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IMPROVED HIGH PRESSURE ALARM.

Our engravings illustrate a very ingenious high pressure alarm, a patent on which was obtained through the Scientific American Patent Agency, January 30, 1872, by Herbert S. Jewell and Ferdinand Steele, of Brooklyn, N. Y.

A, Fig. 2, is the valve—cone pointed—and enlarged above so as to form a hollow chamber, into which lead can be run to weight it; or it may be cast solid and of a given weight, as shown in Fig. 3. Surrounding the valve seat is the plate, B, shown in detail in Fig. 5, the lower side being presented to view to show two ports, C, Fig. 5, through which, when the valve is raised only a little way from the seat, enough steam passes to prevent the valve from rising any further till gradual pressure has accumulated in the boiler. It is obvious that the valve may be weighted and the size of the ports adjusted, so as to allow this action to take place at a given pressure, say 30 lbs. Suppose this, with a margin of 3 lbs., to be the limit of pressure which the engineer is allowed to carry in the boiler. As soon as 30 lbs. is reached, the steam escapes through the ports, C, Fig. 5, passing up through the annular spaces, D, Fig. 6, to the whistle, to warn the attendant that the pressure approaches its limit.

The flow through ports, C, is controlled by screw valves.

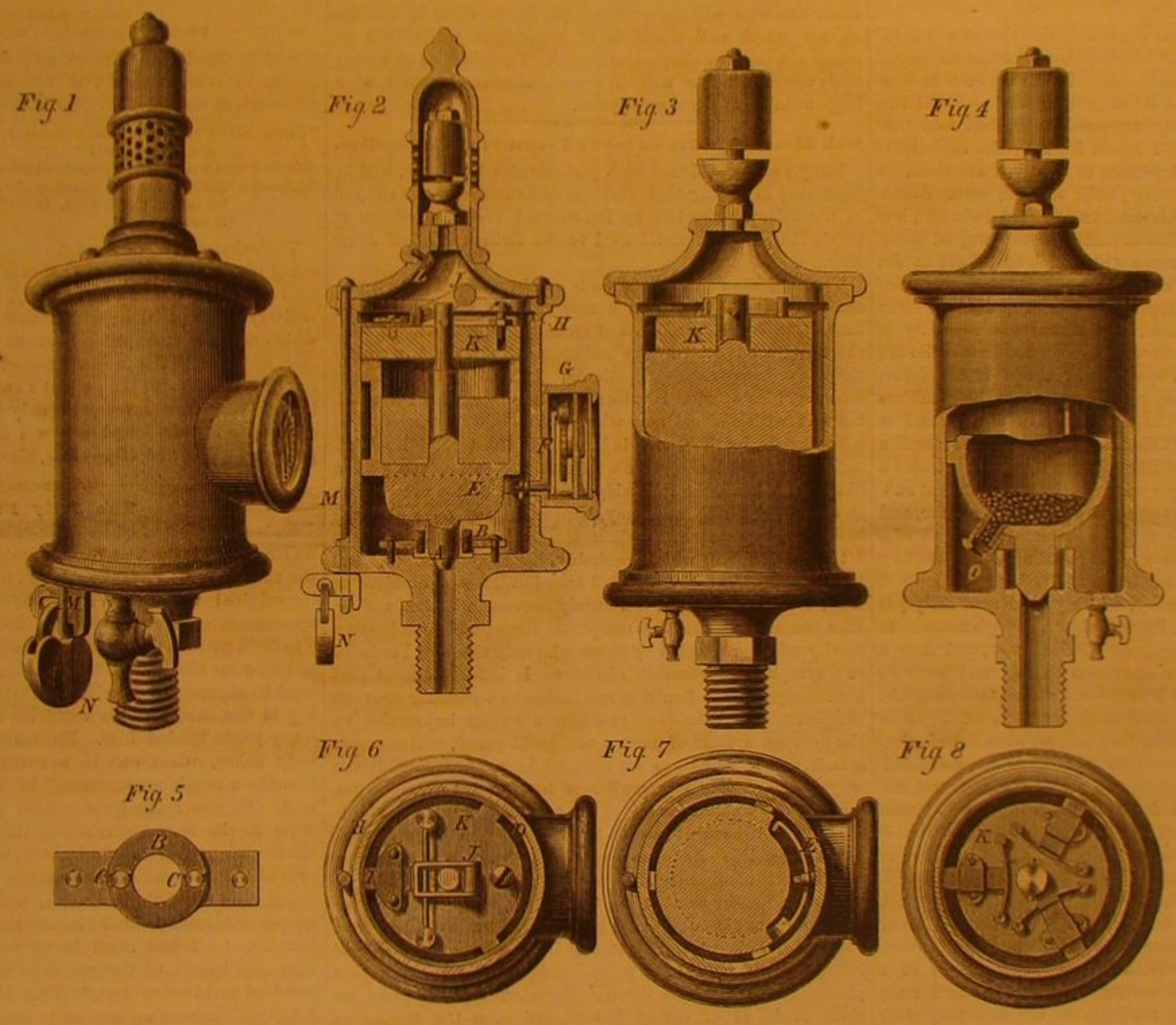
Should the engineer allow the margin of 3 lbs more pressure to accumulate, the instrument performs another function. Referring to Fig. 7, the reader will perceive a bent weighted lever, E, the end of which, opposite the counterpoise, rests under the shoulder of the valve weight, as shown in dotted outline at E, Fig. 2. As the valve weight rises, the counterpoise of the lever, E, descends, thus oscillating the lever on its pivot. To the pivot of the lever, E, is attached the arm, F, Fig. 2. The arm, F, carries a pawl, G, which actuates a toothed wheel, to the axis of which is attached a pointer, as shown in Fig. 1. The pointer is thus moved along the dial a distance of one tooth on the wheel for every time the attendant comes up to or exceeds his margin of pressure. It thus becomes a tell-tale which he cannot escape. As the wheel, by continued turning, finally presents an uncut space upon which the pawl cannot act, an attempt to work it around to its original position, by allowing the pressure to rise a sufficient number of times, only accumulates evidence.

Thirdly, if he exceeds the margin 3 lbs., and runs the pressure up to 35 lbs., the valve will be so much raised as to lock itself in that position. The device by which this is accomplished is shown in Figs. 2 and 6. On the inner side of the outer shell is turned a groove, H. Into this groove the slide, I, Fig. 6, enters, as soon as the valve has been raised high enough, the slide being actuated by the weighted lever, J, Fig. 6, or by springs, as shown in Figs. 3 and 8. These slides suspend an auxiliary weight or disk, K, Figs. 2, 3, 6, and 8, which, from that time, will not act again until the instrument has been opened and the parts readjusted. The careless attendant now finds that he cannot carry within five pounds of the pressure he was allowed to use without continually sounding the alarm and calling attention to his fault, to the commission of which any suitable penalty may be attached; either a fine or his discharge being probably severe enough to keep him on the alert. The cap of the whistle being locked on the inside by the screw, L, Fig. 2, and the cap of the valve being securely locked by the rod, M, and lock, N, he has no recourse but to report himself and to submit to the consequences of his neglect.

It is obvious that this principle may be extended by enlarging the valve, so as to combine the alarm and safety valve in one instrument if desired.

Another form of alarm is shown in Fig. 4. Here the valve is weighted with shot held in a chamber by a disk, O, of fusible metal. The valve rising slightly first gives an alarm, which if neglected, the pressure and consequently the temperature exceeding the proper margin, melts the fusible disk. The shot now escape from the chamber by their own gravity, and the valve is so much lightened that the alarm will thereafter sound at a pressure much below that the engineer is permitted and desired to maintain. Thus hedged in, he is obliged to be careful or lose his position.

The instrument is compact and capable of receiving a highly ornamental finish. For further particulars address H. S. Jewell, 2 Fulton street, Brooklyn, N. Y.



JEWELL & STEELE'S HIGH PRESSURE ALARM.

Iron Steamers for the Mississippi.

Chapman & Thorp, of St. Louis, lumber dealers, have contracted in Dubuque, Iowa, for a boat of the following dimensions: Hull, 145 feet; beam, 26 feet; depth, 4½ feet. The entire hull is to be of iron, including deck and guards. The hull will be divided into eight water tight compartments. There will be tanks in it, by which it will be practicable to sink the boat to the draft required in five minutes, or in about the same time to raise her to her original drait of water.

The contract requires that she shall draw but eighteen inches water when completed, with water and twenty-four hours' fuel on board. Mr. Hopkins, a practical builder from the Clyde, Scotland, will superintend the construction.

The power is to be equal to 20 × 30 inch cylinders, to propel Dowler & Birdseye's shoal water propeller which is the invention of Captain John Dowler, an Illinois river steamboatman. That this wheel and style of boat are excellent for towing rafts is evident from the fact that Chapman & Thorp gave a thorough trial of it last year in the Humbug, a poorly constructed craft, yet she performed the tasks that were set before her in an unusually satisfactory manner. The one under contract is to be able to tow up stream 2,500 tuns weight at a speed of 4½ to 5 miles per hour. She will have a full "texas" with business office, and rooms for the employees of the company. She is to be completed by May 1st of this year.

Robbery with the aid of Chloroform.

Dr. Stephen Rogers, of New York, in a report on "Can Chloroform be used to Facilitate Robbery?" records some facts which prove it to be of no use to robbers. 1st. As to its use to promote the greater security from the disturbance of the sleeper, even were that practicable, the very time that would be consumed in the gradual and cautious administration of the vapor—the only possible theoretical manner of accomplishing it—would so increase the danger of detection that few thieves would think of employing it. 2d. During the course of the administration of the chloroform, whatever manner may be adopted, the patient or subject, as a rule, becomes excited, often very violent and turbulent, with an irrepressible propensity to sing or shout, which is often so loud as to alarm the inmates of the whole house. He is in a state of wild chloroformic intoxication. The exceptions to this rule are so few that no prudent thief would think of running the risk of not meeting one of those exceptions. 3d. Supposing the two preceding obstacles overcome, and the victim thoroughly quieted into a narcotic sleep, a third and very frequent complication arises; he begins to vomit, and, while he does not generally make much noise about it, still he may; and he always requires attentions lest fatal strangulation occur. The knowledge, among the criminal classes, that the abandonment of their victim, with a towel still over his face, to the liabilities of vomiting and strangulation, would often add the crime of murder to that of robbery, would have great effect in deterring them from the further employment of it.

The *Journal of Applied Chemistry* recommends the use of a small quantity of carbolic acid in paste for laying paper-hangings and in white wash, and states that it will repel cockroaches and all other insects. It will also neutralize the disagreeable odor consequent upon the decomposition of the paste, which in newly prepared walls is sometimes very oppressive. The cheapest and best form of carbolic acid is crystal, which dissolves in water at an excess of temperature.

CRYSTALLIZATION.—Professor Schultze has recently exhibited, to the German Chemical Society, Berlin, beautifully formed crystals of sugar, borax, and other substances. He states that by the use of a gelatinizing substance as a solvent, the formation of perfect crystals is much promoted. Solutions of gelatin and kindred substances were the vehicles he employed.

THOMAS FITZGERALD, of Rhinecliff, N. Y., on the Hudson, is 108 years old, and his wife is 100. Both are in good health.

MINING SPECULATION---SOMETHING AS APPLICABLE TO NEW YORK AS TO LONDON.

Says the *Mining Magazine and Review* (London): Among the "comic" paragraphs, that go the round of the press in the dull season the following has had a wide circulation during the past month:

"An American gentleman who claims Oregon as his abiding place, is making an honest living by getting up companies of men, one hundred in number, whom, in consideration of one hundred dollars paid by each, he promises to pilot to a mountain of solid gold. After wandering round in the mountains with his dupes for a few weeks, he suddenly disappears, to start a new enterprise of the same character."

Which is a parable. We need not go to Oregon. There are a good many gentlemen of the kind in America, and not a few in England. Even in the City of London, under the very nose of the Lord Mayor, and within a few yards of the detective quarters in Old Jewry, the "Messrs. Robin" flourish. Companies of men, not by any means limited to one hundred in number, are being continually piloted to mountains of gold, or iron, or silver, which is the same thing, since by a process of modern invention, far transcending in skill the labors of the old alchemists, even visionary mountains of non-existing metal of any kind get transformed into gold "where merchants most do congregate." The nineteenth century alchemists, abandon their dupes after a few weeks; and having set up iron as their discovery one day, on that day six months find that silver or lead will answer their purpose just as well, the net result being that all is gold which comes to their purse; but it comes out, not of the mountain, but of the banking accounts of the befooled public.

It has been said by a great wit that if there were no "flats" there would be no "sharps." We are by no means convinced of the exact truth of this aphorism. There are men in London who have mastered the art of proving that two and two make not, as is commonly supposed, four, but four and twenty—men who hold their heads high in the mercantile world; who associate with persons of title, and use them as decoy ducks for the lord-loving public outside; whose names are never seen in connection with transparent swindles, but who nevertheless do not stick at trifles in the way of statements respecting the concerns with which they have to do. It is such men who do the mischief to the reputation of mining as an investment for surplus capital. The mere brokers who advertise large dividends, upon shares that are fifty to eighty per cent below par, deceive nobody but those who are anxious to be deceived. *Populus vult decipi et decipiatur.* These small men prey upon small men—upon the gamblers who stake their money on the one chance in a thousand or so; upon the chandler in Camden Town, who has saved a hundred pounds, and would like to draw by its investment a hundred and fifty pounds per annum; the self confident suburban pedagogue, who is caught, like a moth, by glare, and would fain obtain sixty per cent for his money, instead of a steady six; the simple country parson, who fancies that by putting three hundred pounds into the Ayrshire Castle Gold and Platinum Mining Company, which pays fifty or sixty per cent in the advertisements, he will obtain enough returns to send his hopeful son to Rugby or Marlborough, and hire a finishing governess for his daughter. These and such as these—men whom we have known—are not capitalists in the true sense of the word. That their interests ought to be looked after more closely than they are, we should be inclined to allow; but a more important portion of the community, the legitimate holders of capital, are on the look out, not for cent per cent, but for a fair return for their money, and are perfectly well aware of the fact that, as the Duke of Wellington said on a memorable occasion, the promise of high interest means the probability of bad security.

In eleven months of 1871, five and a half times as much capital, speaking in round numbers, has been required from our market for mining purposes alone, as in the twelve months of 1870. Since the railway mania of a quarter of a century ago, there has been nothing like this in one section of business. The causes of the increase are not very clear and are at the best complicated. The chief cause was that the public at large, and especially the commercial classes, came all at once to perceive that nothing in the whole range of trade offers both a more reliable investment and a larger interest than sound mining property. How many of the schemes named in 1871 come under this category it is impossible definitely to say; and the present state of the Law of libel—which renders it as much an offence in such cases to tell the truth as to malign unjustly—prevents us from indicating with much particularity the projects which it requires no knowledge of mining to perceive were intended to feather the nests with promoters at the expense of investors.

These cuckoos of the share market have unquestionably had a very good time this year. When a sound company comes before before the world, there are sure to be two or three "shady" concerns in its train which pick up the capital of those who have failed to obtain allotments in the more reputable undertaking; and it may be laid down as a general rule that the more tempting the promises of a mining company's prospectus, (whether at home or abroad, but rather abroad than at home), the more completely should the facts be investigated before a penny of capital is entrusted to the promoters.

Some of the prospectuses issued this year have been curiosities of transparent cunning. So plainly is the net spread in the sight of the birds that one can hardly conceive the possibility of the existence of beings who could be thus deluded. Yet these very companies have obtained, if not the whole, at least a very large proportion of the capital they required—capital to all intents and purposes thrown away as completely as if it were pitched into the mid Pacific. It would really appear that investors have of late begun to believe in the return of the golden age, when every man interests himself, not in his own concerns, but in promoting the wordly prosperity of others—or that the possessors of princely properties underground have imbibed Communistic principles, and have resolved to set a good example by sacrificing a large portion of their wealth in order to raise those are poorer to their level of riches. They offer properties which they represent to be worth hundreds of thousands of pounds sterling for about a year and a half's purchase. It would be tedious to go through the number of examples which we might cite of this astounding generosity; but let us take one instance, in order to show what openhanded and noble spirited men we have amongst us, whose wealth is a burden to them, and who desire to share it with the million. We have forgotten the name or locality of the company which offers reserves of ore estimated at a value of £600,000, and a minimum net profit of £216,000 per annum, for some portion of a capital of £250,000. As we have said, we know nothing of this undertaking or its promoters; we cite it as an example of a noble generosity seldom to be met with in this world. They do not seek fame, these good and generous men. They are content to remain unhonored and unknown. More than Peabody or Coutts, their benefactions are always anonymous. There are those, however, who take a harsher view of such proceedings, and liken the generous promoters to the tavern sharpers who produce bags of Hanoverian medals as gold, and pocketbooks full of Bank of Elegance instead of Bank of England notes, who have received all this wealth as a legacy, and wish to share it with every one who will show his confidence in them by lending them a watch and a couple of sovereigns while they go round the corner to buy some cigars. The exercise of a very little common sense will show the delusive character of a large number of these companies.

Sick Headache--Its Cause and some of the Remedies.

Many persons, afflicted with periodic sick headache, will be interested in finding their feelings and experiences portrayed in the following article by Dr. Samuel Wilks, physician at Guy's Hospital, communicated to the British *Medical Journal:*

The subject of sick headache is one in which I take a personal interest, having been a martyr to it all my life, and having, in consequence, too often had to compare notes with those who have been like sufferers with myself, whether they have been friends or patients. It is important to possess a correct idea of what is intended by the name, for I have often met with medical men who have no other knowledge of a sick headache than what is implied in the term bilious attack, or the headache which follows the eating too good a dinner. A headache following a debauch or too much wine is common enough, and may happen to any one; also the headache, in peculiar idiosyncracies, from eating some special article of diet, and which, probably, has a gouty origin. But the true sick headache, which I take is almost equivalent to hemicrania or migraine, is a purely nervous affection, and occurs generally in the most temperate livers, and thus is often totally misapprehended by those who only think of headache as a symptom of stomach disorder. It is for the most part hereditary, runs in families, and is due to a peculiar nervous temperament. Whatever produces a strong impression on the nervous system of such a one predisposed, will cause an attack, and it may thus be induced in a hundred different ways. Consequently the sufferers from this complaint often make it the whole busines of life to avoid moving a single step out of the even tenor of their way, so as to prevent as far as possible its occurrence. The visit to the theatre, the concert room, or the dinner party, is always followed by headache, for the excitement, the altered temperature or vitiated air, are all equal to its production; but even less than these is sufficient, for any strong impression on the special nerves will produce it, as a loud noise, an hour's visit to a picture gallery, looking through the microscope, odors of various kinds, as of spring flowers, and even the testing of some substances; also exposure of the body to the sun or a strong wind; moreover, various moral causes and worry are sure to be followed by the familiar headache.

The true cause, then, of sick headache, lies deep in the patient's idiosyncracy, and is developed by a hundred different causes. The advice, then, to sufferers is to give as much tone as they can to their nerves by adopting all those methods which experience has shown to be good, and then avoid, as far as is practicable, all those causes which are known to excite an attack. I need scarcely describe a sick headache—how one rises in the morning more dead than alive, perfectly unable to swallow the smallest particle of food, and often, perhaps, actually sick; how the head throbs, and the pain is increased by the slightest movement; how speaking or doing is a burden beyond bearing; how one prays to be left alone in the utmost quiet, so that he may, if possible, sleep. To other persons the sufferer looks extremely ill, very pale, dark around the eyes, and with contracted pupil. To himself his head feels hot, and the application of cold is very refreshing. The clamminess in the mouth, the nausea, and general disturbance, are secondary, and have no connection with any improper meal, and thus are in no way relieved by the too frequent and ignorantly administered purgative. This is not needed, and has no good result. The only remedies which are of any avail are those which act on the nervous system, such as hot tea and coffee; or, after the stomach is quieter, and the more urgent symptoms have passed off, a little wine or ammonia. If the headache take more the form of hemicrania, then remedies are occasionally useful, as the local application of the bisulphide of carbon, or galvanism, and internally the bromide of potassium. This is the only drug which I have really seen to be serviceable. Whilst the nausea exists and the worst symptoms prevail, even this remedy is of no avail. So little can we prejudge the value of medicines, that I have even been willing to administer any remedy which can be proposed; and thus not long ago I myself swallowed with great faith a specific powder sent me by a friend from Vancouver's Island; but, alas! it must be catalogued with all other remedies for sick headache—it was useless. As regards tea and coffee, which often relieve, it is possible that these and other stimulants, taken in excess, render the nervous system more susceptible to the attacks; and I believe I am right in saying that it was Mr. Martyn, of Brompton, who informed me of more than one person who had entirely lost his headache from leaving these off.

The various influences spoken of, acting through the different parts of the nervous system, impress immediately the sympathetic, and so alter the current of blood through the head; thus, while the face is pale, the larger vessels are throbbing, the head is hot, and the remedies which instinct suggests are cold and pressure to the part. In fact, of all the means which have been used to cure this trouble, the only one on which we can rely to procure relief is the wet bandage tied tightly round the head. The method must be instinctive, for it is universal, and has been from all time. As our Shakespeare is often quoted to illustrate the morbid states of the body as well as the passions of the mind, he may be again conjured up to testify to the ancient practice of which I have been speaking. For example, in the scene between Hubert and Arthur, in *King John*, the latter, when petitioning for the preservation of his eyes, says:

> "When your head did but ache
> I knit my handkerchief about your brows."

