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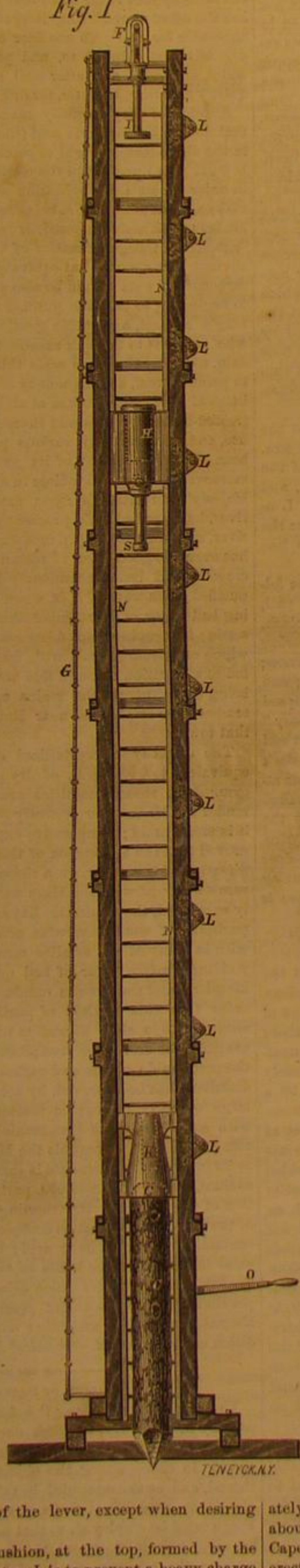
Shaw's Gunpowder Hammer for Driving Piles.

This method of operating hammers for driving piles and for other purposes, is now attracting great attention in the engineering world.

The machine is constructed of heavy wood framing, as in the ordinary pile driving mach'ne, and is provided with a cylinder head of cast iron, K, resting on the top of the pile, C, and guided by the iron rails, N; the cylinder is bored out on its upper end for the reception of a plunger, S, of the hammer, H, and iscast concave on its lower end for the reception of the pile, C. The hammer, H, is guided by the rails, N, (the same as the cylinder)and is bored on its upper end for the reception of a piston, I. It is cast with a V-groove for the reception of a friction rod, M, Fig. 2, to be used as hereafter described. The piston and rod, I, are connected with a cross beam, firmly fixed at the top of the frame, where a rope pulley, F, is also placed for the convenience of hoisting the piles in position. The friction rod, M, is connected with the starting lever, O, and also with short cast-iron arms pivoted to brackets, L, Figs. 1 and 2, for the purpose of pressing tightly against the V-groove in the hammer, as shown in Fig. 2, whenever the hammer moves in a downward direction. A ring is made of steel and screwed on the end of plunger, S; this ring, though of solid steel, expands under this pressure, the same as hydraulic packing, and makes a tight and durable packing.

