end is formed with an annular rib or tongue made to fit the groove above described, except that it does not fill the annular recess at the bottom of the groove. The counterparts of pipe sections being placed together, the screw plug is removed, and through the opening liquid cement, melted lead, or other material, is poured. The screw plug is then replaced.

STEAM BOILER.—This is a water tube boiler, the tubes being connected with a steam dome and mud drum. The tubes are placed at an inclination so that sediment may flow down to the mud drum. Through each tube passes an endless chain, the chain also passing over the axles of crank shafts, which pass out of the sides of the steam dome and mud drum. Turning the cranks draws the chains through the tubes, and, it is claimed, thereby prevents their becoming clogged with scale and sediment. T. J. Lovegrove, of Philadelphia, Pa., assignor to himself and George H. Meyers, of the same place, is the inventor.

LAMP CHIMNEY CLEANER.—Cullen B. Clark, of Armada, Mich.—This invention relates to improvements in lamp chimney cleaners of the class in which plate springs are used to press the material employed in cleaning against the inside of the chimney, and are attached to a rotary shaft or spindle. The invention consists in the arrangement of springs and cleaning pads in connection with a spindle. The spindle is, by gearing, connected with a driving shaft which is turned by hand, so that the pads attached to the end of the spindle will be rotated very rapidly in the chimney to clean the same.

BROOM.—Robert E. Copson, of Hamburg, Iowa.—This invention has for its object to furnish an improved broom, in which the outer or circumference wire shall be so arranged and secured that, should the tack that fastens said wire work out or the wire be broken, the said wire will still be held in its place, securely confining the brush. It consists in the combination of extra braided wires with the outer or circumference wire.

BILLIARD CUSHION.—Matthew Delaney, New York city.—This invention relates to improvements on a billiard cushion for which letters patent were granted November 23, 1869. It has for its object to improve the mechanism for stretching the wire or cord to increase the elasticity of the cushion and provide an elastic end for pocket billiards. The invention consists in two improvements upon the patent referred to. The first consists in combining with the ordinary elastic cushion an auxiliary piece of a different character at the pockets. This is a substance which will not admit of the reaction and rebound of the ordinary rubber, but which at the same time will not be rigid and unyielding as the brass specified in the said former patent. Brass, wood, or any other substance which is practically unyielding causes a very rapid wear of the expensive cloth used upon billiard tables. Especially is this the case on the sharp angle of the pocket. To avoid this difficulty, a hard rubber block is placed at the pocket. The second improvement consists in arranging the tension spindle in a way to produce a valuable effect. In the old patent a tension spindle is placed within the rail; but it has been found, in practice, extremely inconvenient to take off the rail whenever it is desired to tighten the wire. This difficulty is overcome by arranging the spindle so that it can be operated without removing the rail.

LOOP FOR HARNESS.—Addison M. Osborn, of Girard, Pa.—This invention has for its object to furnish an improved loop for hame straps, which shall be so constructed as to hold the strap securely in place without any sewing, and which is simple in construction, convenient in use, and inexpensive in manufacture. It consists in a triple loop, constructed in a peculiar manner to accomplish the purpose set forth.

EGG AND FRUIT CARRIER.—Joseph Taylor Cornforth, of Kansas City, Mo.—A box (made without bottom or top) contains the cells or compartments. There may be holes through the sides or ends of the case, and also through the cell walls for ventilating the case. The cells are formed of one or more strips of paper, cardboard, or any other material which may be bent to the required shape, of a width to correspond with the width of the sides of the case. Each cell is formed of two semicircles, and each row of two corrugated lengths of the strips. It may be of wood with the corrugation formed in a mold. The inventor does not, however, confine himself to making all the cells of a case of a single piece, yet it may readily be done with paper board, so that the cells will retain their shape and be sufficiently rigid to retain the contents. In packing and transporting the cases, he commences on a platform or bottom, and places the cases on top of each other with a plate or sheet of stiff paper board or of wood between the boxes. No weight is allowed to bear upon the fruit or other articles contained in the cells. These division plates may be perforated with holes, so that there may be a circulation of air upward through the cases. By this mode of packing, each egg or piece of fruit or other article is kept separate from the rest and subject to no pressure.