And in *Othello* we have not only the remedy for headache given, but the cause. The former was the handkerchief about which the chief interest of the play centered.

> "*Desdemona*—Why do you speak so faintly?
> Are you not well?
> *Othello*—I have a pain upon my forehead here.
> *Desdemona*—Faith, that's with watching; 'twill away again.
> Let me but bind it hard, within this hour
> It will be well."

The substance of this communication is, that sick headache is not to be cured by gastro hepatic remedies. It is purely nervous affection, and due entirely, in my experience, to hereditary predisposition; and is excited by causes innumerable which act on a susceptible nervous system. There is, therefore, no cure, in the proper sense of the term, for this would imply a change in the patient's nature; and for the attacks themselves, when severe, the only relief which can be reckoned upon is to be found in a wet bandage round the head, profound quiet, and, if possible, sleep.

The Jelly Fish.

So large a portion of its bulk consists of water that one of no less than thirty-four pounds weight, being left to dry in the sun for some days, was found to have lost 99 per cent of its original weight. Writing of the not very attractive appearance of these huge jelly fish, Agassiz observes that "to form an idea of his true appearance, one must meet him as he swims along at midday, rather lazily withal, his huge semi-transparent disk, with its flexible lobed margin, glittering in the sun, and his tentacles floating to a distance of many yards behind him. Encountering one of these huge jelly fishes, when out in a rowing boat, we attempted to make a rough measurement of his dimensions upon the spot. He was lying quietly near the surface, and did not seem in the least disturbed by the proceeding, but allowed the oar, eight feet in length, to be laid across the disk, which proved to be seven feet in diameter. Backing the boat slowly along the line of the tentacles, which were floating at their utmost extension behind him, we measured these in the same manner, and found them to be rather more than fourteen times the length of the oar, thus covering a space of some hundred and twelve feet." This huge mass is produced by a hydroid measuring not more than half an inch in length when full grown.

Salt and Iron Hail.

Professor Kengott, of Zurich, Switzerland, states that a hail storm, lasting five minutes, occurred last year, the stones from which were found to possess a salty taste. Some of them weighed twelve grains. They were found to consist essentially of true salt, such as occurs in Northern Africa on the surface of the plains, mainly in hexahedric crystals or their fragments, of a white color, with partly sharp and partly rounded grains and edges. None of the crystals were entirely perfect, but appeared as if they had been roughly developed on some surface. They had probably been taken up and brought over the Mediterranean from some part of Africa, just as sand is occasionally transported thence to the European continent and the Canaries by means of hurricanes. A still more remarkable phenomenon has been recently recorded by Professor Everman, of Kasan—namely, the occurrence of hailstones, each containing a small crystal of sulphuret of iron. These crystals were probably weathered from some rocks in large quantity, and were then taken up from the surface of the ground by a storm, and, when carried into the hail-forming clouds, served as a nucleus for the formation of hailstones.

TO CLEAR a well of carbonic acid gas, it is suggested to lower a red hot iron to the water, so as to produce a little steam. The vapor instantly absorbs the gas. Should any of our readers try this plan, we hope they will report the result to the SCIENTIFIC AMERICAN.

A New Photographic Process.

An entirely novel method of photographic printing has just been discovered by M. Merget, Professor of Physics at the Faculté des Sciences of Lyons. The principal points discovered by M. Merget may be thus summarised:

1. The vaporization of mercury is a continuous phenomenon, that is to say, the metal emits vapor at all times, even at a very low temperature, and when in a solidified form.

2. Mercury vapor may be condensed upon certain substances, such as carbon, platinum, etc., without these latter being chemically affected.

3. Mercury vapor will pass with exceeding facility through porous bodies, such as wood, porcelain, etc.

4. The salts of all precious metals when in solution are very sensitive to the action of mercury vapor, which has the effect of rapidly reducing them.

The most sensitive to mercury of the precious metal salts are nitrate of silver and the soluble chlorides of gold, palladium, and iridium, and paper prepared with any of these forms at once a most delicate test for the volatile metal; but the solutions must contain some hygrometric body to prevent complete desiccation, so that the surface coated with them will always remain in a moist condition. To demonstrate how exceedingly sensitive this test paper is to mercury, we may state that a section of wood, exposed to mercury vapors and afterwards pressed in contact with a sheet of sensitive paper, prints off upon the surface all the rings and markings it possesses, the mercury being deposited in the pores of the wood in a more or less condensed form.

In the event of nitrate of silver being used for preparing the paper, it is necessary, obviously, to exclude the light, as otherwise a reducing action will be already set up by solar means alone; but with the salts of palladium or platinum no such action need be feared. According to the kind of metallic salt employed, so the tint of the impression varies; but in most cases an intense black may be obtained where the action has proceeded far enough.

Having described M. Merget's discoveries thus far, it is easy to guess how that gentleman employs them in the carrying out of a photographic process. An ordinary glass negative, possessing an image which has been formed by the deposition of silver particles, is prepared in a suitable manner to protect it from injury by contact with the mercury (such, for instance, as coating it in some way with platinum or carbon particles), and the picture is then exposed to the action of mercury vapor. The vapor condenses, in a more or less concentrated form, upon the image—in the same way, pretty well, as it becomes deposited upon, and develops the latent image in the daguerreotype process—and subsequently the plate thus treated is brought into contact with the sensitive paper. The consequence is that the minute particles of mercury deposited all over the image exercise a reducing action upon the salts on the surface of the paper, and a print of the original photograph results, possessing the same gradation of tint as the original. Indeed, when nitrate of silver is employed for sensitizing the paper, the photograph secured is in every respect similar to that produced by light in the ordinary silver printing process, and the picture is forthwith toned and fixed in the same way, in fact, as one of these; in the one case, however, the reduction of the silver salts has been brought about by mercury vapor, while in the other light alone has been the reducing agent. Impressions obtained by means of platinum and palladium salts need simply to be washed in water in order that they may be permanently fixed. These latter, in truth, are so indestructible and inalterable that they cannot be destroyed except by a chemical agent which would at the same time radically injure the paper or other basis upon which they rest.

This process of photography is not yet in such an advanced state as to be of any practical importance; but, nevertheless, it is certainly one of the most ingenious and interesting discoveries made of late in this branch of science. The great advantage it possesses is that of printing without the aid of light, and yet producing prints with detail and half tone dependent upon delicate chemical reaction—such rare gradation being secured as our present light printed pictures (silver and carbon prints) alone possess. A mechanical printing process could, of course, easily be worked out from these *data*, if considered desirable; and, indeed, it is by no means improbable that that this will be the most successful way of applying the discoveries in a practical form. But even in the event of no practical use at all being made of the process—for this is indeed questionable—the research, regarded from a purely scientific point of view, is deserving of the highest eulogium.—*H. Baden Pritchard, in Nature.*

Sea Water to Make Bread.

At the Paris Academy, says *Good Health*, the propriety of using sea water to make bread has been under discussion. M. Moison stated that, in the neighborhood of Cancale, yeast alone is made with fresh water, and that pure sea water is exclusively employed in kneading the paste; the bread thus made has not more than the necessary amount of saline matter. On the contrary, when sea water has been added to soup, instead of salt, a food has been obtained which should be rejected. The author asks if he must not see, in the comparison of these two results, proof of a particular transformation undergone in the salts of sea water during the process of baking. He also calls the attention of the Academy to the good hygienic effects which he attributes to the use of bread salted with sea water.

This discussion is interesting in reference to making bread on long voyages. Why should we not have hot rolls every morning? Moreover, it may be that the therapeutic effects of the constituents of sea water may be obtained in this way.

The Hartford Steam Boiler Inspection and Insurance Company.

The Hartford Steam Boiler Inspection and Insurance Company makes the following report of its inspections in the months of November and December, 1871:

During these two months 1,490 visits of inspection were made, and 2,965 boilers examined—2,656 externally, and 1096 internally—while 240 were tested by hydraulic pressure. The number of defects in all discovered were 1,566, of which 332 were regarded as dangerous. These defects were as follows:

Furnaces out of shape, 71—17 dangerous; fractures, 99—62 dangerous; burned plates, 95—43 dangerous; blistered plates, 204—28 dangerous; sediment and deposit, 282—22 dangerous; incrustation and scale, 235—22 dangerous; external corrosion, 90—24 dangerous; internal corrosion, 45—7 dangerous; internal grooving, 38—5 dangerous; water gages defective, 93—10 dangerous; blow out defective, 26—9 dangerous; safety valves overloaded and out of order, 49—14 dangerous; pressure gages defective, 230—14 dangerous; boilers without gages, 8; cases of deficiency of water, 15—2 dangerous; cases of broken braces and stays, 52—29 dangerous; boilers condemned as unsafe to use, 34. Among the defects enumerated, fractures are quite numerous, and we call attention to it from the fact that several cases have been found where the difficulty originated in poor workmanship in the construction of the boiler; for instance, a case was found where a seam was cracked in line of the rivets for three feet, and on close examination it was ascertained that the defect had its origin with the "drifting tool." Several similar cases have been met with, and although presenting fractures of less extent, are, perhaps, none the less dangerous from the fact that a weak point in the boiler is provided, which, upon severe strain being brought, is liable to be increased suddenly with serious results. Plates often become burned and weakened in places impossible to discover, except the boiler is cold and subjected to both internal and external examination. A case of this kind has recently come under our notice. The brick work setting of the boiler had become broken down on the side against the brick wall of the building. The fire had gone up beyond the water line, and badly burned and weakened the sheets exposed. The boiler was set with the front in the chimney, and the defect was so far forward that the fire escaped through the break into the chimney. No idea or apprehension of danger was suspected, until a cold examination revealed the defect and prevented disaster. We find more or less ignorance prevailing relative to the importance of a good safety valve. And in the fitting up of a boiler, or nest of boilers, the ignorance of the boiler maker and fitter is often glaringly apparent. There seems to be no calculation made relative to the fitness of appliances for the work required of them. Of course this is not true of those who, by long experience and careful observation, have ascertained just what the wants of a boiler are, but more particularly of irresponsible concerns that have no conception of the immense strain brought to bear on boilers at work, nor of the importance of having all the appliances adapted to the size of boiler, pressure of steam carried, and amount of work required.

In a large mill using six boilers there was but one safety valve, and the escape pipe from this valve was only 2 inches in diameter. We do not think the firm making and fitting these boilers up in this way evinced a proper understanding of the principles of boiler fitting. The boilers condemned were not all beyond repair, though many were entirely worn out. Those capable of being renovated have been put in good condition, and will doubtless last for some time yet. There were 24 boiler explosions during the months of November and December, doing serious damage and killing 19 and wounding 38.

The Oyster Trade.

The oyster trade of New York is one using large amounts of capital, employing nearly one hundred and fifty sailing vessels, with crews averaging in the aggregate seven hundred seamen, and handling millions of bushels of oysters per annum. There are now moored at the wharves in New York city nearly sixty barges, or "lay boats" as they are called, costing from $3,000 to $5,000 each, substantially built, having compartments capable of containing thousands of bushels of oysters in the shell, and which pay to the city nearly $27,000 a year as wharfage.

The oyster season commences, says the New York *Journal of Commerce*, about the first of October, when the boats owned by the dealers are sent to the beds for cargoes, and lasts until the middle of March or first of April. The oyster fleet is composed principally of schooners, ranging from 35 tuns to 250 tuns, and receives the proceeds of the dredgings of the beds at York River, Prince's Bay, Keyport, City Island, Cow Bay, Rockaway, Oyster Bay, Glen Cove, Blue Point, Norwalk, Stamford, and Greenwich. When the oysters are received here they are discharged directly on the wharf to dealers; and after the dealers are supplied, the balance is stored in the compartments of the lay boats. From the lay boats the oysters are shipped to other cities at the North and West. For shipment, they are packed in barrels in the shell, or opened and packed in tubs with ice, and forwarded by rail to Boston, Providence, Portland, Chicago, Omaha, San Francisco and other cities. Very few oysters are canned in New York. That trade seems to be substantially monopolized by Baltimore. Besides the oyster shipping interests in this city is the important retail trade. The well fitted and at times luxurious offices on the lay boats are the meeting rooms of the proprietors of the hotels, restaurants, retail oyster saloons, and cheap oyster stands. At certain hours in the day, representatives of each of these branches of the trade may meet in the office, and the rapidity with which a cargo of oysters—extras, box, cullens—is disposed of astonishes a novice. One man wants only the largest oysters in the lot. Another wants to know if the dealer hasn't got a lot of small oysters for cheap stews. Another wants tiptop box oysters, and another asks when the next cargo of York rivers or Rockaways is expected.

Most of the dealers own the beds from which they receive the oysters, but are compelled to have partners to superintend the catching and loading, because most of the beds, in fact all except those bordering on Long Island, are out of the State. The laws of the other States—Connecticut, New Jersey, Delaware, and Virginia—do not permit non-residents to own beds or catch oysters within their domains. So the New York dealers—at least some of them—form copartnerships with residents near the fishing grounds, supply them with money, let them buy beds and plant the oysters, take them in as part owners of the vessel in the carrying trade, and then divide the profits with them.

The New York trade is controlled in a great measure by the weather. If the nights are clear and cold, the sidewalks dry, and the stars out, the consumers throng the retail saloons, and the result is an assemblage of all sorts of vehicles in the morning at the lay boat stations for new supplies. If the country roads are in prime order, and the fast horses of the well-to-do farmers or bloods can make good time to the village, carrying the girls on supper excursions, the demand for new supplies by rail is increased. But when the barometer falls to 29 inches, the stars go out of sight, the roads are muddy, and the sidewalks damp, the demand falls off. Singularly, however, the prices do not fluctuate. The retail prices never change. The wholesale change to so trifling an extent that the consumer never receives the benefit; if any one profits by a fall, it is the retailer.

The oyster trade is one requiring peculiar and delicate perception. What consumer, as he gazes on the silent, quiet, brown shell of what he expects will soon form a portion of his corporal household, could even guess the nativity of the unfortunate bivalve? Yet the expert who catches it in his left hand, taps it over the eye with the butt end of the knife to make it insensible, and shatters its stony lips to take its life, knows as soon as he takes it from the pile where it came from, how old it is, whether it is a Delaware, Prince's Bay, City Islander, or has grown under the dashing waves of Rockaway. He knows, too, whether it will open good. The wholesale dealers at this port have over three millions of dollars invested in the oyster trade, and receive on an estimated average two million five hundred thousand bushels of oysters per annum. Every vessel arriving at this port with a cargo of oysters pays its regular wharfage, discharges either on the wharf or into the lay boat, which also pays wharfage, and then returns for another load. During the warm season, the oysters are sent by rail in refrigerator cars, a recent railway improvement.

The oyster trade has its dangers as well as other lines of business. Only three years ago hundreds of dealers, especially the smaller ones, owning beds were ruined by the devastation of their crops by the oysterman's dread, the drum fish. Enormous schools of this singular inhabitant of the deep visited the oyster beds at Keyport, Prince's Bay and the shores of Long Island, where they devoured hundreds of thousands of bushels of oysters in three days. The drum fish (*pogonias chromis*) is remarkable for making a peculiar drumming or grunting sound under the water. It gathers the oysters from the beds, and grinds the shells to fine fragments in its jaws, sucking out the body and leaving nought but ruin in its path. New York, with its large and ever increasing population, demands a supply of oysters and needs them furnished at the lowest possible cost.

Any obstacle thrown in the way of this trade will probably fall in increase of the price on poor consumers. It is a general opinion among the dealers that the action contemplated by the Commissioner of Docks is just such an obstacle. The Department of Docks proposes to clear the slips now occupied by the lay boats of this trade, and devote the space so acquired to other purposes. The result of this, it is contended, will be to drive the business to New Jersey and Long Island. The dealers express no desire to remain here. They say that the wharfage at Jersey city is cheaper, the water deeper, and the railway facilities for transporting their freight will soon be as good as on this side. The slips now occupied here could not, they say, be made to pay from any other class of boats an amount of wharfage equal to the $27,000 paid by the oystermen; and the cost of the oysters in this city would probably be increased by removing the business across the rivers.

PHOSPHORESCENCE PRODUCED BY FRICTIONAL ELECTRICITY.—M. Alvergniat states that if a little bromide or chloride of silicium is introduced into a glass tube, and the tube is then exhausted and sealed, friction with a piece of silk, or even with the fingers, produces a beautiful phosphorescence, which is rose colored if the chloride is contained in the tube, and a yellowish green with the bromide. The induction spark produces no light within these tubes unless the vacuum is very perfect, but in that case the phosphorescence disappears.

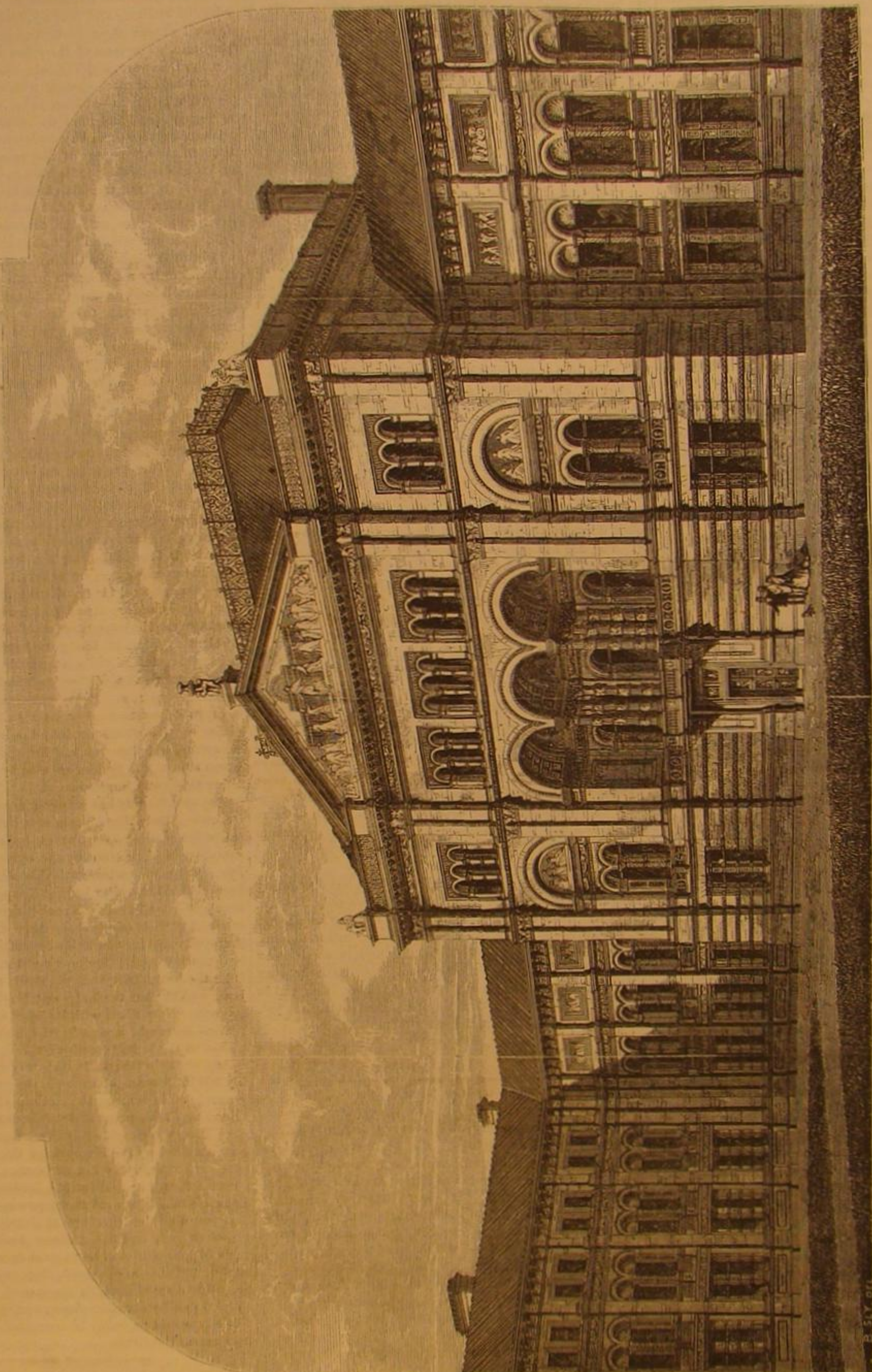
ADULTERATION OF BONE DUST.—Ground bones are now, it appears, occasionally adulterated with the turnings and raspings of vegetable ivory, otherwise known as the ivory nut (*phytelephas macrocarpa*). This fraud may be detected by heating the bone dust to redness. Spurious samples will leave a much smaller amount of ash or fixed mineral matter than the genuine kind, and will be found especially deficient in phosphate of lime.

LECTURE THEATER BUILDINGS AT SOUTH KENSINGTON.