Fig. 1

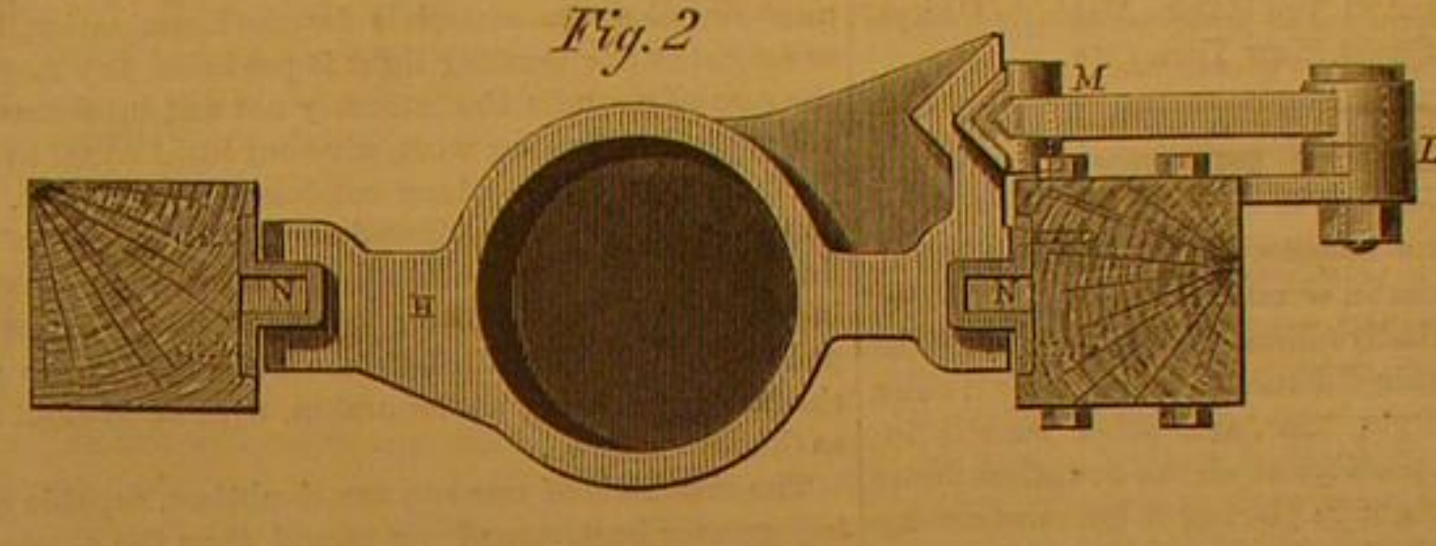


The machine is operated and controlled by a man and boy; the latter is stationed at the rope ladder, G, and throws a cartridge of powder into the cylinder, K; when the hammer is allowed to drop by the man's pressing upon the lever, Q, which elevates and releases the friction rod from the hammer and causes it to drop, forcing its plunger into the cylinder, compressing and heating the air contained therein sufficient to ignite the powder, whenever the plunger comes in contact with the cartridge and tears the paper, so that the heated air may come in contact with the powder. The explosion of the powder elevates the hammer, and the recoil of the cylinder forces the pile into the ground. When the cartridges are thrown at the rate of fifty per minute, the hammer is operated without the use of the lever, except when desiring to cease operating.

The object of the air cushion, at the top, formed by the bore in hammer, H, and piston, I, is to prevent a heavy charge from injuring the machine.

The powder employed is of the most simple character, being composed of one and a half parts chlorate of potash, and one part of bituminous coal, both pulverized and mixed through an ordinary sieve. This powder burns very slow in the open air; a barrel full might be ignited at once without causing any report. The charges of powder are exceedingly small, a charge of one third of an ounce being employed to throw a hammer of six hundred and seventy-five pounds

Fig. 2



weight, and it exerts a force on the head of the pile equal to a dead weight of three hundred thousand pounds for a temporary period. The pressure is exerted on the head of the pile during the presence of the plunger in the cylinder; this gives a blow and pressure of the character of the hydraulic press, with the rapidity of the hammer; hence the pile can be driven more rapidly, and forcibly, and firmer, without in any way injuring or splintering it, as in the common method of driving. The usual wrought iron ring, secured to the head of the pile, preparatory to driving, is, in this method, entirely dispensed with; and it is estimated, that even this trifling advantage will nearly pay for the powder employed.

Piles can now be driven so rapidly as to constantly employ a steam engine in pulling to and hoisting the piles in position.

It is believed that it will take fifty per cent less piles, when driven in this manner, as the pile is not shattered by riveting blows which destroy the strength of the wood, nor is it vibrated (like a piano string), throughout its length, by sudden raps which destroy, to a great extent, the lateral adhesion.

A Committee of Engineers, composed of W. W. Wood, Chief Engineer of U. S. Navy, H. L. Hoff, of the Eagle Iron Works, Philadelphia, and T. J. Lovegrove, Inspector of Steam Boilers, Philadelphia, appointed to investigate the operation of this invention, give the most flattering report, indorsing fully all of the above statements. It is also recommended, in the highest terms, by no less than twenty-seven gentlemen, engineers of note, presidents of railroads, etc., who have seen it in operation, and confirm its great superiority to all other methods of pile driving.

Any further information may be obtained by addressing Gunpowder Pile-driving Co., 505 Minor st., Philadelphia, Pa.

Remarkable Mirage in the English Channel.