BREECH LOADING FIRE ARMS.—Joseph Manton, of Montreal, Canada.—The operation of this fire arm may be described as follows: A breech block descends in a vertical slot in the breech, being thus moved by a lever forming the trigger guard, which has a downward movement and is put in motion by a thumb piece. The breech block in its descent in the slot, carries down one arm of a short lever, which works freely in a cavity in the breech block. The other end of this short lever in its rise presses upon the tumbler cam and forces the dog upward. When the breech block is at its lowest point, the trigger springs into a notch in the tumbler, and the dog remains fixed at full cock. The cartridge is inserted in the barrel, over the breech block, which is then raised by drawing the lever guard upward. The trigger being pressed in the ordinary way trips the pointed end out of the notch in the tumbler and the dog head descends, pushed by the main spring, which expands and regains its original form, out of which it had been bent and confined by the action of the short lever, raising the end of the tumbler cam. A piston or striker is inclosed in the breech block; the dog head in its descent strikes the head of the piston and drives the point of the same against the cap at the base of the cartridge and explodes it. The cartridge is extracted in the descent of the breech block by an angled extractor, one arm of which is caught by the descending breech block and the other arm forced against the rim of the cartridge, ejecting it rearward. The arrangement of the cam and lever with the hammer admits of raising the hammer to half or full cock at the option of the operator. It also admits of raising the hammer by hand and letting it fall independently of the breech block. When the hammer is at full cock the breech block may be worked independently of it. A feature of this gun is the fewness and simplicity of the parts employed to effect the result in the manner described. The pieces can all be made strong and durable, and the arrangement seems not liable to get out of order.

HARVESTER DROPPER.—J. J. Barnhill and D. N. Barnhill, of Vincennes, Ind.—This invention has for its object to improve the construction of J. F. Seiberling's patent dropper or self-raking attachment for reapers, so as to make it more satisfactory and effective in operation, saving a large amount of grain that would otherwise be lost by falling through the spaces between the slats; and it consists in so constructing and arranging the slats of the dropper that they may be partially revolved by means hereinafter described. In these droppers, when a sufficient quantity of grain has been received to form a gavel, the dropper is lowered so that the stubble may pass through the spaces between the slats and hold the grain while the said slats are being withdrawn from beneath it. The dropper is then raised to again receive the grain for another gavel. Removing the grain in this way requires that the spaces between the slats should be at least an inch and a half or two inches wide, to allow the stubble to pass through in sufficient quantity to hold or detain the grain. These wide spaces, when the grain is short, or thin, or straight, and without side blades, allow large quantities of the grain to drop through and be lost. To remedy this, the slats of the dropper are constructed so that, when raised to receive the grain, the adjacent edges of slats may be close together, forming a close platform, which will retain all the grain that may fall upon it; as the dropper is lowered to deposit the grain, and by the same operation, the slats are partially revolved or turned edgewise to form spaces of sufficient width for the stubble to pass through to detain the grain while the slats are being withdrawn from beneath it. As the dropper is again raised, the slats are again partially revolved or turned flatwise to form a close platform to again receive the grain.