Our illustration this week represents the façade of the new Lecture Theater and Refreshment Rooms, which form the north side of the internal quadrangle of the Museum at South Kensington, London, England. The materials employed are mainly red brick with dressings, and enrichments of terra cotta. This is a government institution, maintained for the encouragement of science and art. The first establishment of this department was about twenty years since, the encouragement of art having been chiefly furthered, previous to that time, by the Royal Academy, National Gallery, and the Schools of Design. It began as a school of art, the increase of pupils and the growth of the collection necessitating the erection of the present building.

The chief feature of the design is a deeply recessed arcade on the principal floor, the arches being supported on columns of terra cotta, modeled by the late Godfrey Sykes. The soffits of the arches are filled with white majolica. Figures holding shields of the same material are also introduced in the spandrels on either side of the circular panels in the arched recesses, and in the square panels above the door. The three circular panels just alluded to, are filled with glass mosaics, by Messrs. Salviati, Rust & Simpson. The figures, which represent History, Poetry, and Alchemy, are executed in colored tesseræ upon a gold background.

The door, which forms the central feature of the lower story, is in six panels, with figures of Newton, Davy, Bramante, Michel Angelo, Watt, and Titian. It may be remembered that this bronze door attracted a great deal of notice in the Paris Exhibition. It has since been richly gilt. The brick work of the ground floor is banded with four courses of molded bricks, the intermediate portions being rubbed and gaged. The arch heads of the large openings to the right and left of the central building are filled with lunettes in mosaic work. These mosaics were executed in the South Kensington Museum by the female students, the materials being supplied by Messrs. Minton, Hollins & Co. The rectangular panels in the upper portions of the wings, and the large picture which occupies the tympanum of the pediment, were carried out in the same way. The upper story of the theater building consists of a series of triple arches placed in square headed recesses, the spandrels above the arches being filled with a diaper of red terra cotta. The subject of the design in the pediment is the Exhibition of 1851. Four allegorical figures, representing the four quarters of the globe, receive from Queen Victoria wreaths and rewards, while natives of the different countries bring their manufactures and produce to the Exhibition. In the background is the building. The figures are executed in buff tissue, the Exhibition being black, and the groundwork of the whole, gold. On the pedestals at the corners of the building will be colossal groups in terra cotta, designed by Mr. Bale, a student of the Lambeth School of Art. One of these figures is already on the ground. The summit of the roof is surrounded by a perforated screen of cast iron.



SOUTH KENSINGTON MUSEUM, LONDON ENGLAND.

Meat Extracts and Beef Tea.

Dr. P. Müller has given, in the *Moniteur Scientifique*, an account of his researches on this subject, and his conclusions are as follows: Meat extracts are neither directly nor indirectly food, for they do not contain albuminoid matter, neither do the nitrogenous principles which they contain arrest dis-assimilation; that is, they do not prevent the waste of the organic matter which composes the body. In small doses, these extracts are useful, by the stimulant action of the potassa salts, which promote digestion and circulation; in strong doses—too large at once—these substances may have a very injurious effect. When given to convalescents from serious diseases, especially if the system is exhausted by prolonged abstinence, the potassa salts, present in these extracts in large quantities, will act more injuriously, because the system has lost a great deal of chloride of sodium; instead, then, of promoting digestion, these substances will interfere with it; (1) by the direct action of the salts of potash on the blood globules, whereby the absorption of the oxygen by these globules is greatly decreased; (2) by the predominance of such salts, in the serum of the blood, which only physically dissolve carbonic acid and do not allow the normal quantity of that gas to be exhaled, and thus impede the access of oxygen. Medical men should bear in mind that, if given alone, these extracts, and likewise beef tea, are no nutriment, and only tend to keep the convalescent weak, being thus ill-fed, or rather, not fed at all. These conclusions are substantially those entertained by Liebig and many other investigators in the same field.

Robinson's Self-acting Mules for Spinning.

This invention consists of an enlargement on the scroll or wheel of the back jack band of the Sharp and Roberts and other like spinning mules, so arranged that just previous to the end of the inward or winding-on movement of the carriage, the back jack band—which is the one that regulates the movement of the carriage when it is drawn out by the front jack band—will be wound upon the enlargement so as to considerably increase the tension of the front jack or drawing out band, for giving the carriage a quicker movement—as the back jack band is delivered from the enlargement at the beginning and during a small portion of the outward movement—than the ordinary movement, and faster than threads are delivered from the rollers, for taking out the kinks which get in the yarns when slackened up by the rising of the fallers to let said yarns run up to the points of the spindles, ready for twisting, as the carriage runs out again.

The improvement differs from the arrangement of the enlargement on the scroll which works the front jack band or drawing out band, in that, while it pulls out the kinks, it does not put drag in the yarn; that is, it does not draw out the yarns or threads any finer than they are drawn without it, as the other arrangement does, for the slacking off of the drawing out band compensates for the accelerated motion of the carriage in the first part of its movement, so that, notwithstanding such accelerated movement, the carriage does not move any further during the whole stretch than it would if the enlargement was not used; whereas, in the other arrangement—that is, where the enlargement is on the drawing out scroll and the accelerated motion is caused by the running of the cord on to the enlargement at the beginning of the outward movement—the gain of the carriage on the delivery of the rollers is kept up throughout the stretch, and thus more stretch or drag is put in the yarn than is desirable.

Mr. Feargus O'Connor Robinson, of Fall River Mass., is the inventor of this improvement.

A Monster Engine.—One of the largest stationary engines in the world was recently put into operation a few days ago at the Lehigh Zinc Works, at Friedensville, Lehigh county, Pa. It is of three thousand horse power; it weighs 650 tons, and is capable of pumping, if necessary, from 15,000 to 17,000 gallons of water per minute, and this from a depth of 300 feet. The heaviest pieces are sections of beams weighing 24 tuns each. The cylinder is 110½ inches in diameter, and the stroke 10 feet long. Two wrought iron shafts weigh 16 tuns each, and the crank pins one tun each. The piston rod is 14 inches in diameter. The crosshead weighs eight tuns. The connecting rods weigh 11 tuns each, their length is 41 feet 2½ inches, and their diameter 9 inches in the neck, and fifteen inches in the middle.

The boiling point of bisulphide of carbon is 118½° Fahr.

COLORING SEEDS FOR SOWING.

Horticulturists and farmers are fully acquainted with the importance of securing the equal distribution of seeds, whether sown in drills or broadcast. If the seed be unequally distributed, the result is too small a crop upon the parts of the land that have less than their share, while the portions that are overcrowded with plants will also yield too little, unless the defect is remedied by thinning out, which process is always more or less detrimental to the growth of the plants that are left.

In sowing seeds that, on account of their size and color, are undistinguishable from the soil, there is, in the ordinary way, no guide for the operator, who cannot see whether his work is done uniformly or not. But an inventor down South has just taken a patent through the Scientific American Patent Agency, for so coloring the seed as to enable the sower to see where it falls, thus supplying this needed guide.

The seeds are prepared for sowing by first moistening them, and then rolling them in flour or other suitable material until they are coated. This does not injure them, as the coating absorbs the water, and speedily dries in the sun, if the seeds are not immediately required for sowing.

When the seed is deposited, the coating, by the absorption and retention of moisture, hastens and renders more certain the germination.

The seeds being thus rendered visible, as shown in the accompanying engraving, the sower, whether scattering them by hand or planting them by a machine, may correct such faults in the work as are made apparent. The coating will also act as a fertilizer, the value of which will depend upon its character.

Patented January 16, 1872, through the Scientific American Patent Agency, by J. C. H. Claussen, of Charleston, S. C., whom address for rights or other information.

COLORING SEED FOR SOWING.

Gather Woods Dirt.

When going to work in the fields near the wood lot, take along a shovel and carry home at noon and at night a load of forest loam, or else set apart a day and devote it entirely to the purpose of collecting. Woods dirt is one of the best mulches that can be used; it is one of the absorbments for the stable, and as a loam and fertilizer for soil it cannot be excelled. It is good upon all kinds of soil, and as cheap as the air.

Leaves and loam form an excellent material for house banking and for covering vegetables buried in the fields or garden. Nature has designed the fallen leaves as a shield to the tree roots against the frost; a thin coating being almost impervious to that element, they are, therefore, exactly fitted for the use above mentioned. No better manure can be used upon the garden, as it will make the soil light and airy, and at the same time give it the primitive qualities of fertility.—*Ohio Farmer.*

Painting.

A correspondent in the *Journal of the Farm* gives the following hints on painting buildings: The advantage of a good coat of paint on the woodwork of buildings and wooden implements is too obvious to need any special notice. The only thing necessary to speak of is, which is the best method of performing the work to give the greatest durability? Buildings are painted for a double purpose; in the first place for ornament, and in the second place to afford greater durability to the wood. Painting is an object of great importance to the farmer, for without it houses and implements will not last more than half as long as when kept well painted. The ornamental part of painting depends on the coloring material employed and the skill shown in the proper adaptation of mixing the ingredients. But the utility of the work depends altogether on the oil. The closing of the pores or the saturating of the surface of the wood to exclude air and moisture is the great object to be obtained.

Oil without the admixture of paint thoroughly worked into the wood will be the best protection against atmospheric influence, but the first cost will be much greater than when mixed with paint. Painters direct too much attention to the rapidity of execution, which is incompatible with filling the wood with oil without extra ingredients for drying, such as benzine, turpentine, japan, varnish, litharge, etc., which have a tendency to decompose the oil with which the paint is mixed, and which is the only principle of durable adhesion in paint. The small amount of oil which is left in the paint is formed into a gloss which is only superficial and is soon worn off by rain.

To be convinced that turpentine injures the durability of paint, we need only observe the effect it produces on oil spots on floors, clothing, etc. But for inside work not exposed to weather, a due portion of turpentine with oil is much better for mixing paint than oil alone, which turns the paint yellow in the absence of air and light. All the preparation that oil needs to make good paint is boiling to free it from impurities, and for outside work, barns, fences etc., nothing but the purest oil should be used, as it is always the cheapest in the end; for in painting, everything depends much on having the work well done. All the articles should be good, and the operation skilfully performed. In conclusion, let farmers not in any wise neglect to paint their buildings, yard, fences, etc. Moderately cold weather is the best time lay on the paint, and great haste in the application is inadmissible. The oil must have time allowed for absorption, so that the paint and oil will become glazed and indurated before the second coat is applied. Some painters talk of giving two coats of paint in a day. It may be done, but depend upon it, durability is far paramount to dispatch, and the farmer who does his painting in a hurry and in hot, dry weather, commits a great mistake; for the preparation dries with such rapidity by the heat in the boards that the oil is absorbed and the pores of the wood are only closed on the surface by the paint. Clear cold weather, pure linseed oil without any turpentine or other drying materials, and long intervals between the applications of the several coats of paint, are the best plan that can be adopted.

PATENT CROCHETED CAPS, FOR INFANTS.

Mrs. L. E. Love, of New York city, obtained, through the Scientific American Patent Agency, Nov. 28, 1871, a patent upon crocheted silk caps for infants as a new article of manufacture. Our engravings represent the appearance of these articles, which may be made in various other styles and patterns, the material employed, and the method of manufacturing it admitting of variety, with extreme delicacy and beauty of finish.

The caps are admirably adapted to the use for which they are intended, and are much cheaper than those of real lace and quite as beautiful; while the softness of the texture renders them far preferable. They will neither chafe the delicate skin of infants nor be injured in folding. Lace is a harsh material and is apt to abrade the skin and produce irritation about the neck. These caps, may be made very warm and comfortable for winter cover, or light and airy for summer.

The article is doubtless destined to take its place in the regular trade in this line of goods, and will, we think, upon inspection, verify all we have stated in regard to it. Patents have also been secured, through this office, in England and France. For further information address Samuel Love, agent, 313 Sixth avenue, New York.

Evans' Improvement in Overshoes.

This invention consists of a cloth top and india rubber bottom overshoe, having a yoke of elastic india rubber lined cloth inserted in place of a portion of the instep at the upper part removed, for stretching to allow the shoe to be put on, and contracting again to keep it snug and tight, the object being to dispense with the elastic gores heretofore used, which are objectionable, as it is only a small portion of the upper part of the shoe top that is required to stretch to put on the shoe, while the gores extend to the bottom and take much more of the elastic cloth than is needed; and they are not so easy on the foot, for the latter is subject to the contracting power of two pieces of the elastic cloth; whereas in this invention but one is used, and the same length of cloth is stretched as when the gores are used, for the yokes may be extended as far along the top as necessary.

The yoke of elastic cloth is made wide—say an inch or thereabout, at the center of the instep, as may be necessary to allow of putting it on sufficiently easy, but varying according to the hight of the shoe; and it extends along the top at each side toward the heel one third of the way, more or less, gradually tapering up to the top of the shoe, where it is secured in any way preferred. This yoke is preferable to the gores, in that it is exactly in that part of the shoe that is required to stretch when putting it on or taking it off, or by the action of the feet in walking. The shoe is therefore more symmetrical and natural than when the gores are used, and the stretching is at the sides.

The improvement is the invention of Mr. John Evans, of New Brunswick, N. J.

Transparencies for the Lantern.

Mr. E. Anderson gives the following as the most simple plan of preparing photographic views, etc., for exhibition on the screen. The negatives should be very intense, and, of course, reduced to a size proportionate to the lantern. Let the glass be very flat and free from scratches and bubbles; for these, when magnified, produce an unsightly appearance on the screen. Varnish them with a very thin, transparent varnish. Next take ordinary portrait collodion, and add to it one third of its volume of a mixture of equal parts of alcohol and ether, shake well, and filter. Coat very thin, spotless glass with this, and sensitize in the usual way. When smoothly coated, wash thoroughly under the tap, and flow twice with common ale well filtered. When perfectly dry, put in contact with the negative in a printing frame. Expose one minute or more to strong gas light, or from five to twenty seconds to diffused light. Next flow on and off the plate an ounce of the following solution:—Pyrogallic acid 12 grains, citric acid, 8 grains, water 6 ounces. When the plate is uniformly covered, add a few drops of a forty-grain solution of nitrate of silver in water. When sufficiently developed, wash, fix, wash again, and set aside to dry. Pictures thus produced may be painted with the ordinary transparent oil colors.

Phosphorus Bronze.

Some recent experiments, made for a committee of the French Academy, upon the properties and merits of the application of the new alloys containing phosphorus, have resulted very favorably. One of these experiments was the bursting trial of a six pounder cannon of phosphorous bronze cast at the royal foundry at Liége; the result showing that under the charges the regulation piece had burst, while the new gun could still be fired with perfect safety. The bronze employed was made by adding phosphorous copper to metal coming from old guns. From the great hardness, toughness, and stability of the new compounds, as evinced by these as well as other trials, it is safe to conclude that their future applications will be very numerous. As an example of the application of the bronze in machinery, it is stated that a pair of pinions of universal rollers had been used for ten months, and were finally destroyed by the wearing away of the teeth, none of them having been broken or split. It has also been successfully applied for the collars of hydraulic presses, eccentric rings for locomotives, pistons and bolts for steam cylinders, etc.

IRON AND WIRE RAILING.—J. B. Wickersham, formerly of this city, but more recently of Philadelphia, has again established himself in the manufacture of iron and wire railing, at 1,003 Ridge avenue, in the latter city. He was among the first to make light ornamental iron and wire railing in this country, and for many years carried on the business prosperously in this city. The railings around the reservoirs in our Central Park, and at Prospect Hill and Ridgewood water works, were made under Mr. Wickersham's patent. We wish him prosperity in his old field of labor.

THERE have been 72 patents granted for post hole augers, the first dating back to 1825, and the last, October, 1871.

Correspondence.

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

Diamonds.

To the Editor of the Scientific American:

The late immense discoveries in Africa of large precious gems are startling and wonderful, creating no small amount of interest in the craving minds of many; and although I have from time to time seen, in your ever interesting and instructive paper as well as in some other publications, brief accounts of or merely allusions to size, value and number of precious stones, I have not as yet ever seen any reference as to the manner or mode of knowing at sight how to discriminate between a common pebble and a gem in the rough state. No doubt, if the information now respectfully sought after can be given, it will be of very great interest to thousands who weekly enjoy the perusal of your science-imparting paper.

1. What (if any) are the particular geological locality and peculiarities indicating the presence of the diamond?

2. Are there any superficial indications of soil, etc., and does the diamond generally accompany precious metals or their ores?

3. Is the diamond found only in isolated localities, and more frequently in tropical regions?

4. Do precious stones, the diamond in particular, always conform, in their natural rough state, to any special shape or configuration; or are they of irregular shape like ordinary river pebbles, with granular incrustations or sandy coatings?

5. Are the skill and experience, of a lapidary only, capable of knowing and determining at sight what a diamond or other precious gem is?

6. Are diamonds so hard as not to admit of any ordinary abrasion or scratch of a steel file, or will any ordinary percussion or blow produce fracture? I have heard many persons assert that the blow of an ordinary hammer would make no impression on or deface the diamond.

7. Are precious stones in the rough shaped and dressed in the United States, or are the finished gems produced only in foreign countries?

8. Do diamonds in primitive form have impurities or fractures?

9. Does a genuine diamond emit rays in darkness, and are the facets of the finished gem due to the taste and skill of the lapidary, or are the facets peculiarities of the gem requiring special cutting?

10. What is the real estimated value per carat of a diamond of the first water, and does the size increase the value per carat?

I have never seen in print, nor have I ever been able to find any full and satisfactory explanation to the foregoing questions, although Dana's works, Feuchtwanger and others have been consulted carefully.

Sunnyside, D. C. QUERIST.

Answers: 1. Diamonds have been found in alluvial deposits, in brown hematite, and in conglomerates; but in almost all instances the rocks have been of the metamorphic group, containing gold. 2. There are no surface indications; in Brazil, diamonds are found in conjunction with itacolumite or flexible stone (already described in these columns), while in Golconda, the most famous mines in the world, the stones are in boggy earth, so soft that the workers pound it with their feet to find the diamonds. 3. India, Borneo, and Brazil have till lately furnished most of the diamonds now in use, but some have been found in Georgia and North Carolina. 4. Diamonds have been found of all possible shapes, but their surfaces are always characterized by peculiar crystallization, and, 5, it is by this that they are distinguished from pebbles or pieces of quartz, by diggers. 6. No steel file will cut a diamond, but fragments have been reduced to powder in a steel mortar. 7. Diamond cutting is carried on chiefly by the Jews of Amsterdam, although it is done to a considerable extent in London, Paris and Vienna. 8. The faults of diamonds are fractures and impure color, the latter taking all shades of blue, red, yellow, and brown. The celebrated blue diamond of the late Mr. Hope attracted much attention in the Exhibition in London, 1851. Black diamonds are common in Brazil; they are nearly pure carbon, and are now extensively used in the construction of rock drills. 9. It has been stated that diamonds, after exposure to the rays, especially the blue rays of the spectrum, of the sun continue to emit light after removal into a dark room; but this report needs confirmation. The heat of fire or of the sun increases the refractive power of the stone. The manner of cutting is determined by the shape and proportions of the stone, the usual forms being the brilliant, the rose, and the table. It is in judging on this point that the skill and knowledge of the lapidary is chiefly exhibited. 10. The value varies from $15 to $75 multiplied into the square of the number of carats in the stone. Thus a diamond of 10 carats, of the highest purity, would be worth 10 × 10 × 75 = $7,500. A 61 carat stone sold in 1858 for $165,000.—ED.

Test of Water Wheels at Lowell.

To the Editor of the Scientific American:

Some time since, seeing a notice of Mr. Burnham's in your paper, giving results of a test of one of his wheels, stating how much benefit the public generally is deriving from the tests of water wheels at Lowell, Mass., and giving the wheels so tested their true record and position: it occurred to us that fuller details of a test might interest your readers, for we also are of the opinion that more light is needed upon turbine wheels.

On January 10th, 1872, one of our wheels, an ordinary cast iron wheel and case, was tested with the friction brake employed in these tests. This brake is made in sections, very ingeniously arranged, to allow a current of water to circulate all around the bearing surfaces, thus keeping them cool, and not interfering with their lubrication.

The circumference of the circle, which would be described by the revolution of the point where the load was attached to the brake, was 15 feet. The wheel made 433 revolutions in five minutes, or 86·6 revolutions in one minute with 220 pounds load;

$$\frac{86{\cdot}6 \times 15 \times 220}{33000} = 8{\cdot}66$$

actual horse power developed by the wheel. To obtain as great accuracy as possible in this test, it was thought best to correct the observed depth on the weir for the velocity of the water approaching the weir. This is not always done, even though the water may approach the weir with greater velocity than it did in this test. Mr. J. B. Francis, the author of this mode of correction, says that it is only necessary where great accuracy is required. In this test, this correction reduced the percentage of the wheel seven tenths of one per cent from what it would have been had such correction not been made.

Mr. Francis' formula for the flow of water over weirs is the one used in this test, as well as in all the Lowell tests. This formula and the one for correction, for velocity of water approaching the weir, were both verified by Mr. Francis in his experiments at the lower locks in Lowell, Mass., in 1852, and both must be equally correct.