BRAN DUSTER.—A wire gauze cylinder is arranged in a suitable frame between the two heads, which have large openings at the center—one for the admission of air, and the other for the air to escape, together with the fine particles of dust. Brushes, mounted on the radial arms of a shaft extending beyond the heads of the cylinder, and mounted in the adjustable bearings, revolve within the gauze cylinder. The arms of this shaft are intended to be made adjustable lengthwise to regulate the pressure of the brushes on the wire cloth. The shaft is rotated by a band and pulley, and carries a fan in a fan case attached to one of the heads, and provided with a discharge spout. This fan draws the air through the wire cylinder, taking the fine particles which do not need grinding again with it, and leaving the coarse particles to escape through the meshes to the hopper below in a better condition for grinding than when mixed with the fine particles. The suction may also be applied to fan dusters, either at the end for taking the fine particles through the escape hole, the bran being discharged through another spout at the end of the cylinder, while the coarse particles pass through the same, or the fan may be applied to the spout from the hopper to draw the fine particles through the wire cylinder and leave the bran to escape at the end. A heavy bolt or rod is arranged in the end of the case to be forced in by a spring acting on a lever, to strike the end of the wire screen and keep it from clogging. John Damp, of Ashland, Ohio, is the inventor.

SUSPENDING WINDOW SASHES.—Thomas Morton, of New York city.—A chain is connected with the sash by means of a slotted tube or plate, or piece of metal, or other suitable material, placed in a recess or cavity at the end of the chain groove, the said slotted tube, plate, or other fastening being so formed that the chain will slip with the slot and be held by the enlarged end of the link when the chain is cut to the required length. The shank of the weight hook is constructed so as to receive the chain by means of a slot. The chain is thus slipped into a circular eye or semicircular shank, and may be held in any manner by the enlarged end of the link. For connecting the chain either to the sash or the weight the chain is not drilled or altered in any manner. It is only cut to the required length, and is then ready to be connected. This is the main feature of the invention.

BROOM.—Edward Americus Anderson, of Danville, Texas.—This invention consists in securing the corn brush to the handle by the employment of a conical or flat tapered thin sheet metal ferrule, and a correspondingly shaped end of the handle, but smaller, the brush being packed in the ferrule as much as the required amount, and then separated by a tapered mandrel and spreading it to the shape of the said ferrule, being driven in from the tops of the brush, the butt ends being packed in the ferrules to make room for the handle, which is then driven in after the mandrel is removed and secured by nails or screws.

SMUT MILL.—This is a new and useful combination of spreader plate arranged in the grain passage, between the scouring cylinder and separator, with adjustable springs, a gate and conduit, and other well known devices used in machines of this character. The combination is claimed to prevent the diffusion of dust in a mill, and otherwise facilitate the operation of clearing grain from smut.

BUSH FOR MILL SPINDLE.—Herman W. Vitt, of Union, Missouri.—This invention furnishes an improved bush for mill spindles and other vertical shafting, which is simple in construction, easily and conveniently operated whether the spindle or shaft be running or not, will not get the spindle out of tram, and which will exactly center the spindle, it being impossible to move one of the followers without moving them all. It consists in a combination of parts by which the followers are all moved together.

DROP GRATE FOR FURNACE.—William Shepherd, of New York city.—This invention has for its object to provide a solid support for the grate, to prevent the occurrence of warping, and permit the rapid and convenient dropping of the grate and the ready removal and replacing of single bars. The invention consists in the arrangement of an air chamber around and on the same plane with the grate, so that a continuous supply of cool air is carried to the grate bars, and in a new manner of hanging, securing, and holding the pivoted grate bars.

EGG BEATER.—Daniel B. Clayton, of Columbia, S. C.—This consists in a suitable vessel and beater operating devices, in which the blades, which are caused to move very rapidly, are arranged to cut edgewise against the egg in a way to separate it into very fine particles, and introduce the air, it is claimed, more thoroughly than can be done by the beaters now in use.

APPLICATIONS FOR EXTENSION OF PATENTS.

CANDLE SNUFFERS.—Orson W. Stow, Plantsville, and Augustus Barnes Southington, Conn., have petitioned for an extension of the above patent. Day of hearing, November 8, 1871.

FLY FRAMES OF PRINTING PRESSES.—Richard M. Hoe, West Farms, N. Y., has petitioned for an extension of the above patent. Day of hearing, November 1, 1871.