The depth on the weir by observation was 1·02 feet; velocity of water approaching the weir, ·64769 feet per second; head due to this velocity, ·00652175 feet; then by Mr. Francis' formula, we have

$$[(1{\cdot}02 + {\cdot}00652175)^{\frac{3}{2}} - {\cdot}00652175^{\frac{3}{2}}]^{\frac{2}{3}} = 1{\cdot}02619$$

the depth on weir by correction.

The length on weir was 4·5 feet; the number of end contractions, two.

$$4{\cdot}5 - {\cdot}2 \times 1{\cdot}02619 = 4{\cdot}2948$$

length of weir corrected for end contractions; then

$$3{\cdot}33 \times 4{\cdot}2948 \times 1{\cdot}02619^{\frac{3}{2}} = 14{\cdot}86708$$

cubic feet of water per second.

The head of water was 6·11 feet, each cubic foot of water at temperature of 33° F., weighing 62·377 lbs.; then

$$\frac{14{\cdot}86708 \times 62{\cdot}377 \times 6{\cdot}11}{550} = 10{\cdot}3021688$$

theoretical horse power of water flowing through wheel.

Actual power of wheel

$$\frac{8{\cdot}66}{10{\cdot}30213} = {\cdot}8406$$

actual percentage or ratio of useful effect to power expended.

We submit herewith a tabular statement of percentages of useful effect, the results of all the tests yet made with different wheels at Lowell by this brake:

No. of Wheel.	Full Gate 1	Full Gate 2	Full Gate 3	Full Gate 4	Full Gate 5	Full Gate 6	Full Gate Average	Three Fourths 1	Three Fourths 2	Three Fourths 3	Three Fourths 4	Three Fourths 5	Three Fourths 6	Three Fourths Average
Risdon	·7714	·7880	·8406				·8000	·6650	·6920					·6789
Houston	·7990	·7996	·7890	·8090	·7740		·7989	·5500		·6090				·5790
Swain	·8130	·8370	·8190	·7556	·7706	·7617		·7400		·7800		·7230	·5920	
	·729						·7865	·6900						·7010
Burnham	·7709	·7920					·7814	·6463	·5170					·5966
Stetson	·7816	·7570	·7740				·7719	·7200	·6960	·7179				·7118
Leffel	·7970	·7430					·7700	·7500	·6640					·7070
Bodine	·7590						·7590	·5800						·5800
Bryson	·7514						·7514	·5800						·5800
Luther	·7324						·7324	·4000						·4000
Barber	·6632	·7990					·7311	·5974						·5924
Libby	·7502	·6480	·7710				·7240	·4142						·4142
Wheeler	·7450	·7446	·6761				·7220	·6800	·7062	·5889				·6264
Cook	·7311	·7240					·7175	·6792	·7410					·7101
Thompson	·7050						·7050	·6800						·6800
Trullinger	·7037						·7037	·5000						·5000
Cox	·6920						·6920	·6410						·6410
Stillwell & Bierce	·6860						·6860	·5348						·5348
Davis	·6856						·6856							
Bastion	·6675	·6990					·6832	·4830	·5460					·4140
Tyler	·5694	·7383	·6740	·6710			·6621		·5908					·5908
Busby	·6613						·6613	·5951						·5951
Whitney	·6713	·6050	·6080				·6280	·5900	·5940					·5920
Wynkoop	·6260						·6260							
Kindleberger	·6246						·6246	·5900						·5900
Teller	·6470	·5429					·5940	·4885	·3650					·4267
Upham	·5208	·5382	·5745	·6409	·6409		·5830	·2900	·4500	·5000				·4130

Mount Holly, N. J. T. H. RISDON & Co.

Something about Opals.

To the Editor of the Scientific American:

The opal, a well known mineral and precious stone, is a silicate containing water, much softer than quartz. It can be easily dissolved in a hot solution of potash, while quartz is not so dissolved. As many are aware, such stones often, after a time, become dull, losing the water contained in them, and in this state are valueless. A friend of mine, a few months ago, purchased several such worthless stones from a jeweler in this city, for a mere nothing, with a view of restoring them. He placed them in a damp cellar, and in a month or two they were perfectly restored, and are as brilliant and beautiful as when the jeweler bought them.

Let any who have such stones try this experiment, and they will find their opals restored. G. J. R.

Hoboken, N. J.

A FINE tube is half filled with bromine and hermetically sealed; on heating, the bromine becomes opaque, so that the tube appears to be filled with a dark red resin.

Our Rotten and Inefficient Navy--A Cheap and Tried Plan for Vessels of War.

To the Editor of the Scientific American:

As the fostering of erroneous opinions, or other causes, has not only cost the government untold millions of money in the construction of seagoing vessels of war, but has left us without an efficient navy with which to protect our commerce or assert our rights among nations on the high seas; and as the public journals from Maine to Georgia are now complaining most bitterly of the past administration of our navy department, it may be of utility to the country at large, and the scientific and practical mechanic in particular, to offer a few remarks upon plate armor for ships, and the practicability of diffusing the impact of percussive force; in other words, upon a means of resisting or deflecting shots and shells of all sizes and shapes, and at the same time constructing ships so that they may possess the essential elements of buoyancy and dispatch, as well as cheapness.

Without referring to familiar instances, it is well known that excessively hard or soft fibrous substances, when impacted and of sufficient thickness, will successfully resist the penetration of projectiles. Iron is one of the former substances, and cotton, oakum, wool, and silk are among the latter, the former operating by opposing direct resistance, and the latter gradually checking the force of the projectile and enlarging the base of resistance. Therefore it would seem, theoretically, that a combination of both these powers of resistance would at the same time unite impenetrability and lightness.

Plates of vulcanized india rubber, as at present manufactured in the United States, possess all the conditions required to enter into this combination, and accordingly the results of experiments with this substance when laid under the iron plates of gunboats in the West, during the late war, has fully demonstrated the theory to be correct. But a series, of plates of iron and elastic cushions alternately arranged, appears from the results of experiments more effectual than a single layer of each composed in the aggregate of the same thickness of materials: as the force of the blow is thereby diffused from the point of impact over a larger surface of the inner plates (in the proportion of 80 to 200 per cent at direct firing, and as the angle becomes obtuse the per centage has been known to quadruple), and, therefore, opposes a greater proportionate resistance to penetration.

These results correspond with the theory before advanced, and were anticipated from the well known action of india rubber when combined with fibrous substances. The iron plates resist the sudden percussive force of the ball, and the india rubber plates oppose a gradual but powerful resistance from a greater extent of surface. Many useless and erroneous objections have been made to the use of india rubber for this purpose, without reflecting that when we wish to cut or punch a bar or plate of iron, we naturally lay it upon and in close contact with the most unyielding and solid support that we can devise, in order to obtain the greatest effect from the percussive force applied to the chisel or punch. Surely, we may reasonably infer, from this familiar example, that iron plates should be never laid upon a solid support if we wish them to resist the penetration of a cannon ball.

It is true that, in punching a hole through an iron plate, we place it immediately over a cavity or hole, which is to receive the plug of iron which is cut out and driven through the plate; but we must bear in mind that in order to do this, the support must be unyielding and the edges of the hole in the die made hard and sharp, so as to have the effect of powerful shears, when the die, in combination with the sharp square edges of the punch, cuts out the plug which the punch follows through the hole. Sheet iron workers also frequently use blocks of wood, endwise, and lead upon which to punch holes through their iron; but we all know that these two substances are comparatively inelastic, and that for this purpose the most unyielding support is the most effective for this or similar purposes.

Of the action of india rubber itself, which is not so effective as when combined with the fibrous substances, the feat of a juggler, when catching a heavy cannon ball falling from a great hight, is an apt illustration. In attempting to check its descent, he does not place himself perfectly erect, or in a rigid attitude, but he gradually yields to the momentum of the descending body; and thus he is enabled to check, without injury, the impetus of the weight that would otherwise crush every bone in his body.

Aside from the familiar examples above cited, the superiority of elastic backing for defensive armor was fully and indisputably demonstrated in the late war, as before stated, on board the United States gunboats *Essex*, *Lafayette*, and *Choctaw*. These three vessels were in the hottest of battles, fought at close quarters; some of them were under the enemy's fire for more than five hours at a time, and were hit by cannon balls 276 times in the aggregate, as appears from published official reports. Notwithstanding the fact that the iron plate armor did not exceed two inches in thickness, and in some parts was only three fourths of an inch thick, on these three vessels, all that portion of them that had elastic backing was not in a single instance penetrated, while certain parts of the same vessels (protected with iron of like thickness placed on unyielding oak backing, but without the elastic backing) were penetrated at various times and by different sized shots and shells. These statements are authenticated by the affidavits of commissioned officers, who not only served on board these three vessels during the war, but were present during their reconstruction, and saw how each square foot of each vessel was protected. The *Essex* was originally a common ferry boat at St. Louis. Her cost to the Government was less than one hundred thousand dollars; and at the time she destroyed the ram *Arkansas*, August 6, 1862, she drew only 6½ feet of water. The *Lafayette* and the *Choctaw* were originally common steamboats on the Mississippi river.

From the above facts, it is apparent that it is not essentially necessary to expend untold millions of money in order to produce a good and efficient navy; neither is it essential so build new vessels. But it is essential to do away with old fogyism and fossil-like plans, expedients, and devices, and adhere to scientific principles and mechanical laws, as well as to past experience.

To awaken the attention of officials and Congress to a sense of the humiliating condition we are in, owing to our inefficient navy, we have only to refer to the last annual report of Hon. G. M. Robinson, Secretary of the Navy, and the records of the past. That our foreign relations are such as to demand of every honest citizen a faithful response to the *imperative necessity*, is apparent to every intelligent person in the country. J. . J.L

[For the Scientific American.]

A REMEDY FOR SMALL POX, BY ONE WHO HAS TRIED IT.

The following was written several months ago, but was not forwarded, as the press has been teeming with small pox "cures" which are generally so evidently worthless that I hesitated putting my little communication among the prescriptions; feeling almost sure it would meet with no more attention than is accorded to the many, placed daily before the prudently incredulous reader.

But I find it impossible to resist the conviction on my part that to withhold any longer from the public my knowledge of a remedy—or mode of treatment—for variola and its modifications, would be criminal, as well as weak, in view of my confidence as to a successful result.

Some years ago, I had a case of varioloid, in my family, contracted from actual contagion, but not from strictly immediate contact with variola. The patient, my daughter, a child nine years old, carried a muff to church, the day after her mother had loaned it for a short time to a young lady friend in the cars. This lady had just recovered, apparently entirely, from small pox contracted from her brother, who had returned home from the army, convalescent but during the period of active desquamation, after a recent and almost fatal attack of small pox.

Precisely ten days after my daughter carried the muff, on the eve of the tenth day, she was quite ill from a complication of symptoms. The next morning I noticed a number of spots on her skin, alarmingly suggestive of variola. Not having had any experience of such a case, I consulted a friend, a physician, who at once pronounced her disorder varioloid. He thought, too, that it would prove a severe case, as the symptoms, namely, fever, back ache, headache, nausea, and the general appearance of the eruption, warranted such a diagnosis.

I took the case pretty much into my own hands, as I had at once resolved to pursue a line of treatment entirely different from that usually employed in such cases. Some time in the year 1861, I read in a number of the SCIENTIFIC AMERICAN (of that year), that a new remedy, discovered by a French chemist, namely, *sodæ sulphice*, was attracting great attention in certain quarters from its success in the treatment of ulceration, etc., and more particularly by its having cured entirely several well attested cases of hydrophobia. Its many valuable properties were fully discussed, verified, and freely endorsed by the French College of Surgeons; and were in substance what is now given in ample detail in the "United States Dispensatory," 1871, thirteenth editorial article—"Sodæ sulphis."

After some delay, I obtained a bottle of this medicine, and made use of it according to the notice of its properties, as occasion gave opportunity and always with satisfactory results.

To resume the subject of my case of varioloid. I administered to my patient 15 grains of the *sodæ sulphice*, dissolved in milk well sweetened, every three hours. I also had her entire body oiled effectually with crude petroleum, applied with the bare hand.

The next morning the eruption was absolutely killed and dry; and the disease broken up, to the wonder and, I need scarcely add, the great relief of all interested. As no pustules had had time to form, not the least trace of the eruption remained; and in a few days my child was as well as ever.

When the "seventeen year locust" abounded in this region, it was found that the sting of the male locust was so poisonous as to produce serious and, in some cases noted, even fatal effects. A servant girl in my family trod upon a locust, and the sting had to be withdrawn with tweezers. The girl screamed with agony, and said it was "worse than forty bee stings." I gave her about 15 grains of the *sodæ sulphice*, and kept the wound wet with a cloth dipped frequently in a mixture of equal parts of spirits ammonia, alcohol, and strong water solution of the *sodæ sulphice*. Although her foot had swollen amazingly before I had time to prepare my remedies, yet it stopped swelling at once after the first dose and application. A sharp pain went through the foot occasionally, but in a few hours the swelling and pain were entirely gone.

When my interest was first excited by the article referred to, concerning the *sodæ sulphice*, I urged a prominent druggist to send for it. He consented, stating, as far as I remember, that I should have to wait some time for it, as he should have to order it through a London house. I received it in due time, labelled as above.

I have, since that first supply was exhausted, made use of the American preparation, the sulphite of soda; but I prefer the foreign (French) article, as the American contains a larger percentage of sulphuric acid, and is, in fact, a hyposulphate. However, this now officinal preparation is equally efficacious.

I used the *sodæ sulphice* with perfect success, in cases of ulceration and as a wash for scrofulous discharges of the eyes and glands, at the same time administering it internally, in doses varying from 10 to 30 grains, three times a day.

I would strongly urge the use of the crude petroleum in connection with the *sodæ sulphis*, for variola and all its modified forms; and in the treatment of measles, scarlatina, or any eruptive disease, whatever its nature may be. The beneficial effect of oiling the skin is well known.

The "crude oil" I use is that sold here in Pittsburgh under the name of "Kiers Petroleum." Several varieties of crude petroleum can be got, on inquiry, that are so clear and pure as to be available for many purposes without refining. Of this article there is, fortunately, no scarcity.

As the latest edition of the "United States Dispensatory" may not be within reach of all interested, I subjoin, from my copy (1871) a portion of what is said of the remedy—*sodæ sulphice*—under the description of the article, pp. 826, 827.

"Sulphite of soda, (*sodæ sulphis*). This salt was first adopted as officinal in the present edition of the 'United States Pharmacopœia.'

"Medicinal uses. Sulphite of soda has been used in cases of yeasty vomiting with remarkable success. The matter vomited in these cases has a yeasty appearance on the surface, and is generally found to contain—when examined by the microscope—two microscopic fungi called *sarcina ventriculi* and *toruli cerevisiæ*. The diseases, in which these medicines (the sulphites) have been recommended, are purulent infection, of whatever origin; malignant pustules; hospital gangrene; erysipelas and other exanthematous fevers; malarial and miasmatic fevers; and in fine, all diseases which may be supposed to depend on absorbed poisons not acting on the tissues, but by a species of fermentation. . . . . .

"Also, in controlling suppurative ulcers, and all suppurative affections of the mucous membranes, as of the throat; the bronchial tubes, through inhalation by the atomizer; the urinary passages; and the alimentary canal; and in any case where there is reason to think that the local affection is sustained by zymotic influence or invisible organisms, (parasitic, vegetable or animal); and in any disease in which purulent infection of the blood may be produced by the same cause. They almost act as specifics in such cases.

"At certain stages of cancer they operate in the same way, by obviating the effects of putrid fermentations."

Dr. Farnsworth says, in an article on the influence of drugs upon *larvæ* and insect life in standing water: "A solution of soda sulphite destroyed the inhabitants of the water in one glass, in two hours," etc. By comparing the effects of the different drugs, the Dr. shows that the soda sulphite takes rank with the highest in efficiency.

Thus we have evidence that the soda sulphite is an agent (just beginning to be appreciated) that can be relied on in exterminating noxious parasitic life; also animalcules, that produce or follow upon various diseases; as a remedy for ulcers and sores, for nausea, and vomiting; for eruptive diseases; for poisonous stings and bites; and at the same time possessing no injurious properties whatever, when made use of, internally or externally, in reasonable proportions and quantity.

THE ELECTRO-MAGNETIC TELEGRAPH.--HONOR TO WHOM HONOR IS DUE.

At a recent meeting of the Regents of the Smithsonian Institute, correspondence was presented in relation to the proposal of the National Monumental Society to erect a monument at Washington to symbolize, in statuary of colossal proportions, the history of the electro-magnetic telegraph. Among others, a letter was read from Mr. F. O. J. Smith, who was one of Morse's earliest and strongest aids in the introduction of the telegraph, and who is very familiar with its original history. Speaking of the Monumental Society, he says:

"I feel constrained to say, if that highly laudable association resolves 'to erect at the national capital of the United States a memorial monument' to symbolize in statuary of colossal proportions the 'history of the electro-magnetic telegraph' before that history has been authentically written, it is my conviction that the statue most worthy to stand upon the pedestal of such monument would be that of the man of true science who explored the laws of nature ahead of all other men, and was 'the first to wrest electro-magnetism from nature's embrace and make it a missionary to the cause of human progress;' and that man is Professor Joseph Henry, of the Smithsonian Institution.

"Professor Morse and his early coadjutors would more appropriately occupy, in groups of high relief, the sides of that pedestal, symbolizing by their established merits and coöperative works the grandeur of the researches and resulting discoveries of their leader and chief, who was the first to announce and to demonstrate to a despairing world, by actual mechanical agencies, the practicability of an electro-magnetic telegraph through any distances.

"All telegraphic inventors, from Steinheil, of Germany, down through Cooke, and Wheatstone, and Bain, of England, and Morse and House, of our own country, are but disciples to the science of Henry; and the world is indebted to the latter alone, and to our country, for the first and earliest revival of incentives to mechanical genius directed to telegraphic results of both the electric and magnetic orders, subsequently to the announcement of Barlow's experiments, which were accepted by the scientific world as demonstrating the utter impracticability of such telegraphs.

"But Henry pushed on and melted away his toiling hours in more than four thousand experiments, piercing the mysteries of the subtile forces of galvanic electricity and electro-magnetism, and at length won the victory beyond disputation. And to Joseph Henry our country and beyond it the 'rest of mankind' owe, first, last and forever, the highest and foremost distinction in their monumental symbols of telegraphic history.

"To place the statue of any man above that of Professor Henry in symbolizing the history of the electro-magnetic telegraph, would be to reverse the order of nature as much as if the apex of a monumental shaft were inverted to rest on its pedestal. It would be, in fact, more symbolical of the misdirected judgment of its promoters, than of enduring honor to their subject. It would be to perpetuate, in granite and bronze, a blunder of history. * * * * *

"Dr. Barlow reached, in 1825, the same mechanical point that Professor Morse reached in 1837, and failed of success for the want of Professor Henry's discovery, for *then* it had not been made known. And, in 1837, Professor Morse must have failed without Henry's discovery, of which he was ignorant, although it had been made known to all men of science several years previously.

"Then Barlow and Morse are inventors of exactly equal merit *in the electro-magnetic history*, although the former was in advance of the latter many years.

"Barlow used the Moll magnet and Morse used the Moll magnet, and neither could succeed.

"Barlow used the quantity battery and Morse used the quantity battery, and neither could succeed.

"Neither knew how to propel the galvanic current *to* a distance, and neither knew how to generate the needful magnetic forces *at* a distance; and hence each failed to construct a practical electro-magnetic telegraph that could be worked at a distance from the operator beyond from 'fifteen to forty feet.'

"Who invented the needful agencies to breathe the breath of life into the mechanism of each—of Barlow and of Morse, and of all other forms of mechanism for an electro-magnetic telegraph?

"Undeniably, Professor Joseph Henry is that man; and 'to him,' I repeat, 'our country, and beyond it the rest of mankind, owe, first, last, and forever, the highest and foremost distinction in their monumental symbols of telegraphic history.'

"In vain will ephemeral pretensions contest this honor. Time, the great unfailing touchstone of exact truth, will correct the errors of partisan and sordid sycophancy; and history, sublimated by true knowledge, will write the name of Henry at the head of the column of well earned, immortal fame in this department of human progress.

"To such a monument I would cheerfully subscribe in the ratio of my means, but to none other that shall precede it, though flattering may be the encomium of having been an early coadjutor of Professor Morse.

"I will thank you to make these sentiments known to the finance committee of the Monumental Association, with my highest considerations of respect for their patriotic motives.

"I remain, with great respect, your obedient servant,

"FRANCIS O. J. SMITH."

PATENT OFFICE DECISION.

In the matter of the interference between the application of Thomas Hanvey and the patent No. 102,346, granted to Henderson Willard, April 26, 1870, for improvement in barrels. Appeal from Examiners-in-chief.

Leggett, Commissioner:

The invention in controversy is a barrel or cask made, in the manner usually adopted for making cheese boxes, of thin strips of wood bent around a mandrel and the ends fastened with nails driven through and clinched. The barrel is made of two plies, one within the other, and so arranged as to break joints. The inner ply is a little shorter than the outer, thereby making a shoulder upon which the head rests.

The evidence shows that Hanvey conceived the idea in 1866, and that he produced some small specimens for exhibition; but there is no evidence to show that he has ever made a barrel for use as such up to the time of filing his application, October 31, 1870.

Willard shows that he began making barrels involving the invention in December, 1869; has continued the same, and applied for a patent April 1, 1870. There is no doubt but the parties are both independent inventors of the device in question. Hanvey first conceived the idea; Willard first reduced it to practice, and threw it upon the market, the first to come to the office, and had his patent six months before Hanvey applied. Yet Hanvey, being the first to conceive, is entitled to priority, provided he used "due diligence" in reducing his idea to practice, and in making application for his patent. Did he use such diligence?

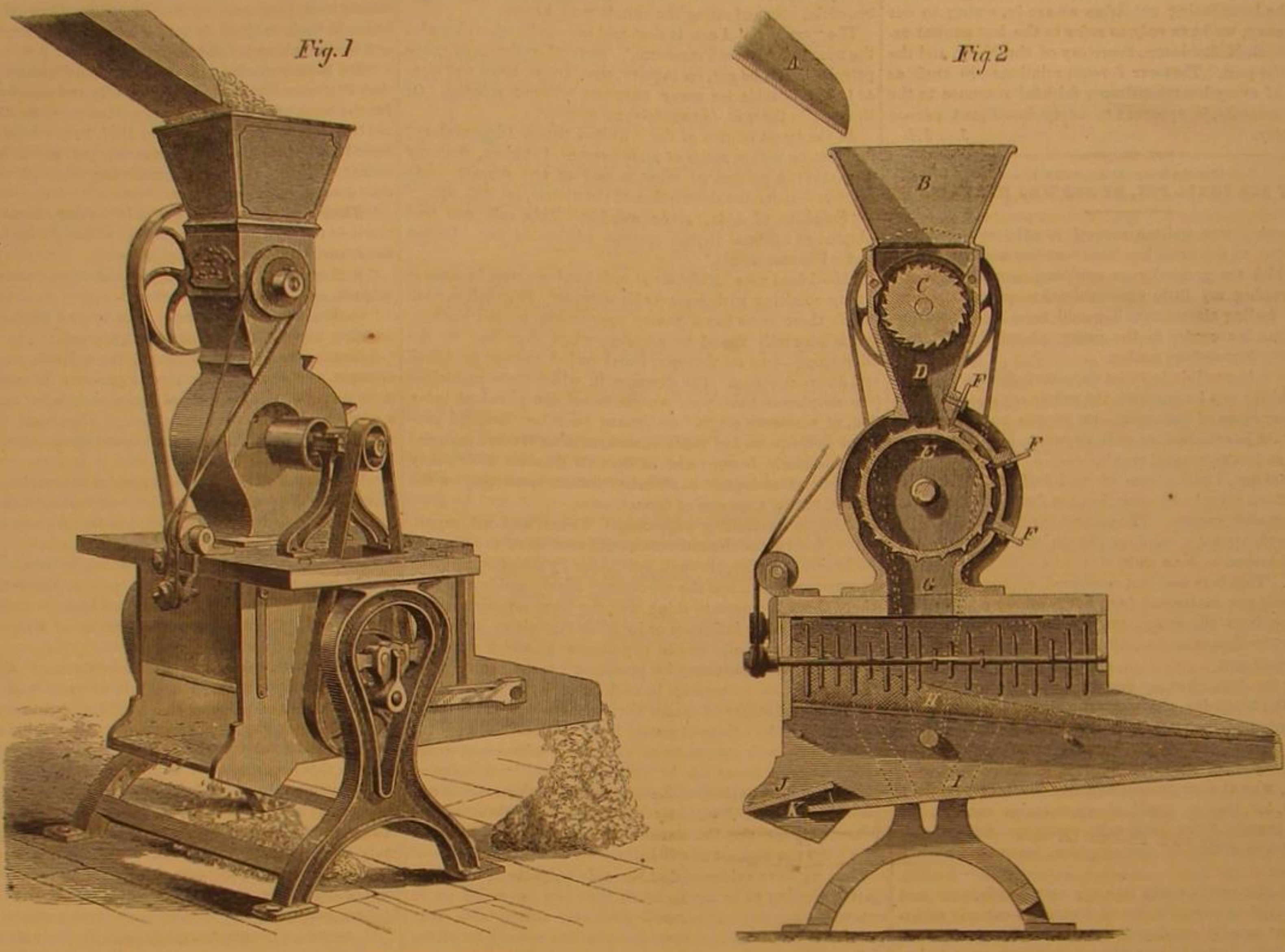
Hanvey states himself that he made the invention complete in 1866, and that in that year or the next he made a barrel; but, notwithstanding the fact that he is a barrel maker, he has never made one since. He tries to account for this neglect of his invention by proving that he was sick during two years of the time. The proof, however, shows that he was not so sick as to be confined to his house or to keep him entirely from business. From his own statement, his invention required no more study and no more experimenting. His model was already made, and I can see no reason for delaying application for a patent, except a want of appreciation of the value of the invention. He evidently regarded it as impracticable or of very little value, and therefore gave it no attention. Willard had invented the same thing, obtained his patent, and put the barrels manufactured under his patent upon the market before Hanvey awoke to the knowledge that his invention was of any value. He slept too long. The man who invents a device and hides his invention under a bushel until another has invented, patented, and developed the same thing is not regarded with favor in this Office or before the courts.

The decision of the board of examiners-in-chief is affirmed, and priority decided in favor of Willard.

SULPHUROUS acid boils at $17\frac{6}{10}$ degrees Fahr.

Cotton Seed Hulling Machine.

Thousands of planters in the South are in the habit of throwing away large quantities of cotton seed, of which they cannot dispose and for which they have themselves at present no use except as manure; yet they buy corn from the West to feed their mules and cattle. These will be interested to learn that a machine has been invented which can, it is claimed, be sold at so reasonable a price as to pay for itself in a very short time; it cracks the seed and separates the meats, which can be used for oil or for feeding purposes. The hulls, when rotted, make a splendid manure.



KAHNWEILER'S COTTON SEED HULLING MACHINE.

Our engravings illustrate this new huller. It has its origin from a very successful machine adapted for oil mills, and patented by the same inventor in 1869, and which has been used over three years in some of the largest oil works.

Mr. Kahnweiler designed, in this machine, to simplify the construction of the original machine, so that it might be managed by almost any laborer, and at the same time greatly lessen the cost. There is a great demand among planters for a machine of this kind, to prepare seed for feeding purposes; also to fit it for sending to distant oil mills, to which it might not pay to ship the unhulled seed.

A new improvement also, a screening apparatus, is attached to this machine, forming a complete hulling mill on a small scale. It separates the meats from the hulls effectually without the use of a fan, and is therefore less complicated, and requires less power to run it. The same separator is adapted to use in all the cotton seed oil mills, as the work is done in a small space, and the separator can be built at much less expense than ordinary revolving screens, while it is claimed that it does more perfect work.

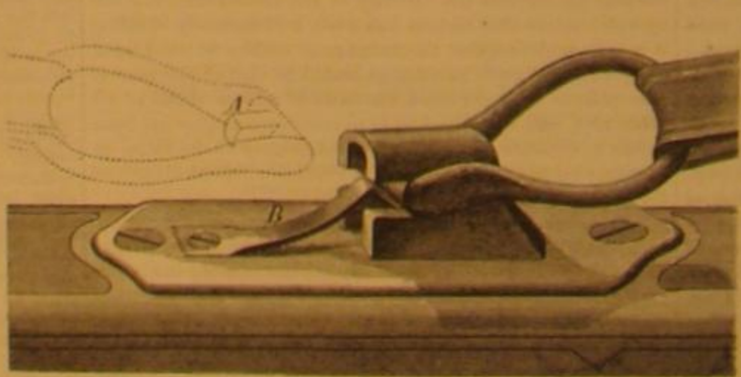
The operation and parts of the machine will be understood by reference to Fig. 2, in which A represents the chute which conveys the seed to the hopper. B is the hopper, C is a toothed or rather a ribbed cylinder, which feeds down the seed, but arrests the passage of stones, sticks, or other substances likely to injure the machine. These foreign matters wedge between the cylinder and the hopper, and cause the belt, which drives the ribbed cylinder, to slip until the obstruction shall have been removed. D is the chute through which the seed passes from the feed cylinder, C, to the hulling wheel, E. This wheel is made of three notched and ribbed sections, which act in conjunction with the knives, F, in the concave shell of the hulling wheel, to crack the hulls of the seed. The sections of the hulling wheel are so arranged that the cutting notches or ribs are staggered, thus rendering the action of the huller more uniform and steady. The knives are adjustable, so as to secure their proper action upon the seed. G is a chute between the hulling cylinder and the screen, H. This last is made of wire netting and bent into the form of a portion of the surface of a cylinder. The seed, when it reaches this screen, is acted upon by a revolving agitator or rubber, formed of a shaft with radiating arms, as shown, which completes the separation of the hulls from the kernels. The latter pass through the screen, while the coarser hulls and fibers are carried along and discharged from the lip of the screen. The hulled seed is then received into the box screen, I, which being shaken by suitable mechanism, separates the still remaining lighter portions of the hulls that pass the wire screen, carrying these portions out over the apron, J, while the cleaned and hulled seed passes out through the chute, K.

The machine is compact, and may be run with one horse power. The invention is secured by several patents, obtained through the Scientific American Patent Agency, the last of which bears date January 9, 1872. For further information address David Kahnweiler, 241 East Fifty-seventh street, New York.

SIMONS' SAFETY HOLD-BACK FOR CARRIAGES.

The nature and object of this improvement secures, at a trifling cost, a neat, convenient, and safe hold-back for all vehicles drawn by a single horse. It is constructed in such a manner that when tugs unhitch, or the singletree breaks, it will let the horse go free It is stated, from a reliable source, that more persons are killed every year by runaways than are killed on railroads and steamboats, and a large portion of these accidents are occasioned by the tugs unhitching, and the horses getting frightened and running away.

This invention appears to afford security against accidents of this kind, and is, in our opinion, an excellent substitute for the clumsy and inconvenient practice of wrapping the hold-back strap two or three times around the thill, and through an iron or a leather loop, so that the horse cannot become detached from the thills until the harness breaks.



These hold-backs are attached to the upper side of the thills, and the quarter straps of the harness pass through the rings of the hold backs instead of around the thills. The moment the tugs unhitch, or the singletree breaks, and the horse attempts to run away, he turns the ring over, it unlocks and springs out (as shown in the dotted lines of the engraving) thus letting the horse go free.

The projection, A, shown in the dotted outlines, presses upon the spring, B, when the ring is reversed, forcing the latter down so that the ring slips out from the slot in which it plays previous to its release.

Patented April 4, 1871, by N. W. Simons, Williamsport Ohio, whom address for further information.

Good Practical Advice.

Thomas Hawksley, Esq., was elected in January last, to the presidency of the Institution of Civil Engineers, London and on taking the chair, delivered a very interesting and able address, in which the existing condition of science, practical and theoretical, was reviewed in glowing terms. His address closes with the following sound and sensible advice for young men.

1st. Of all things, don't attempt too much. 2nd. Keep up and augment your knowledge of mathematics and the applied sciences, especially of those sciences which are most needed in that walk of the profession which you have selected for your own path; but again, I say, do not attemp too high a flight, for if you do you will never become a practical man. 3rd. Do not let your French grow rusty, and acquire German if your leisure and aptitude are sufficient for the purpose, because your future avocations may be in countries in which these languages are either habitually spoken or are in considerable use. 4th. Acquire in the office, and by the study of esteemed works, a knowledge of form and design. 5th. But bearing in mind that you will never become a practical engineer on theory alone, take every opportunity which presents itself of becoming apt in surveying and levelling, and in the methods employed in the settingout of works; learn the uses and applications of tools; make yourselves able to distinguish a good material from a bad material, good workmanship from bad workmanship, sound ground from treacherous gound, good puddle from bad puddle, good mortar from bad mortar, and a good workman from a bad workman. This knowledge is not to be obtained in a school, a college, or an office, and cannot be learnt from books. 6th. Make yourselves acquainted with every description of plant, and all the appliances and contrivances which an experienced contractor employs for the purpose of rendering a paper design into a substantial construction. 7th Keep brief treatises on geology and chemistry always at hand, for some acquaintance with these sciences cognate to engineering is, in the present day, almost essential. 8th. Practise as much as possible the art of mental computation, for this will give you the means of almost intuitively arriving at determinations on questions of cost, and of at once seizing on the best of several alternative plans or methods. 9th. Be not afraid of soiling your hands or dirtying your boots, but be in every other respect—in thought, feeling, and conduct—a gentleman.

OVER the western half of the Atlantic ocean there are three times as many storms as there are over the eastern side.

Scientific American.

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Contents:

(Illustrated articles are marked with an asterisk.)

SUBSTITUTING OTHER VAPORS FOR STEAM.---VAPOR OF LIQUEFIED CARBONIC ACID.

Most volatile liquids resemble water in this respect: That when heating them many degrees above their boiling point, the tension or pressure exerted upon the vessel containing them increases in an enormous ratio for a comparatively slight rise of temperature. The table below sllustrates this in regard to water and liquid carbonic acid; but it should not be overlooked that these pressures are only obtained as long as there is liquid present; when the last drop is evaporated, and dry steam or pure carbonic acid gas is obtained, the law for the expansion of gases by heat is applicable; the expansion being then uniform for equal degrees of rise in temperature, and by no means subject to the enormous increase experienced as long as unevaporized liquid is present.

If, then, we can get no advantage in using liquids requiring a small amount of latent heat for their evaporation, as shown on page 119, we may, by using liquids of very low boiling point, take advantage of the slight difference in higher temperatures, able to produce evaporation and condensation. If we would apply this principle in the use of steam, we stumble at once on the high temperatures required; if we heat water, for instance, in a closed vessel, from 212° to 248° Fah., we increase the pressure one atmosphere, that is, for 248—212 or 36° Fah. increase in heat, we increase the pressure only 15 pounds per square inch, scarcely half a pound for every degree of heat, while if we add the same quantity of heat to water previously heated to 473° and bring it to 509°, the expansive force of the steam will be raised from 35 to 50 atmospheres; this is 15 atmospheres or 15×15 pounds per square inch. The increase is now 15 pounds or one atmosphere for every degree of heat added. Two vessels of water thus, in which such a difference of temperature was maintained, could, when connected by proper arrangements, be made to exert this difference of pressure on both sides of a piston, and thus drive machinery, with a steam pressure of 15 atmospheres and even more, if a difference of more than 15° in heat was only maintained.

As said above, the very high temperature required is the objection to the use of this principle in the case of water and steam; but when going down to the bottom of the list of condensable gases, or to the top of the list of volatile liquids, and selecting one of the most volatile, say liquefied carbonic acid, which boils at 148° below zero, Fah., we have a liquid which, at the common temperature of say 60° Fah., will exert a pressure of 51 atmospheres, and at the freezing point or 32° a pressure of 38 atmospheres. giving thus a difference of 12 atmospheres or 180 pounds per square inch for only a cooling of 28°, which in the case supposed may be effected by means of ice. We have thus here a prime motor driven by the use of two reservoirs, the temperature of one of which is kept up at some 60°, simply by the heat of the surrounding air, while the other is cooled by ice and kept at some 32°; in this way, a power may be kept up equivalent to that produced by a high pressure boiler carrying 180 pounds of steam. The curiosity of this arrangement is the fact that in place of storing up coal for the production of heat, we store up ice for the production of cold. One great objection would, however, be that one pound of ice will only subtract, by its melting, 142 units of heat, while one pound of coal will, by its combustion, produce some 14,000 units of heat. We should thus require about 100 pounds of ice as equivalent for only one pound of coal; if we add to this the difficulty of keeping ice and the ease of keeping coal, and above all, if we consider the enormous strength of the vessels required, and also of the cylinders and connecting tubes, all able to stand about 1,000 pounds per square inch, making the apparatus heavy and dangerous: also if we consider the obstacles which such thick plates offer to the transmission of slight differences of temperatures, it is evident that such strong surface condensers cannot act properly; add to all this the expense of the liquefied carbonic acid, the ease of its escape when confined under the required high pressure, its corrosive action on the metals, the objection that such an engine would have to work with a back pressure on its piston of some 700 or 800 pounds per square inch, while the comparatively slight excess of 80 or 100 pounds would be the motive power, etc., and it is clear that the plan is utterly impracticable.

But the old saying of Cicero "that there is no theory so absurd that there are no philosophers to defend it" may be applied to inventors; and it may be said that no contrivance is so objectionable but there are inventors who attempt to bring it in practice. It is the same with this carbonic acid power. A few years ago a pamphlet appeared under the title: "Power without fuel; an investigation of the means by which it may be obtained from natural sources." In this publication, the author attempts to prove the practicability of the plan explained.

On the title page of the pamphlet referred to, we find the following remarkable note: "The right is reserved to patent in the United States any of the plans herein described. None of them will, however, be patented in any European country; they will be free to all who may there choose to employ them." This is simply a bait to European inventors, in order to save our inventor here trouble and expense; giving him, in case the idea should perhaps turn out to be practical, the advantage of the American monopoly, which surely would be worth something if—successful.

To recondense the gas by pressure is of course out of the question, as it would be equivalent to a water wheel pumping up the water which drives it.

We close with the following table of the remarkable effects of heat on water and liquid carbonic acid:

TABLE SHOWING THE COMPARATIVE TEMPERATURES OF STEAM AND CARBONIC ACID, PRODUCING THE SAME PRESSURE.

Pressure in Atmosphere.	Temperature required for this purpose.	
	Of water.	Of liquefied carbonic acid.
100	577	120°
90	566	109°
80	554	98°
70	541	87°
65	534	81°
60	526	75°
55	518	67°
50	509	59°
45	500	52°
42	491	45°
39	482	33°
34	464	23°
29	446	13°
24	428	3°
22	420	—4°
20	410	—8°
18	401	—13°
16	392	—22°
14	380	—27°
12	368	—32°
10	356	—43°
8	338	—53°
6	320	—62°
5	302	—70°
4	288	—78°
3	275	—90°
$2\frac{1}{2}$	262	—102°
2	248	—114°
$1\frac{1}{2}$	232	—128°
1	212	—148°

Authorities agree as to the steam pressures corresponding with the different temperatures, as contained in this table; in regard to the pressure of the liquefied carbonic acid gas, those for temperatures above 32° Fah. have been taken according to Pelouse, and for the low temperatures, from 32° to —148°, according to the determinations of Faraday.

SULPHITE OF SODA AS A REMEDY FOR SMALL POX.

We publish in another column a very interesting letter upon this subject, the writer of which desires his name to be suppressed, as he does not wish to detract from the force of his statements by creating an impression that he is puffing a nostrum from personal motives. Though personally unknown to us, we have formed a high opinion of the candor of this writer, both from the communication itself and the private letter that accompanied it.

The statements made are in the highest degree remarkable. Small pox has so long been considered an incurable disease, not to be arrested by any human means when once its virus has entered the circulation of those unprotected by vaccination or previous attacks of the same complaint, that the announcement of even a single successful cure will arrest public attention at once.

The remedy named, sulphite of soda, has been growing in favor for some time as an antidote for blood poisons, which act seemingly like ferments; and we have ourselves witnessed apparently happy effects produced by its use in complaints supposed to arise from such poisons. Its value in this class of diseases has been so far demonstrated that it has been made an officinal remedy.

If we are to credit the statements of our correspondent, a most astonishing effect upon the small pox poison was produced by something, which, if it was not the *sodæ sulphis*, ought to be most earnestly sought. We are not aware that any spontaneous resolution of this terrible disease ever has taken place, of a character that could be mistaken for the cure ascribed to the action of the drug under consideration. The drug produces in proper doses no effects to be feared, and can therefore be made the subject of experiment without danger to patients. Its merits, therefore, as a small pox remedy ought to be at once thoroughly tested, and if it should be found that the cure alluded to was probably an effect of the crude petroleum employed to anoint the body, or the result of a cause unknown, the fact that a cure is alleged should stimulate investigation into the real cause. It is, we believe, very rare that an unfavorable prognosis, based upon the acuteness of pain in the head and back in attacks of small pox, fails to be verified. In the particular case described, these bad symptoms were strongly marked, yet the patient, the next day after the character of the complaint was deemed established by the eruption, was convalescent, and in a few days recovered without the formation of a single pustule.

There is, of course, the possibility that there was a mistake in diagnosis, and that the disease was not really small pox, yet this seems rather improbable. The hope that a cure, for such a scourge as small pox, may be discovered prompts us to call particular attention to the letter of our correspondent; and we most sincerely wish that the supposed efficacy of this simple remedy may be demonstrated to be a verity.

COMPULSORY SAFETY GAGES.---THE STEAMBOAT OWNERS' PROTEST.

A meeting of steamboat owners, held in Philadelphia on Friday, February 2d, resulted in a decided expression of opinion adverse to the action of Congress in rendering it compulsory for them to use certain so-called safety appliances *per se*; but they maintain with much reason that, as they are compelled to assume a responsibility, they should be the judges of the best means to fulfil such obligations.