SAFETY LAMPS.—William Pratt, New York city, has petitioned for an extension of the above patent. Day of hearing, November 8, 1871.

TRUSSES.—J. W. Riggs, Brooklyn, N. Y., has petitioned for an extension of the above patent. Day of hearing, November 8, 1871.

STEAM ENGINES.—Edward D. Barrett, New Haven, Conn., has petitioned for an extension of the above patent. Day of hearing, January 3, 1872.

LONG TRUNKS FOR CLEANING COTTON.—Isaac Hayden, Lawrence, Mass., has petitioned for an extension of the above patent. Date of hearing, November 15, 1871.

Inventions Patented in England by Americans.

August 1st to August 7th, inclusive.

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ALARUM PUMP.—E. Hoskell, New Hampshire.
ANCHOR FOR PLOUGH.—A. Campbell and R. Clark, Sacramento, Cal.
GAME BOARD.—W. Hearne, New York city.
RAILWAY VEHICLES.—J. B. Calkins, Pacific, Mo.
REFRIGERATOR, ETC.—K. Goddard, Richmond, and J. P. Adams, Brooklyn, N. Y.
SEWING MACHINE.—E. Moreau and W. B. Isaacs, San Francisco, Cal.
SEWING MACHINE.—Howe Machine Company, Bridgeport, Conn.
SHOVELS, ETC.—F. Alsip, North McGregor, Iowa.

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118,178.—TWIST DRILL.—B. Arnold, East Greenwich, R. I.
118,179.—TWIST DRILL.—B. Arnold, East Greenwich, R. I.
118,180.—READING CASE, ETC.—W. F. Baade, Buffalo, N. Y.
118,181.—TILT HAMMER.—H. Baines, Toronto, Canada.
118,182.—PRINTING PRESS.—W. L. Balch, Boston, Mass.
118,183.—EXHAUST CHAMBER, ETC.—J. Becker, Chickies, Pa
118,184.—COUPLING.—W. C. Bibb, Morgan county, Ga.
118,185.—SHOE SOLE.—E. Blaney, Marblehead, Mass.
118,186.—CULTIVATOR.—B. C. Blomsten, Waupaca, Wis.
118,187.—DESK, ETC.—A. M. Bodwell, Ann Harbor, Mich.
118,188.—CORN CRUSHER.—A. Bolander, Akron, Ohio.
118,189.—MOLE TRAP.—D. Boswell, Greencastle, Ind.
118,190.—SHUTTER WORKER.—C. M. Brown, Chicago, Ill
118,191.—AI-ARM.—H. L. Brower, New York city.