It is objected that the appliances,in question are not safety appliances in fact, but only so in name, and that the act enforcing their use was passed in the interest of private individuals who hold by patent the monopoly of certain inventions. Mr. Copeland, of New York, a well known and able engineer, pronounces the "safety gages" prescribed in the act as actually perilous to human life, so much so that several steamboat companies have resolved to carry no more passengers till the regulation is abrogated.

The principle of this kind of legislation is wrong, and when adopted always acts in an oppressive manner. It is right that steamboat proprietors should be held responsible for the lives and safety of their passengers; but it is not right that they should be forced to use devices which they and experienced engineers regard as worse than useless. Their responsibility, if they are strictly held to it, will prompt them to select, under the best advice, all that can insure them from incurring damage from accidents to passengers. To arbitrarily select these things for them is to deal a death blow to that healthy competition which is vital to progress. So far from securing safety, such action actually defeats its avowed intent, and increases risk. The action of the companies, as stated above, is wise. Responsibility without free volition is always revolting to reasonable minds; no wonder the steamboat owners reject it. Let the law be either amended or repealed.

THE EFFECT OF SOUND IN BUILDINGS, AS INFLUENCED BY VENTILATION.

We noticed in a recent issue the publication of a work upon this subject.* We now take occasion to review the theory, and its claims to become accepted as science.

It is scarcely necessary to dwell upon the importance of constructing public buildings with reference to the effect of sound. There are so many in which it is difficult both to speak and to hear distinctly, that those who speak and those who listen may find examples without number to enforce the lesson. Any real contribution to our knowledge of the subject, that will enable architects even partially to correct the faults of present construction, would be eagerly embraced by them and find universal application hereafter. Mr. Saeltzer claims to have made such a contribution and to have discovered that, however correct the proportions and form of an auditorium may be with reference to acoustic effect, the result will be failure, unless the ventilation be made to correspond with certain principles, so called, which he lays down in his work.

The following propositions have long been accepted as part of the science of sound, namely: that sound is propagated by fluid, solid, or gaseous media, in waves or pulsations, which extend in all directions from the source of the sound —the sonorous body; that, in general, whatever may be the source of the sound and the number or kind of media that convey it, air forms the best medium by which it reaches the auditory apparatus; that the intensity of sound depends upon the density of the medium in which the sound is generated, and not at all upon the densities of the media which convey it; that the velocity of sound in air is independent of the density of the air; that the velocity of sound in air, at 0° C. or 32° F., is 1,090 feet per second, and that this velocity will be increased two feet per second for every centigrade degree the temperature is raised.

It is further known that the greater the elasticity of a medium is, the greater the velocity of sound through it, and the greater its density the less will be the velocity of sound traversing it, according to the following law. See Tyndall on "Sound," page 45:

"The velocity is directly proportional to the square root of the elasticity, and inversely proportional to the density of the medium." It follows that in media which, like air, obey Mariotte's law, namely: that their elasticity shall increase in exact proportion to their density, sound will, as above stated

* A Treatise on Acoustics in Connection with Ventilation, by Alexander Saeltzer. New York: D. Van Nostrand, 23 Murray street.

in regard to air, always pass with equal velocities, no matter what their densities may be. This holds good for all gases.

Now, as the density of a medium may be affected by the presence of matters foreign to it, floating in it or intimately mingled with it, while its elasticity may remain unaffected, it follows that the rapidity with which sound is conveyed will be influenced by the presence or absence of such foreign matters. Tyndall, in his first lecture on "Sound" speaks of thunder peals as not penetrating the air to a distance commensurate with their intensity, on account of the non-homogeneous character of the atmosphere attending such storms. In the same lecture he shows how, in the presence of hydrogen which, equally elastic, is less dense than air, the velocity of sound will be much greater than in pure air; and how this velocity is reduced by the presence of carbonic acid, which is denser than air though possessing the same elasticity.

We have here sufficient reason for the assertion that, when the air in an auditorium becomes vitiated by the breathing of many occupants, the increased density affects the velocity of the sound, and the non-homogeneous character of the medium must interfere more or less with the extent to which sound will reach; all this without any new discovery or the enunciation of any new law. Inasmuch as sound is thus impeded, it will be less and less interfered with if the air is kept pure by perfect ventilation. But what is the new discovery?

If we understand the author, who does not make himself very clear in his enunciation of it, it is that carbonic acid is poison to sound as it is poison to life. In other words that sound has some peculiarity that renders air, independent of considerations of density and elasticity, a fitter medium for its transmission than air mingled with watery vapor and carbonic acid. The language used to express this supposed discovery will strike those familiar with acoustics as somewhat peculiar, not to say ludicrous. We will quote some of these propositions:

"The density of the air in those rooms is generally in an unhealthy state, heterogeneous (?) to the nature of sound, and even to health itself." * * * Speaking of the echo in St. Paul's Cathedral, London, the author says: "Now, if we rest upon the assumption that a pure air, genial to sound, guides the path of sound, this mystery is solved at once. Bad air, it is true, becomes much more dense, but the substances of this air are poison to the vitality of the sound, as well as to health, mind, lungs, and voice, and this proves that sound can only carry out its function when well supplied with healthy and congenial air. If you notice the changes of sound in crowded houses, and follow its diminishing state of existence, you will first find its nature often in tolerably good humor, then it becomes delirious, and is placed in a most uncomfortable position, not knowing which way to turn; poison on all sides, ever anxious to do its duty, fall of its natural vitality, it becomes disheartened, leaves its first battle field, the pit, next the first gallery, then the second, third etc., and at last, exhausted, looks up as high as possible to gain rest in the strata of warmer and more flexible air, air more congenial to its nature, which is always found at the highest point."

"The theory advanced will also abolish sound boards over pulpits; how is it possible that a sound board, even eight or ten feet square or circular, should cause the sound to descend to the lower strata of air full of poison? never will its nature consent to such unreasonable demands; no, it will, like a bird leaving its open cage to seek its liberty, pass the outlines of the sounding board to rise to a higher sphere, in the very reverse direction to that desired. Forget not that sound is of a nobler character than generally supposed; its requirements are a distinguished treatment, and it will resist every infringement upon its dignity, and hence, not only through science, but even art, is an approach to hearing possible."

"The heat will rise to those parts (the ceiling) and invite the sound to follow, and it does follow with force, and its general diffusion throughout the church is lost."

In another place, the author speaks of sound rays following "the most flexible air," and becoming "isolated and distinct in their field of operation." In still other places, he dwells upon what he calls the "vitality" of sound, as though it were a living entity that could be poisoned by a foul gas.

But enough of quotation. What we have quoted, as well as what we have said, shows that the author thinks, as Josh Billings quaintly says, he has discovered a new truth when he has only stumbled over an old one. That sound is somewhat less audible in ill than in well ventilated rooms has long been known, and the causes have also been known. The fancied cause, assigned by Mr. Saltzer, is scarcely worth writing a book about, a book that can only influence the opinions of the ill informed, and this by its false teachings.

THE DIFFERENCE BETWEEN BENZOLE AND BENZINE

So much confusion prevails, in consequence of the indiscriminate use of the words benzole and benzine, that it may be proper to state what these substances really are, and in what particulars they differ, and in what they are alike.

In the year 1825, Faraday discovered a peculiar liquid in the holders which at that time were used for conveying illuminating gas to private houses in London. He gave to it the name of bicarburet of hydrogen, and published a pretty full account of its properties. Nearly ten years afterwards, the Berlin chemist Mitscherlich produced the same substance from benzoic acid, and in allusion to its origin he proposed the name benzine. Liebig reprinted Mitscherlich's article in his "Annals," and in a foot note remarks that, as the termination *ine* is too suggestive of strychnine, quinine, etc., bodies with which it has no analogies, it would be better to change the word into benzole, and this he accordingly did. It was thus that the word benzole was first introduced into our language. The French writers adhered to Mitscherlich's original name, and in their dictionaries we find the word benzine, while the English have adopted Liebig's proposition, and speak of benzole. We should have been spared much confusion if Faraday's original name had been retained by all parties.

It will thus be seen that, at the outset, benzole and benzine meant identically the same thing, but after the discovery of petroleum it was observed by chemists that the native rock oil was quite a different substance from the coal tar product of the gas house. The various hydrocarbons which can be distilled from petroleum have a different chemical composition, and vary in specific gravity and properties from the coal tar products. Benzole has a fixed molecular composition; it is a true chemical compound, as much so as alcohol or water; its properties have been fully studied and described, so that on this point no doubts need prevail. On the other hand, the volatile substances which come over during the fractional distillation of petroleum are of a mixed and indefinite character, and it is difficult for chemists to agree upon a definite specific gravity, boiling point, etc. By degrees it has become customary in the United States to call the liquid which has the specific gravity of 62° to 65° Baumé (=0·73) benzine; the lighter hydrocarbons are called naphtha, rhigoline, and chymogene; the latter is condensed by pumps and is used for an ice machine. This class of liquids differ considerably from the true benzole of coal tar; the latter has a specific gravity of 0·85, and freezes at 37° Fah. The light oils of petroleum have never been frozen, and their specific gravity is very low; any product of the distillation of petroleum having so great a specific gravity as 0·85 (that of benzole) would be too thick to burn in a lamp and could only be used for lubricating purposes. The solvent properties of benzole and benzine are analogous, though by no means identical; benzole rapidly dissolves asphaltum while benzine scarcely attacks it; benzole is a better solvent of resins; benzole is far superior to benzine in carbureting air or gas for illuminating purposes. The most marked difference between the two exists in the fact that benzole can be converted by nitric acid into nitro-benzole, and by further treatment into aniline; whereas benzine from petroleum is not thus acted upon, and cannot be employed in the manufacture of aniline colors. Benzine can be readily ignited at a distance, while benzole must have the flame brought a little nearer; although it is volatile at all temperatures, and gives rise to explosive compounds. Benzole costs from six to eight times as much as benzine, according to the state of the market. Nearly all of the benzole of the world is sent to Germany to be there manufactured into aniline, from which are subsequently made the favorite aniline colors. It will thus appear that although benzine and benzole started into life meaning one and the same thing, they have, in the course of time, come to be two widely different substances. Benzole is made from coal tar, benzoic acid, and numerous other bodies, and can be converted into aniline. Benzine comes from petroleum, is very light, cannot be frozen, and cannot be converted into aniline. We find from our foreign exchanges that the English, French, and German writers are beginning to recognize this distinction, and it will be better for all parties to agree upon what boiling point, specific gravity, and chemical formula they will adopt for benzine. Benzole contains about 92·5 per cent carbon and 7·5 per cent hydrogen; benzine is approximately composed of 84 per cent carbon and 16 per cent hydrogen. In America, therefore, benzole and benzine mean different bodies of different origin, and having different uses.

THE ART OF THINKING.

Is thinking an art to be acquired? Are not all men endowed with the power of thought? Is there anything more necessary than for one to close his eyes and let his mind have free course in order to think? To answer these questions, it is necessary to define what is meant by thought. If day-dreaming, that act of mind in which thought roves at random, purposeless and without effort, is thought, then even the idiot thinks in his poor fashion. Then are no rules applicable to this sort of thinking. But much indulgence in this kind of dreamy thinking weakens the mind and begets a mental laziness that is fatal to progress. It benumbs all but the purely animal faculties and instincts. It is, therefore, to be deprecated in the strongest terms. It has proved and will yet prove the ruin of many a promising youth.

The kind of thought worthy the name, which strengthens instead of weakening the mind, is what we mean when we speak of thinking as an art. This kind of thought is the pleasant labor rather than the luxurious ease of the mind. It is only perfect when under complete subjection to will.

The first great thing in learning to think is to bring thought under subjection to will. There has been a great deal said about the importance of gaining mastery over our animal passions, propensities, and emotions. Many an earnest prayer for help to conquer these fleshly lusts has been breathed. The fact is, however, that with minds trained to perfect subservience, the passions can have but little sway. It is unrestrained imagination that kindles the fires of passion. Cool blood generally goes with cool heads.

Too much stress cannot be laid upon the fundamental importance of perfect command over thought. How many a student finds a lack of this power the chief hindrance to progress! How many a page must be re-read, how many a lesson conned over and over to compensate for lapses of thought! In the possession or absence of this power over mind, lies the chief difference between mental strength and mental weakness. Some men think as a child plays with a hammer, striking little blows here, there, anywhere, at any object within reach. The action of a strong mind may be compared to the stonebreaker's sledge hammer, dealing stubborn blows successively upon one spot till the *hard rock cracks* and yields.

When this command over thought has been acquired through the long exercise of resolute will, the power to arrange ideas and to think systematically will come with it, and no thinking amounts to much unless it is systematic. This, then, may be considered as the second important acquirement in the art of thinking.

The power to classify and arrange ideas in proper order is one that comes more or less slowly to even the best of minds. In proportion as this faculty is strengthened, desultory and wasted effort diminish. When the mind *acts, it acts* to some purpose, and can begin where it left off without going over the whole ground again to take up the threads of its ratiocinations.

Concentration and system are thus seen to be the chief elements in the art of thinking. To cultivate the first, constant watchfulness to detect the least wandering and the immediate exertion of the will to call back and hold the mind upon the subject under consideration should be vigilantly exercised. To secure the latter, the practice of analyzing and considering the different parts of a subject, first separately and then in their relations to each other, is a discipline to which every young mind should be subjected, and *which*, we are sorry to say, is very much neglected in the methods of instruction practiced in this country.

JAPANESE NATIVE STEEL.

Mr. G. D. Hamill, superintendant of the Imperial arsenal at Tientsin, China, originally of New York State and now on a visit to this country, called upon us the other day, bringing with him a specimen of what is stated to be native steel found in Japan, several large deposits of which are reported to exist. He states that swords and other articles of cutlery are forged directly from this metal, and that it has been recognized as native steel by every Japanese to whom he has shown it, a circumstance which increases his confidence in the truth of the reports concerning it. The specimen is highly crystalline, resembling somewhat the pig bloom obtained in the Ellershausen process of iron manufacture. If it be true that large and accessible deposits of this material exist in Japan, that country has in its possession an element of wealth the value of which can hardly be estimated.

Though not connected with this subject, we may remark that Mr. Hamill speaks discouragingly of the prospect of future progress in China. This peculiar people is hard to arouse from the influence of the superstitions and prejudices that obstruct civilization; while Japan, inhabited by the same race, and with a religion almost identical in its main features to that of China, is shaking off the sleep of ages, and advancing with marvellous rapidity.

Mr. Hamill speaks of the annual freshet in the region of Tientsin as unusually severe this season. It has flooded the arsenal at that place, and work is suspended. On his return, this gentleman proposes to investigate the subject of the native steel deposits in Japan, and to communicate to us such facts as he may be able to obtain.

SCIENTIFIC AND PRACTICAL INFORMATION.

DESTRUCTION OF SCIENTIFIC COLLECTIONS BY THE CHICAGO FIRE.

Dr. J. W. Foster and Mr. William Stimpson, respectively the President and Secretary of the Chicago Academy, have circulated a report of the losses sustained by their valuable institution in the late conflagration. Among these are some collections of national importance, such as that made by the Audubon club, the entomological collection of Mr. B. D. Walsh, the illustrations of the natural history of Alaska, the Smithsonian *crustacea*, and many others of more or less importance. With characteristic energy and courage, the trustees have announced the intended reconstruction of the buildings, and the recommencement of the publication of the Transactions of the Academy.

The large general collection, illustrating American natural history, was one of the most extensive and complete in this country, and great efforts will be necessary to replace the specimens. Assistance from the museums of Europe, many of which have duplicates, may be relied on; and similar institutions in the United States would do well to help, with all their power, the noble collection of the Chicago Academy, now struggling to regain her position and renown among the *almæ matres* of science in America.

BOILER DEPOSITS.

M. P. Champion publishes the result of his investigation into the causes of a boiler accident, in a sugar manufactory, which was originated by a deposit of carbonate of lime on the interior of the boilers. The utter impenetrability of the carbonate of lime to water caused the burning of the boiler plates. These boilers were fed with water both from an artesian well of great depth and from the condenser of the engines. The water of condensation was free from the carbonate, but the well water showed on boiling a considerable deposit of it. On inspection, fatty matter was discovered in the feed tank; and with a view of investigating its effects, M. Champion prepared a concentrated solution of bicarbonate of lime, and added to it one drop of oil. On boiling, the carbonate was precipitated, and it combined with the fatty matter; and, when dried, it was absolutely impenetrable to water, the oil doubtless giving it this resisting power. This is a new light on the subject of boiler incrustation, and deserves the attention of our engineers. Judging from the scores of letters we receive weekly, the subject of boiler explosions continues to engross the attention of a large number of experts, and a statement so consistent with the ascertained facts as that of M. Champion deserves thorough investigation.

PURIFYING WATER FROM CARBONATE OF LIME.

As a corollary to the above, we may append a description of a process for ridding water for boiler purposes of its most dangerous ingredient. One mode in use is to precipitate the lime salt before pumping the water into the boiler, either by boiling or by the addition of lime. By the latter process, sixty-six per cent of the carbonate of lime can be removed; but the proportion used must be only sufficient to effect the precipitation. Oxalate of ammonia can be employed to test the thoroughness of the process. The Northern Railway of France cleanses water for its locomotives in this way, subsequently filtering it through sponge.

ORIGIN OF FIRES.

Mr. Alexander A. Cr̂oll, a well known London gas engineer, suggests that rust on iron pipes may, under some circumstances, absorb oxygen so rapidly as to become red hot, or till a temperature, dangerous to dry timber in their proximity, is attained. Galvanizing the pipes would prevent this, if it be found, on investigation, to be a possible occurrence.

THE HÔTEL DIEU, PARIS.

One of the most ornamental of the public buildings, so lavishly ordered by the late Imperial Government in France, has just been condemned as unfit for its purpose. It was a new erection for the chief hospital in Paris, and its total cost was enormous; but the Society of Hospital Physicians and Surgeons has unanimously resolved that, in its construction, it does not fulfil the conditions required by a hospital in the present state of scientific and hygienic knowledge. Two members of the society proposed the reduction of the 800 beds to 400, and using them for the reception of patients suffering with skin diseases, thus utilizing the building, but vitiating the scheme of a general hospital. This proposition has been negatived, and some alterations to the costly structure must be made, casting an additional burden on the citizens of Paris.

FURNACE FOR BURNING PETROLEUM.

Of the many attempts to construct a furnace to consume crude petroleum as fuel economically, one recently introduced in Paris deserves especial mention. The appliance for distributing the oil consists of a pipe with branches, and of a grooved grate along which the oil flows after dropping from these tubes. A wrought iron cistern contains the supply of petroleum, and is connected to the distributor by an india rubber tube. The grate is placed vertically; the air, passing between its bars, supplies the oxygen for the combustion of the petroleum vaporized by the heat of the fire. The petroleum is supplied to the grate a little in excess of the requirements of the furnace, and the surplus drops into a receiver, and is volatilized by the heat of the furnace and the vapor consumed. The flame is described by the inventor, M. Wiesnegg, as being of great intensity, a temperature impossible from coal alone being attained. This fact recommends it for use in the laboratory, as a great heat can be obtained without the use of a blast.

ANTIDOTE TO CARBOLIC ACID.

The use of carbolic acid as a disinfectant, now so common everywhere, is fraught with danger, as it is a virulent poison; and if it be accidentally taken internally, an effective antidote will be necessary. Dr. Husemann, of Göttingen, suggests, for counteracting its effects on the stomach, a new preparation which he calls *calcaria saccharata* (saccharate of lime), prepared by dissolving 16 parts refined sugar in 40 parts water, and adding 5 parts slaked lime. Digest the mixture for three days, stir occasionally, filter and evaporate to dryness.

THE NEW COINAGE IN GERMANY.

The *Borsen Zeitung* of Berlin gives details of a bill, to be introduced into the German parliament during the present session, for the regulation of the coinage of the empire, a measure the necessity of which is obvious to any one who has ever been perplexed with the multifarious currencies of the many German states. According to this sketch, the new bill establishes the mark of 100 pennies as the unit of account, and the following will be the small coins: 1. A ten penny piece, 1,035 of which will contain a pound of fine silver, and 227·7 of which will weigh a pound. 2. A five penny piece, with half the value in silver and half in copper. 3. A two penny piece in copper. 4. A one penny piece in copper. Higher silver coins: 5. A quarter mark piece, value 25 pennies. 6. A half mark piece, value 50 pennies. 7. A mark piece. 8. A three mark piece, corresponding to the present thaler. As the gold money established by the last bill was to consist of 20 and 10 mark pieces, the whole new coinage system, if this bill is carried out, will consist of ten coins—the gold pieces corresponding to the English sovereign and half sovereign, but worth respectively 5 pence and 2½ pence less; the higher silver coins (quarter mark, half mark, mark, and three mark) corresponding to the three penny piece, sixpence, shilling, and what would be a three shilling piece, if there were such a coin, but all of fractionally less value, corresponding to the less value of the gold coins; and the smaller silver and copper pieces (ten, five, two, and one pennies) corresponding to the penny and half penny, and what would be the fifth and tenth of the English penny, but all of fractionally greater value—the German ten penny piece being the 200th part of 19s. 7d., whereas the said penny is only the 240th part of 20s. The new German coinage will thus, in small matters as well as great, approximate in a perplexing fashion to the English system without obtaining any of the advantages of identity.

Burns' Improvement in the Manufacture of Candy.

Mr. William J. Burns, of Georgetown, Kentucky, has patented an invention which has for its object to furnish a candy, pure and simple in composition, beautiful and inviting in appearance.

In making this candy, ten pounds of brown sugar and one ounce of cream of tartar, with sufficient water to make a syrup, are used. This solution is boiled and well skimmed and then boiled to a bale. At this stage, one half of a gallon of molasses is added, little by little to prevent boiling over, and boiled down to a bale. At this point, two pounds of butter are added clarified as follows: Boil the butter and skim off all impurities that may rise to the top; strain it to free it from all particles of undissolved salt; let it stand and cool from five to ten minutes. The candy, as soon as the butter is added, is boiled to a crack and poured upon marble to cool. When cold enough to work, about one fourth of it is cut off for striping in the ordinary way. The balance is then pulled white on the hook, the stripe put upon its top, and both are pulled out upon marble, cut in the middle and doubled with the white next the stripe; then pulled out again and cut and doubled until it is striped as desired. In this way the white will be upon both sides and the stripes will all be on the inside. It is then laid, from half an inch to an inch in thickness, upon a large pan, well greased, and cut or broken when cold with a small hammer.

Business and Personal.

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

Notes & Queries.

1.—SAFETY BOILER.—Which is the most secure from explosion, an upright or an horizontal steam boiler?—J. T. W.

2.—GOLD BRONZE.—Will some one give me a recipe for making a bright gold bronze liquid?—G. F. McI.

3.—JAPANNING.—Will some one tell me what composition is used by japanners for locks and other small gray iron ware?—J. J. D.

4.—TEMPERING STEEL.—What is the best way of tempering steel bits? The common processes do not make them hard enough.—H. G.

5.—J. M. K., wants to know where he can procure a machine for sawing stumps off even with the ground.

6.—MATHEMATICAL PROBLEM.—Will some one tell me how to raise a number to a power of a fraction; for instance, how can I raise to the power of 3·6?—T. M. N.

7.—GIVING UNFINISHED YELLOW BRASS CASTINGS A COPPER COLOR.—Will some one give me a recipe for giving yellow brass castings a copper color?—E. R.

8.—FIREPROOF FABRICS.—Which is the best known process for rendering women's clothing fireproof?—H. S.

9.—FIREPROOF WOOD.—Is there anything known that will render wood to a certain extent non-combustible?—H. S.

10.—METAL FOR WIRE.—What metal, or combination of metals, will produce the strongest, softest, and cheapest wire?—N. F. E.

11.—WELDING STEEL AND CAST IRON.—Is there any preparation in use by which steel can be welded to cast iron, so that when welded, they will stand hard knocks?—T. T. D.

12.—BREWING.—Can some one furnish me with a good recipe for the manufacture of a light ale for table or invalids use? And also with the process of brewing, etc.?—J. A. Jr.

13.—HYDROGEN LAMP.—Will C. C. W., of Ill., or some other reader of the SCIENTIFIC AMERICAN, give such information in regard to the hydrogen lamp as will enable me to obtain or construct and use one as a substitute for friction matches?—L. G. G.

14.—FELT ROOFS.—We have here several roofs made of felt paper, covered with tar; and in winter time the frost cracks them so that when the snow melts or rain falls on them, they leak like a riddle. Is there any paint or other substance which will fill up the cracks and keep them from leaking?—O. S.

15.—DISSOLVING MICA.—Can any of your readers tell me of anything that will dissolve mica and hold it in solution? I wish to know of something to mix with paper pulp, that will render the paper or pasteboard entirely impervious to water.—W. R. H.

16.—SAND IN TUBE OF PUMP.—Will reaming out the bottom end of the wooden tubing of a pump, so that the hole in the tube will taper, prevent the sand that may be in the bottom of the well from rising?—C. M. R.

17.—FREAK OF BROKEN IRON.—I have a small iron pulley about 12 inches in diameter and two inch face; in running it, I broke out a section of the rim, and then found that the piece which I broke out was too large to go in where it came out. Can any of your readers tell me why it was too large?—C. M. R.

18.—SPLITTING OF HORSES HOOFS.—Can any of your many blacksmith readers inform me how to keep the hoofs of horses from splitting or breaking? The shoes will not keep fast more than two or three weeks.—E. E. S.

19.—CUTTING SEALS.—I want to engrave a seal, for sealing express packages, with name and place of business. Will some of your readers please inform me how I can mark the letters so as to be right on the impression; and what process engravers use for transferring copies of photographs to plates before engraving them?—J. B.

20.—CEMENT FOR STOPPING CRACKS IN IRON.—Having just taken charge of a stationary steam engine that has had the steam passage, leading to the cylinder, cracked by frost, I would ask your numerous correspondents for a recipe for a cement to apply internally in the crack to stop the leakage of steam. A patch of iron has been put on the outside without stopping.—H. P. S.

21.—FREAK OF PRESSURE GAGE.—Whilst building a fire under our boiler, on the coldest morning of the season, I discovered Kirkup's steam gage showing 100 pounds. There had been no fire for forty hours previous, consequently there was no steam whatever. I would like to hear from some of your correspondents, a philosophical reason. A boy standing near suggested that Pluto's dominion had frozen to the bottom, and the contraction outside, and the expansion inside, had produced the effect. Who can give a better solution?—Mc.

22.—WIND POWER FOR RAISING WATER.—I wish to avail myself of a boiling spring, located 600 feet from, and 25 feet below my dwelling house, and to discharge the water into a tank 27 feet above level of ground at the house. I want about 300 gallons of water per day. Can I use any thing cheaper, more effective and requiring less attention than a wind mill of the improved kind? I have no fall, and cannot use a ram. Will some of your readers please answer?—G. W. D.

23.—ELECTRIC LIGHT.—Will some one inform me how to construct an electric light, stating the proportion of the several parts, the kind of charcoal to be used, the battery power required, etc?—S. F. C.

24.—COATING CAST IRON WITH PORCELAIN, ETC.—Is there any kind of cement or varnish, which can be applied to cast iron, which will harden and be smooth and stay hard under water? Something of the porcelain nature, which would impart to cast iron the same sort of surface that varnish does to wood, is wanted. It should not have to be baked in order to harden it.—F. W.

Declined.

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

BOILER EXPLOSIONS.—C. T.
EXTRACTION OF GOLD BY ZINC.—R. D'H.
MENTAL PHENOMENA.—R. O. D.
METEORS.—T. R. D.
PSYCHIC FORCE.—J. B.
SAW CLAMPS.—C. M. S.
SUSPENSION BRIDGE.—J. B.
TRADES UNIONS AND APPRENTICES.—W. C. D.
TROUBLE.—R. G.
ANSWERS TO CORRESPONDENTS.—M.—J. G. H.—O. R.—S.—J. W. T.—J. A. P.—C. M. B.
NOTES AND QUERIES.—M. H. B.—D. L. B.—G. J. B.—M. H B.—J. A. P.—I.

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.

A. B. L., of N. Y.—Answer to first query.—Suppose the wheels of a railway truck to be perfectly round, their surfaces perfectly smooth, running upon a rail that is perfectly smooth, and, when not loaded, perfectly straight, supported only at the ends, this rail, when the truck with its load reaches the center, will be deflected, so that the last half of its length will present a curved up grade, which the truck must mount. In ascending this grade, the action of the truck against the rail will equal the reaction or upward pressure of the rail against the wheels of the truck. Now to raise a given body through a given distance requires an initial force, the quantity of which will increase as the square of the velocity with which the body is raised. The force which raises the truck is the reaction upon the rail; therefore this reaction must increase, according to the law above stated, with the velocity of ascent. Any irregularity in the shape of the wheels or in the surface of the rails generates a reaction which obeys the same law; except that short depressions are jumped at high speeds, and the steady reaction of ascent is changed into impact at the end of the jumps, which will be as the distance the load has fallen during the jump, and the square of the velocity of its motion. Answer to second query. Ice and salt, when put together, mutually dissolve and become liquid, in doing which the solution, as it forms, draws heat from other bodies. By taking heat from cream they freeze it, and by taking heat from other bodies the two melt and dissolve, whether in pipes or freezer.

LIGHT ENGINES FOR SAW MILLS.—NEMO (No. 16, January 20), in speaking of the application of light engines to saw mills, thinks that a ten horse power in theory should saw half as much as a twenty, and finding that it will not do so, asks how to employ an engine of that size on a saw of 50 or 56 inches with the best results. From a series of experiments, made in this State, to ascertain how far a light power could be utilized in driving circular saws of that size and larger, the point seemed to be clearly proven that they must be driven by the necessary power to produce favorable results, and that any attempt to reduce this power only resulted in choking down the saw and in reducing the useful effect below a point of any value. These failures, however, have resulted in experiments in applying these threshing powers to muley saw mills in this State. They are spoken of as attaining the point your correspondent asks for in making as much lumber per day to the hand as is made by mills with power sufficient to drive a 50 or 56 inch saw; and I see that they are here coming into very general use, or, in other words, I believe them to be a success.—INDIANA.

S. N., of N. Y., writes: I have a fall of water (say four feet) and wish to use it for power. If I raise a pipe in the form of a siphon, with the long leg extending over the fall, shall I have more power if I apply the water through the siphon than if I took it directly from the fall?—Answer: No.

R. K., of O.—A back pressure of one pound per square inch upon the piston of an engine having a cylinder 20 inches in diameter, 30 inches stroke, and making 80 revolutions per minute, will require, to overcome it during ten hours, a work of 75,398,400 foot pounds, equal to 3·8 horse power for the same time.

R. L., of N. Y.—We know of no work that treats of coloring fur skins.

T. F. A. W., of ——.—Portland cement is itself a hydraulic cement. Any good hydraulic cement may be substituted for it. We do not know the cement to which you refer.

F. B., of N. Y.—The smaller the pipe leading from your pump to your boiler, the greater will be the power consumed in friction while forcing a given quantity through it. The velocity of flow in forcing the given quantity in a given time will be greater with the small pipe than with the large one, and to produce increased velocity requires a greater consumption of power.

W. D. B., of Pa.—Can the same amount of power be obtained out of the same amount of pressure of steam if the length of stroke be twice or thrice as long, the speed not being taken into consideration, but merely the power? For instance, let there be a boiler whose hourly supply of steam at 40 pounds equals *a*, which supplies a *b* horse power engine with a stroke of *c*. Now by lengthening the stroke to 2 or 3 *c*, can a *b* or *b plus* horse power be secured with *a* steam, high pressure and crank motion having nothing to do with the question? Answer: The power is in the steam, not in the engine, which is only a means of applying this power to work. Theoretically, the power developed should be in proportion to the quantity of steam used.

WATERPROOFING CANVAS.—W. T. B., of D. C.—The alum processes, given on page 105 of the current volume, will no doubt serve your purpose.

ASBESTOS.—To J. R., of Ill.—Answer to query 1: Yes. 2: No. 3: Yes. 4: To a very great degree, but not wholly. 5: If you claim asbestos for a peculiar purpose, you must have the real article in your model.

CHARGING MAGNET.—To W. E. D.—Jacobi's method is to place the poles of the magnet to be charged against the poles of another making the opposite poles meet. Then place a piece of soft iron at right angles to the magnets, and draw it from the poles to the bend of the magnet to be charged. Do this many times on both sides. If the magnets are of good steel, this produces a maximum power.

CLEANING CASTINGS.—If L. B., query 9, February 3, 1872, will provide his tumblers, for cleaning castings, with hollow shafts, say four inches in diameter, closed at one end and well perforated inside the tumbler, and attach a suction fan to the open end, and a discharge pipe leading out to the open air, it will answer his purpose of getting rid of the dust. One fan will serve for a number of tumblers.—J. L., of Ind.

FACE WORMS.—If H. E. A. will use a crash towel and chafe well each side of his nose whenever he washes his face, he will find that the grubs will soon disappear; at least it was so in my case. Both my nose and forehead were constantly marked, but for the last ten years I seldom have a mark on my face from that cause.—H. W., of Ill.

SAW SETTING.—If C. M. B., query 7, January 27, 1872, will file toward the point of the saw, holding the handle of the file a little lower than level for soft wood, and low enough to make back of teeth square across for hard wood; and after setting and filing, with a fine single cut file, lay the saw flat on a straight board and joint sides I think he will be satisfied with the result.—J. T. D., of Ill.

POUNDING OF PISTON.—To W. M. T., query 12, February 3, 1872. The trouble with your engine is probably that the valve is not set right to clear the cylinder of steam in time for the return stroke. An engine, say of 24 inch stroke, should have about one eighth of an inch lead on steam side, and commence to *exhaust* when the piston gets within two or three inches of the end of the stroke; then, if everything else is right, your engine will make 200 revolutions per minute without pounding. C. G., query 17, same date, will see by the above whether he is right or not.—A. A. H., of Pa.

GRINDING STEEL TOOLS.—To E. C. J., query 3, February 3, 1872. You can grind edge tools on an emery wheel without material injury to the temper of the *tool*, by holding your fingers close to the edge you are grinding. Do not remove your fingers until you have completed your grinding.—J. E. G., of Mo

QUESTION IN MECHANICS.—Query 16, page 90, Vol. XXVI., February 3. If H. W. U. will arrange a rope and pulley in such a manner as to raise a weight of fifty pounds as the opposing force of his fluted rollers, he will find that it takes no more power to force the last block through than it did the first, friction not being considered.—J. E. G., of Mo.

SPEED OF CIRCULAR SAW.—To D. S. B., query 11, February 3, 1872. You can run your 52 inch saw 600 revolutions per minute to do good work and more of it than by running it faster. I have had thirty two years practice with saw mills, and that is the speed I use for 52 inch saws.—J. E. G., of Mo.

FACING OIL STONES.—I have used oil stones for eighteen or twenty years without facing. I drop oil on the end nearest me, then push my bits, etc., out over the far end (not off) taking up the oil just as I need it. Thus I can keep my stone straight or a little rounding, always whetting on the highest part; and so I waste neither time, labor, nor stone by facing.—C. H. W., of Pa.

SPEED OF CIRCULAR SAW.—In your issue of 3d inst., D. S. B. inquires: "How many revolutions per minute a 52 inch circular saw should make to cut from 5,000 to 8,000 feet of lumber in ten hours working time? And also, how high a speed it would be safe to run such a saw?" It will do the 8,000 feet easily enough by running 500. It will be safe to run it 1,500.—N. B., of Pa.

POLISHING WOODEN ARTICLES.—Let C. M. (page 90, Vol. XXVI., No. 15, Notes and Queries) who has failed to get the polish he wishes on wooden articles in the lathe, take two parts of rather thick shellac varnish (made by cutting the gum in alcohol) and one part of raw or boiled linseed oil: put them together in a bottle and shake thoroughly before using. Apply with a woolen cloth to articles to be polished. He will, after practice, get as good a polish as he could desire.—G. M. H., of N. Y.

WILD TEA.—I have been informed by a friend that J. B. W. with his wild tea is a humbug. He writes to the editors around the country, stating that he is over sixty years old, and has been cured of cancer by the application of wild tea, both by drinking the tea and putting it on the cancer; and he asks the editor to publish it for the benefit of mankind (thus getting advertised for nothing). The editor most generally publishes the statement, and the readers that have a cancer make inquiries in regard to wild tea: but no one ever heard of the plant. At last the sufferer writes to J. B. W., of Pa., in regard to finding the tea, and receives a reply "that he can furnish the tea" at the modest price of three dollars per ounce. The sufferer sends for some of the tea and receives, in return for his money, dried mullen leaves. The tea does the sufferer no good and J. B. W. goes on his way rejoicing.—E. E. D., of N. Y.

WILD TEA.—J. W. McA. is informed that the *Ceanothus Americanus*, a small spreading shrub common to all parts of the original thirteen States of the Union, is generally known as wild or New Jersey tea, and is said to have been used during the revolution of 1776 as a substitute for tea. It is of the order *Rhamnaceæ*, and described in nearly all botanies. I have found it in Darby, page 270, and in Gray's "Manual," page 115. If J. W. McA. will apply to any botanist in his neighborhood for the *Ceanothus*, he will be likely to get what he wants.—J. H. A.

PROPORTIONS OF ENGINE.—Page 49, Vol. XXVI.—The trouble with J. R. L.'s engine is that his steam pipe is too small. It will be seen that the area is only about one half the area of the steam port, while the piston speed is nearly 400 feet per minute. With 80 pounds pressure upon the boiler, I doubt if J. R. L. realizes more than 45 or 50 pounds upon the piston, owing to the wire drawing of the steam through the governor. He must put in a 3 or 3½ inch pipe with a governor of the same size; a large governor with a smaller pipe will not answer as well. The proposition of the builders to put on a heavier fly wheel sounds very like a perpetual motion theory, as of course it will effect nothing but to equalize motion. It is quite likely, also, that the distributing valve in this engine is badly proportioned; for a builder, who would use a 2½ inch steam pipe with a 12 inch piston traveling 400 feet per minute, cannot be very wise upon the subject of the steam engine. A good governor will always throttle the steam considerably, and J. R. L.'s difficulty is therefore but another evidence of the value of the automatic cut off.—F. H. C., of N. Y.

SLIDE VALVE QUESTIONS.—As C. G. does not give the travel of the valve, his questions may not be so easily answered; but I am confident he could not have set his eccentric nearer right for common practice than he did, as the drag of the valve when the pressure of steam is upon it will cause it to open the ports about on the center. There is nothing gained by giving much lead to a valve where there is much lap, as the early closure of the exhaust will generally cause all the cushioning that is required. The exhaust does not open any too soon to allow the spent steam to escape in time to clear the cylinder properly. If he will examine his valves and ports, he will find the exhaust is closed considerably before the steam is admitted, and that the common slide valve is a very imperfect thing when much lap is added, as it deranges the exhaust.—A. L., of Mass.

POUNDING OF PISTON.—To W. M. T.—You have not given the style of engine you have the trouble with; but if it is a common slide valve engine and does not prime, or in other words, work water over into the cylinder, the trouble is evidently in the engine alone. You do wrong to draw the keys or loosen any part of the engine. The keys should be loose enough not to heat or bind; then if the piston does not strike the cylinder head, the pounding is probably caused by the steam not being admitted in proper time. If it pounds after the crank has passed the center, the steam is not admitted soon enough, and you should set your eccentric forward; if the pounding occurs before the crank reaches the center, set your eccentric back; and if that does not remedy it on that side of the center, the only conclusion I can come to is that the exhaust closes so early as to cause excessive cushioning, and the only remedy is to cut away, from the exhaust side of the valve faces, enough to relieve it; but I would not advise you to make such an alteration in the valve until you are thoroughly acquainted with its principles, as you will find it an ugly customer. Otherwise, buy a good treatise on the engine and slide valve, and study it. I would like to learn the results of your experiments when convenient.—A. L., of Mass.

SLIDE VALVE QUESTIONS.—No. 17, Page 90, Vol. XXVI.—The slide valve about which C. G. inquires has still too much lead. I should say one thirty second of an inch was ample. If I am not much mistaken, the ideas of live engineers on the question of lead have been considerably modified of late years. The exhaust lead referred to as being one eighth of an inch is all right; only it should probably be double or treble that amount, the exact quantity depending upon the proportions of the valve and the speed of the piston. The exhaust ought in all cases to be liberated soon enough to preclude the possibility of back pressure on the return stroke. But exhaust lead may be carried to excess. The proportioning of slide valve presents so many complicated considerations that it is impossible to give definite instructions in any particular case without a full knowledge of all the *data*.—F. H. C., of N. Y.

Recent American and Foreign Patents.

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

SALVE.—Theodore Kuhn, of Greenville, N. J.—This invention relates to a new salve for the cure of boils and eruptions of a non-poisonous character, by combining a certain quantity of beeswax with good brandy. While it is entirely harmless, it is claimed to be invigorating to the system.

SAWING MACHINE.—Henry P. Ohm, of Baltimore, Md.—This invention relates to an improvement in portable sawing machines, intended especially for working up lumber, and performing other light work, but also equally applicable for cross-cutting logs, etc., and the invention consists mainly in an apparatus for feeding the lumber to the saw and in the manner in which the driving power is applied to the latter.

MACHINE FOR PRESSING COTTON, HAY, OR ANALOGOUS ARTICLES.—John S. Schofield, of Macon, Ga.—This invention consists in a new and ingenious method of constructing a sectional press so as to obtain free access to the bale after being pressed; and also in a new way of giving ample space for the insertion of the bale by arranging a carriage so that it can be moved to one side and carry with it the press screw, nut, and levers.