118,192.—VAPOR BURNER.—C. B. Brown, Placerville, Cal.
118,193.—LAMP BURNER.—G. E. Brush, Danbury, Conn.
118,194.—OIL CAN.—J. Burson, Yates County, Ill.
118,195.—FURNACE.—F. E. Chatard, Jr., Baltimore, Md.
118,196.—AUGER.—A. R. Clark, Albia, Iowa.
118,197.—STEAM GENERATOR.—O. Clark, Rockford, Ill.
118,198.—CROSSCUT SAW.—W. Clemson, Middletown, N. Y.
118,199.—ALARM.—G. E. Cock, J. H. Guest, New York city.
118,200.—GOVERNOR VALVE.—W.A.Cogswell, Rochester, N.Y.
118,201.—BOOT, ETC.—O. Collier, Sacramento, Cal.
118,202.—SLED BRAKE.—J. E. Coutant, Rondout, N. Y.
118,203.—BOOT HEEL.—A. O. Crane, Boston, Mass.
118,204.—BANK CHECK.—S. Crane, Dalton, Mass.
118,205.—LATH BOLT.—T. Crispin, Bay City, Mich.
118,206.—PUMP.—E. S. Crowell, Augusta, Me.
118,207.—HARVESTER.—T. E. Curtiss, Titusville, Pa.
118,208.—CULTIVATOR.—L. Daley, Minaville, N. Y.
118,209.—CHLORINE.—H. Deacon, Widnes, England.
118,210.—BLEACHING POWDER.—H. Deacon, Widnes, Eng.
118,211.—CHLORINE.—H. Deacon, Widnes, England.
118,212.—TREATING GASES.—H. Deacon, Widnes, England.
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118,216.—PAVEMENT.—C. Deutsch, New York city.
118,217.—HARVESTER, ETC.—M. Devore, Victor, Iowa.
118,218.—FIRE ENGINE.—A. L. Dewey, Westfield, Mass.
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118,220.—FLOOR.—J. Dunseith, New York city.
118,221.—GAS METER.—H. H. Edgerton, Fort Wayne, Ind.
118,222.—PUMP.—J. Edson, Boston, P. Noyes, Lowell, Mass.
118,223.—SIGNAL.—H. S. Evans, West Chester, Pa.
118,224.—FEEDER. J. Ferguson, J. Turner, Bridgewater, Mass.
118,225.—RULER.—L. Feusier, Jr., Virginia City, Nev.
118,226.—RULER.—L. Feusier, Jr., Virginia City, Nev.
118,227.—PISTON.—L. Finlay, St. Louis, Mo.
118,228.—ARM SHEATH.—J. J. M. Frey, Sacramento, Cal.
118,229.—LAMP, ETC.—A. C. Frieseke, Owasso, Mich.
118,230.—BRICK KNIFE.—J. Garity, Brewer, Me.
118,231.—ANNUNCIATOR.—E. Gray, Chicago, Ill.
118,232.—STAKING HORSE POWERS. W.Gregg, Dansville, Mich.
118,233.—BUCK SAW FRAME.—W. Hankin, Hawley, Pa.
115,234.—CUTTER.—B. Harnish, Lancaster, D. H Harnish, Pequea, Pa.
118,235.—CUTTER.—B. Harnish, Lancaster, D. H. Harnish, Pequea, Pa.
118,236.—HARVESTER.—O. M. Harrison, Glasgow, Mo.
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118,244.—PROPELLER.—John Jochum, Brooklyn, N. Y.
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118,248.—WASHING MACHINE.—J. J. Kenyon, Boston, H. P. Huntoon, Cambridge, Mass.
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118,250.—DISTRIBUTER.—A. Knowlton, Boston, Mass.
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118,253.—SHADE RACK.—H. Lull, Hoboken, N. J.
118,254.—COTTON TIE.—S. Mather, New Braunfels, Tex.
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118,259.—STRIPPER.—C. Muller, Albany, N. Y.
118,260.—BEARING PLATE.—E. Myrick, Ayer, Mass.
118,261.—ROOF.—D. Newton, Newport, R. I.
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118,263.—BOOT, ETC.—H. F. Packard, North Bridgewater, Mass.
118,264.—AX.—G. Palmer. C.W. Hubbard, Pittsburgh, Pa.
118,265.—BOILER.—N. Parks, G. A. Hynds, Rome, N. Y.
118,266.—AX.—W. Peabody, Orono, Me.
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118,301.—ELENATOR.—G. C. Timpe, New Orleans, La.
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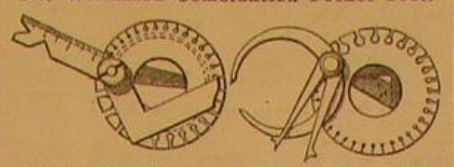

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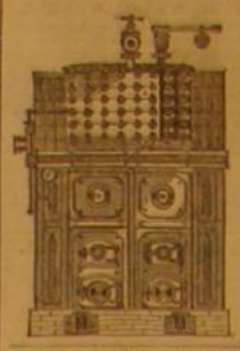

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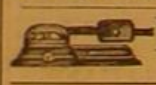

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