PAPER FEEDING MACHINE.—Dundas Dick, of New York city, assignor to Victor E. Mauger, of same place.—This invention relates to new apparatus for "pointing" sheets fed to a cutting machine; and consists in the arrangement of spring plates through which the points work, the sheet to be cut being placed upon the points and held thereon while the table is being moved forward. At the end of this forward motion the spring plates are raised by means of sliding wedges, so that the sheet is freed from the points and taken ahead by the feed rollers of the machine. By this invention great exactness of feed to the cutters is obtained, which is an item of extreme importance in the cutting of playing cards and also in the cutting of all sheets that have been pointed or marked before cutting, and even in the marking of sheets. When on cutting machines no reliable pointing apparatus is provided, the sheets are easily fed so as to be cut out of line, and the cards consequently spoiled. In the manufacture of playing cards considerable loss is experienced from this cause, which will be prevented by the application of this invention.

CHUCKS FOR SCREW CUTTING LATHE.—Eugene C. Plimpton and Samuel Taylor, of Bridgeport, Conn.—This invention relates to a class of chucks ordinarily used for cutting screws, but which may be used for other purposes; and consists in the mode of operating the chuck, and of making the dogs of the chuck adjustable, so that a larger or smaller piece of metal may be admitted and worked. The inventors do not confine themselves to the precise form or arrangement of any of the parts, as they may be varied without departing from their invention. The claims cover a combination with a dog, a plate, and adjusting screw, and also a sliding fastener, plates, and adjusting screws, in combination with a band and lever.

SASH HOLDER.—Robert B. Ball, of West Meriden, Conn.—This invention has for its object improvement in sash locks of the class in which a gravity bolt is employed, the same being provided with a thumb piece, projecting through a slot in its case, whereby it may be raised. The invention consists in a peculiar construction and arrangement of parts, whereby there is no exposure or projection of the thumb piece of the bolt through the slot of the case. A plate is provided within the case to form, in connection with a lug, a guide for the bolt, and also constitute a floor for the slot, or made to cover and conceal the wood beneath. A sash lock is thus formed whose functional parts are not only concealed within the case to the usual extent, but the thumb piece of whose bolt is flush with the face of the case, so that no impediment can exist to sliding the upper sash past the lower. The lock is likewise claimed to be more simple in construction, and hence cheaper in manufacture than others, since the guide and stop devices are cast in one piece with the main parts of the case. It is, furthermore, ornamental in appearance.

GRAIN SEPARATING ATTACHMENT TO THRASHING MACHINE.—Zephaniah Miller, Canal Fulton, Ohio.—This invention consists of a tailing screen, conveyer, and elevator, combined with the sieves and with the straw carrier, by which the pods and tailings are separated from the stems and other large refuse matter that is carried over and conveyed back to the bottom of the returning part of the straw and chaff carrier, to be returned to the thrashing cylinder for being more completely thrashed. It also consists of a conveyer levator, and another conveyer arranged to receive and convey the dirty seed which drops down through a slot in the said box back upon the sieve again to be subjected to a second operation.

BOOT BLACKING MACHINE.—Nathan Eisenmann, New York city.—This invention has for its object to improve the construction of a boot blacking machine for which letters patent were issued November 28, 1871. The bristles that form the brushes are so arranged as to cover and operate upon the entire surface of the boot or shoe, whether the said brushes be expanded or contracted. By the present construction of the machine, the brushes, by the combined action of the suspension cranks and operating bars, receive the necessary movements to cause them to operate properly upon the boot or shoe to be blacked or polished.

COMB.—Orange Johnson, Grand Lodge, Mich.—The object of this invention is to so construct a comb that broken teeth may be removed and renewed. It consists in making the plate of the comb with a rib, and with screws for securing the teeth. The teeth may be made of wood, metal, or ivory, or of any other suitable material. When a tooth breaks, the screws may be loosened and a new tooth put in its place. This comb is adapted for most of the purposes for which combs are used, being made of any size or proportions. In combination with independent teeth and set screws, a sheet metal plate is doubled upon a block, and ribbed on the inner side, to hold the teeth.

CAR LOADING MACHINE.—Samuel J. Bingham, Garlandsville, Miss.—The object of this invention is to provide ready and convenient means for loading railroad cars with wood and coal or freight. It consists in a suitably constructed frame and a lifting platform, so constructed and arranged that the wood, coal, or freight is made to slide from the platform on to the tender or car of a railroad train. The machine is situated near the railroad track, so that the contents of the platform may be dumped directly into the tender, or on to a car, as may be desired. The platform may be made of any desired size, so as to contain sufficient coal or wood to supply the tender. The platform being loaded, when it is used for transferring fuel to the tender, all that is necessary is to bring the tender into the proper position and dump the contents of the loaded platform into it. With this machine, it is claimed that much hard labor and time are saved.

ELASTIC LANYARD.—John E. Jones, of Waretown, N. J.—This invention relates to a new arrangement of parts used on an elastic lanyard, and is for the purpose principally of reducing the length of the adjusting screw, and thereby adding to its strength and effectiveness. The invention consists in a new combination of parts, whereby the stated object is attained, and whereby also the rubber cushions are brought close together and the transverse plates reduced in length. Two rubber or metallic cushions impart the necessary spring to the lanyard. They are held between plates and their several sections separated by other plates. Rods constitute the lower strap of the lanyard. Their lower ends are formed into or connected by an eye which is secured to the side of the vessel. Their upper parts pass respectively through the cushions and are riveted or otherwise secured to the upper plate. Rods also constitute the upper strap of the extension part of the lanyard. They are at their upper ends formed into or connected by an eye to which the lanyard proper is secured. Their lower ends are riveted or otherwise secured to a plate, which is below the cushions, fitted upon the rods to slide loose thereon. A screw is swiveled in a plate which slides on the rods below and is fitted through the lower plates which has a female screw thread for its reception, the upper end of the screw bearing against the lower plate of the cushions, or swiveled therein. When the screw is turned to the right, it serves to stretch or to slacken the lanyard. By this practical arrangement the screw is brought entirely against one end of the cushion, and does not, as heretofore, pass between the same. It is, therefore, shorter, and, in consequence, stronger, besides permitting the two cushions to be brought close together, so as to occupy less room and reduce the length of the plates.

SAWING MACHINE.—William Weaver, of Greenwich, N. Y.—This invention has for its object to furnish an improved machine so constructed that it may be readily adjusted for use as a scroll saw, a circular saw, a planer, or a boring machine, and be convenient and effective in either capacity. When either the circular saw, the planer, or the boring tool is to be used, the other two of said parts are to be detached, so as to obtain as much space as possible for the work, avoid carrying unnecessary weight, and avoid the danger of injuring the workman with the tools not being used.

OPERA CHAIR.—Anthony Abel, of New York city.—The seat, arms, and back of this chair are supported by vertical frames which rest upon the floor. A pivot plate is attached to each side of the bottom of the seat, by means of which the seat is pivoted to the vertical frames, so that the seat may be turned up to a vertical position out of the way. The frames are provided with lug bearings, one being at the front, upon which the bottom of the pivot plate bears. The other lug is on the back portion of the frame, against which the upper side of the pivot plate strikes, as the seat is turned down. The seat is thus supported at the rear as well as near the front, so that no strain is brought upon the seat pivots. A rod is pivoted to the side of the seat and also to the arms. The arms are jointed to the frames. With the rod the arms may be raised when the seat is raised, but the inventor does not confine himself to the use of the rod, as the arm can be raised by a separate movement of the hand. By this construction and arrangement of parts, these chairs are readily taken apart for transportation or storing away.

LOOM.—Alwill Urbahn, of Paterson, N. J.—This invention relates to a new arrangement of the working mechanism of a positive motion loom for weaving goods of less width than the length of shuttle.—The object of the invention is to produce more reliable and effective action than heretofore, and also to provide for an easy adjustment of all parts, and a most absolute control of the shuttle. The loom differs but little from ordinary power looms in its general principle of operation. But the manner of carrying the various movements and actions differs considerably. The invention embraces peculiar features upon which no less than eight claims have been allowed.

HOE SOCKET ATTACHMENT.—John S. Craig, Guilford, Kansas.—The invention consists in constructing a tubular hoe socket of wrought metal, with a shoulder near the end, and a prolongation therefrom which is extended through the tool and then staved up on the front side of the blade. This seems to be a very decided and useful improvement in tools for farmers' and gardeners' use.

BOOT CRIMPING MACHINE.—Rufus H. Dorn, of Port Henry, N. Y.—An endless chain runs over pulleys, the chain carrying one or more metallic formers, attached in such a manner that they do not obstruct the movement of the chain over the pulleys, while they are attached firmly thereto. Two jaws are securely attached to the top of the bench. They stand edgewise and a short distance apart. Attached to the insides of each of the jaws is a perforated steel plate, but between the jaws and these steel plates, strips or pieces of rubber or other elastic material are placed. The position of the plates is regulated by bolts and set screws. The leather to be crimped is placed upon the forming end of the two jaws, and hanging therefrom to or near the top of the bench. A plate is at the base of the former. An elbow corresponds nearly or quite in shape with the two forming ends of the jaws. A crank or a pulley on the end of the driving shaft revolves the chain around the carrying pulleys by hand or other motive power. As the chain revolves the formers are carried round with it, and when the former strikes the leather it carries it through between the steel plates of the jaws, stretching and crimping it as it is held by the friction between the plates. The slots of the plates increase the friction on the leather, but the elasticity afforded by the rubber strips prevents tearing. At the base of the jaws there is a groove which admits the plate of the former. The chain revolves with the former or formers with very little friction when not crimping the leather. One or more "uppers" of a boot may be crimped at each revolution of the chain.

GIG SADDLE TREE.—Samuel E. Tompkins, of Sing Sing, N. Y.—The first part of this invention consists of a construction of the frame whereby it is adapted for making a saddle with short jockeys, and, at the same time, preserving bearings of the requisite length and breadth, which is accomplished by shortening the flanges, though making the main portion as long as heretofore or longer, and as wide as the flanges, with the exception of the notches or recesses at the ends of said flanges, to allow of sewing the jockeys as far as needed. The second part of the invention consists of projections on the terret nuts to fit in the notches in the frame to prevent the nuts from turning around in the tree when screwing the terrets in or out. The third part consists of ribs on the outer edges of the flanges to have sufficient thickness along the edges to insure the security of a perfect form in the casting, while the said flanges are made thin enough between the said ribs and the bearings of the frame to allow of punching the nail or rivet holes readily in case they fail of being formed properly by the casting of the plates. The fourth part consists of a shoulder on the front upright on the crown of the plate for supporting the saddle for said saddle to rest on while the continuation of said support extends up in the hole through the saddle for the bolt, which secure it to the tree to hold it against lateral movement, as well as to support said tree a certain distance above the plate, the tree being fastened on either by a screw bolt and socket nut—the latter being at the top—or by a bolt with the cone nut at the bottom fitted into a countersunk hole in the plate for allowing the nut to sink to the surface so as not to injure the animal's back. The fifth part consists of a detachable crupper loop having a flattened shank or portion, by which it is connected to the tree by one of the bolts used for attaching the check rein hook and the saddle, and by a square or other angular projection rising up from the top of the tree, and having a screw threaded portion and a nut screwing down upon said shank, which has a square or other angular hole for said projection, also a hole for the aforesaid bolt; and the loop is so bent upward at its connection with said shank as to make room for the rear end of the "middle leather" to be placed under it, while the shank is firmly clamped to the tree. The sixth part of the invention consists of a cone shaped projection raised on the upper side of the shank of the check rein hook around the countersunk bolt hole for compensating for the lack of strength caused by countersinking the hole on the underside to allow the bolt head or nut to sink in said hole, so as not to come in contact with the animal's back and injure it, as would be the case if it projected below said shank.

PLANTER AND CULTIVATOR.—Edward B. McClellan and John F. McClellan, Alexandria, Ala.—The standards which hold the plows are in this machine detachable on the frame, and the plows are also detachable on the standards for shifting both the standards and the plows to use different kinds as may be required by the nature of the work in hand. When it is to be used as a cotton bedding machine, one double turning plow is attached to the middle beam in the rear, a right hand turning plow to the right hand beam, and a left hand turning plow to the left hand beam. This arrangement is employed for turning the earth from the middle each way to form a bed wherein the cotton is to be planted, which bed will be completed by two passages of the machine, each passage finishing one bed and forming one half of the next. A front sloping hopper, having a hole and slide, rotary arms, having holes and tube, when combined in a seeder, constitute the claim.

HAND PLANTER.—Young F. Wright, of Hannahatchee, Ga.—This invention has for its object to furnish a simple, convenient, and reliable hand machine for dropping seeds and distributing fine fertilizers. It consists in the combination, with a boot piece and seed reservoir, pivoted at the heel thereof, of the valves and a spring, arranged to contain the seed or fertilizer, prevent its packing, and to drop it uniformly.

TELLURIAN.—George Shotter McKenzie, New York city, assignor to William J. Gordon, Cleveland, Ohio.—A wheel and pin, an intermediate wheel hung to a frame, and a loose and spokeless wheel combined with a forked frame and driving wheel, are the features of this simple yet evidently well designed piece of apparatus for the illustration of all the important changes, movements, and phenomena produced by the motion of the earth and moon.

CAR TRUCK.—Lemuel I. Fleming, Mobile, Ala.—This invention has for its object to improve the construction of railroad car trucks in such a way as to make them stronger and better than the trucks constructed in the ordinary manner, to prevent the possibility of the brake bars falling upon the track, and at the same time to allow the truck frame to have a free vibration. The invention is ingenious and practical, while, we judge, it may be cheaply applied

[OFFICIAL.]

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DESIGNS PATENTED.

5,510.—HAND STAMP.—W. H. Golding, Chelsea, Mass.

5,511 to 5,513.—OIL CLOTHS.—H. Kagy, Philadelphia, Pa.

5,514.—TYPE.—J. Lindsay, Brooklyn, N. Y.

5,515 to 5,517.—FLOOR OIL CLOTHS.—C. T. Meyer, Lyons Farms, Elizabeth, N. J.

5,518.—CARPET.—E. Pyne, Morrisania, N. Y.

5,519 to 5,527.—CARPETS.—R. R. Campbell, Lowell, Mass.

5,528.—PULL FOR DOORS, ETC.—H. Herit, New York city.

5,529 to 5,538.—CARPETS.—H. Horan, Newark, N. J.

5,539 & 5,540.—IRON PEDESTAL.—M. D. Jones, Boston, Mass.

5,541.—SHOE.—G. E. Leathe, Reading, Mass.

5,542.—CARPET.—J. Wade, Palmer, Mass.

TRADE-MARKS.

653.—BREAD.—J. F. Kohler, New York city.

654.—WATERPROOF GARMENT.—H. Kuhlman, Boston, Mass.

655.—WOOLEN CLOTH.—Middlesex Company, Lowell, Mass.

656 & 657.—WHISKY.—T. E. Moore, Shawhan, Ky.

APPLICATIONS FOR EXTENSIONS.

Applications have been duly filed and are now pending for the extension of the following Letters Patent. Hearings upon the respective applications are appointed for the days hereinafter mentioned:

20,196.—STEAM ENGINE.—D. Barnum. April 17, 1872.

20,098.—SHINGLE MACHINE.—J. R. Hall. June 5, 1872.

20,245.—GUIDE FOR SEWING MACHINES.—L. W. Serrell. April 24, 1872.

20,263.—GUARD FOR HARVESTERS.—L. Miller. April 24, 1872.

20,175.—SEWING MACHINE.—E. H. Smith. April 17, 1872.

20,267.—THICK WOVEN FABRICS.—J. Gajer. May 1, 1872.

EXTENSIONS GRANTED.

19,258.—FLASK FOR CASTING WHEELS.—F. Nishwitz.

19,252.—PLATE FRAME FOR PHOTOGRAPHIC CAMERA.—W. & W. H. Lewis.

19,318.—LAP JOINT.—H. Underwood.

19,321.—PLOW.—G. Watt.

19,328.—CANE GUN.—J. F. Thomas.

Inventions Patented in England by Americans.

From January 19 to January 25, 1872, inclusive.

[Compiled from the Commissioners of Patents' Journal.]

AXLES AND WHEELS.—E. Doty, G. W. Miltimore, Janesville, Miss.; R. Mickel, Chicago, Ill.; I. Mickel, New Lisbon, N. Y.

CLUTCH FOR BRAKES, ETC.—F. G. Bates, Springfield, Mass.; R. Baker, Middletown, P. Ferguson, New Haven, Conn.

COPYING PRESS.—A. Le Clercq, New York city.

DIAPHRAGM MOTOR, ETC.—W. E. Prall, Washington, D. C.

ELEVATOR, ETC.—T. Silver, New York city.

FIRE ARM LOCK.—W. F. Parker, Meriden, Conn.

LUBRICATOR.—W. A. Clark, New Haven, Conn.

POWER FOR TRACTION ENGINES, ETC.—W. W. Hanscom, San Francisco, Cal.

SEAL LOCK.—American Seal Lock Company, New York city.

SHUTTLE BOX, ETC.—J. Brierly, Worcester, and J. Brierly, Millbery, Mass.

WOOD PAVEMENT, ETC.—B. B. Hotchkiss, New York city.

NEW BOOKS AND PUBLICATIONS.

We are in receipt of the REPORT OF THE CHIEF SIGNAL OFFICER OF THE WAR DEPARTMENT for the year ending June 30, 1871. It is an interesting and important document.

AMERICAN LOCOMOTIVE ENGINEERING AND RAILWAY MECHANISM. With a Practical Treatise on the Material, Draughting, Construction, and Management of the Locomotive Engine and Railway Cars. Illustrated with Large and Detailed Engravings, Diagrams, etc. By G. Weissenborn, Mechanical Engineer. Published by the American Industrial Publishing Company, 267 Pearl Street, New York.

This is a work to be sold to subscribers only. The large plates are folio size, while the printed text is of large quarto size. The plates are beautifully executed, and the typography is good. We wish we could say as much as to the treatment of the subject in the text. From what we can judge of the first number, the work will prove more a compendium of facts extracted from various sources than an exhaustive treatise upon locomotive engineering, pure and simple. We are not wholly sure that the facts do not contain some misstatements—*vide* the following, which, appearing on page 5, will certainly astonish some chemists. The statement is this: "Up to within the past few years, these two bodies (hydrogen and oxygen) have been considered as gases; but a series of remarkable experiments which were conducted in France, and repeated in the laboratory of Dr. Doremus, of New York city, seem to prove the astounding fact that the base of hydrogen is *a metal*." This statement will be truly astounding to those who are acquainted with the history of hydrogen, and who are not aware that the gentleman mentioned has thrown any great light upon its real character, or confirmed authoritatively the researches of lesser lights in Europe. However, the work is beautiful in execution, and calculated to interest locomotive builders and engineers.

FIRST LESSONS IN PHYSICS, for Use in the Upper Grades of our Common Schools. By C. L. Hotze, Teacher of Physics in the Central High School, Cleveland, Ohio. St. Louis: Hendricks & Chittenden.

A book of this character, placed in the hands of pupils in the higher grades of common schools, would undoubtedly do much good. The plan is a good one, strictly in accordance with the method of object teaching, and consists in the description of simple experiments illustrative of elementary principles and facts in physical science, with remarks upon them calculated to elicit thought, and lead to the inference of other facts and principles. Extreme care should, however, be used to avoid errors in a book of this kind, as early misconceptions are so hard to eradicate. Glancing through the pages of this work, we see some typographical errors, as well as some errors of a graver sort. On page 22, the term adhesion is repeatedly used to denote that species of attraction known to physicists as cohesion. On page 60, in speaking of the equilibrium of a lever, the term power is used to denote a purely static effect. On page 113, we are told, a locomotive or steamboat could never have been thought of without circular motion. These are errors which we light upon hap-hazard, and which, on that account, are more evidence that the book has been too hastily prepared.

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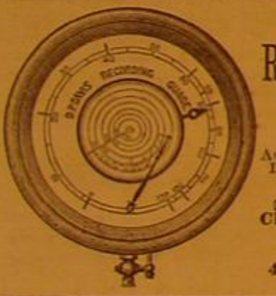

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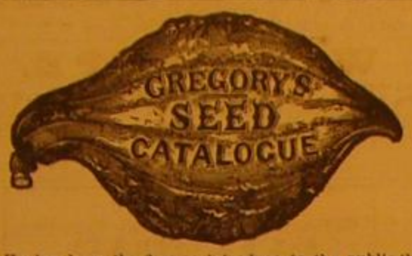

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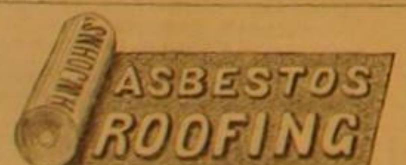

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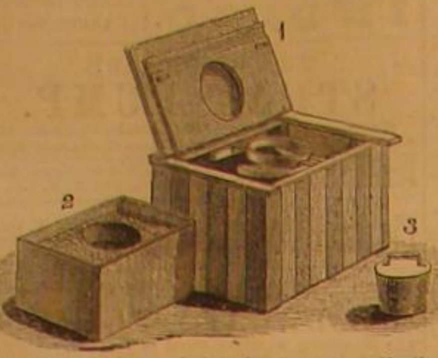

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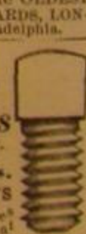

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