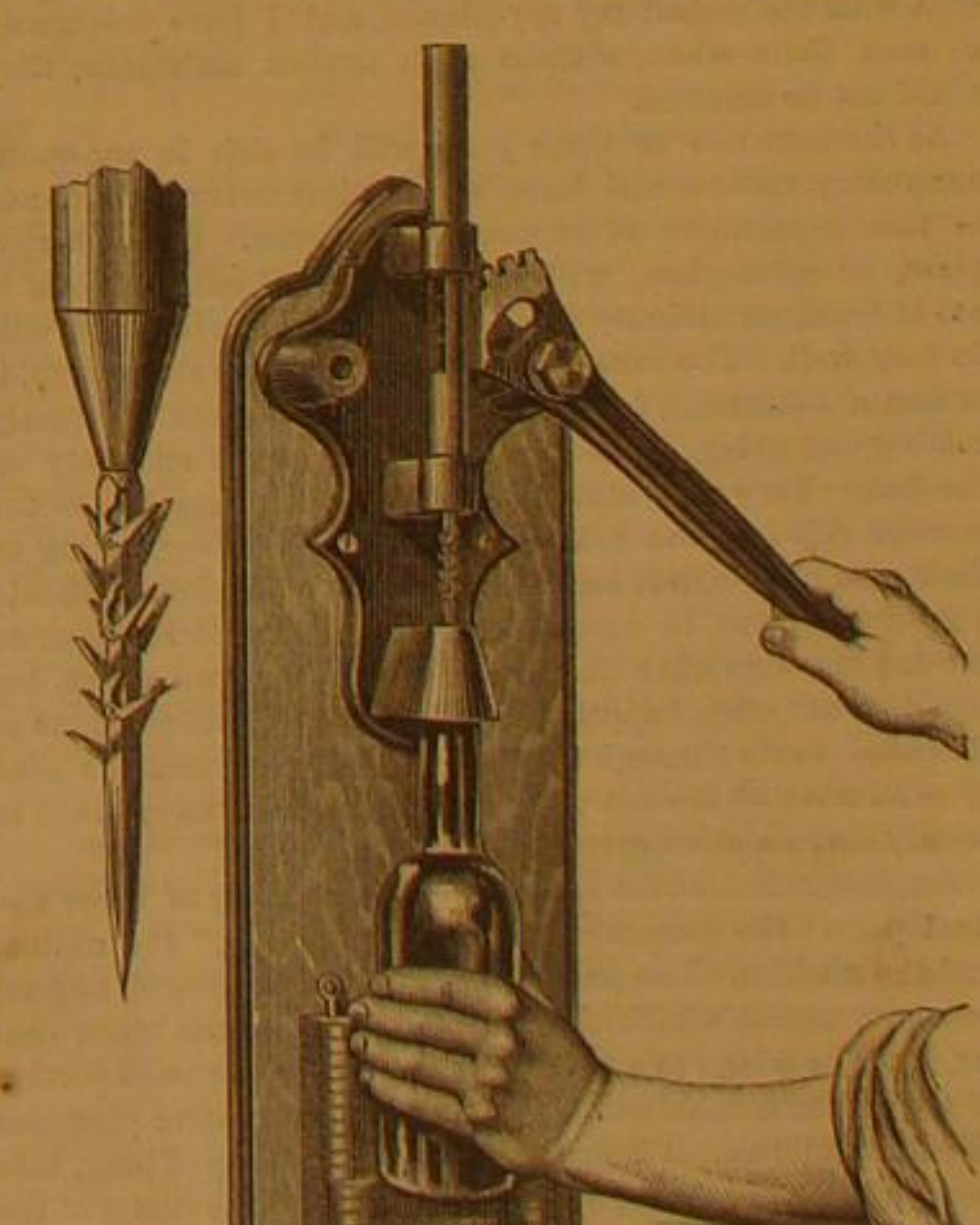
Mr. John A. Parnell, F.R.A.S., communicates to the *Philosophical Magazine*, an account of a remarkable mirage which occurred in the English Channel, April 13th, about 2 P.M.

During the morning, and up to two o'clock, P.M., a dense fog had hung over the sea; but, apparently it was not very deep, as the sun's rays penetrated it pretty freely. At the hour above mentioned, the fog opened toward the southeast, disclosing the cliffs on the French coast; and, in the course of a few minutes, the fog had disappeared, leaving the atmosphere in a state of unusual transparency. The French cliffs were apparently so lofty, and, with every indentation, so clearly visible, that one might easily have imagined that they were but ten miles distant. On examining the objects in view through a small telescope, with a 25-power, it was at once apparent that this arose from something more than common looming. The French coast could be seen from near Calais, toward the east, far away, and many miles beyond Boulogne, toward the southwest; the land in the latter direction being ordinarily invisible, as it is situated below the horizon. Immediately under the erect image of the coast was an inverted one of about double the hight of the former. The light-house at Cape Gris-nez gave five images in a vertical line, the lowest erect, but somewhat magnified; above that, and separated from it a pair of images of the center and highest portion of the building only, one erect and the other inverted; and over these another pair, the inverted image being like the former one, but the erect image showing the whole building. Over Boulogne, in the air, were two images of the double funnels and the mast of a tug boat, the lower image being erect and the upper inverted, the two lines of smoke bending, the one upward and the other downward, and both toward the west, till they joined together. The only tug-boat near Boulogne, at the time, so far as could be ascertained, was in the harbor. The cathedral was plainly visible, but only gave a single image. Toward the southwest, beyond the French coast, some fishing luggers were observed, hull down so that the position of the horizon could be ascertained; over these were pairs of images of vessels which, ordinarily, would have been invisible. In some instances three and even four pairs could be observed, placed in a vertical line, the lower image in each pair being inverted. With the exception of the uppermost pair, the images seemed to represent the maintop gallant sail only, and that considerably elongated; but the highest erect image showed the mizen and the fore masts and the jib, but in no instance could the hulls be seen. The inverted images were about twice the hight of the erect. Soon after three o'clock vessels between the observer and the horizon began to be affected. The *Varne* light ship, about 8½ miles from the English coast, had her mast, flagstaff, and stanchions elongated to some three times their proper length; this effect lasted for about ten minutes, when they shrank to less than half their usual size, and the hull began to rise till it was nearly as high as it was long, and formed a most conspicuous object, even to the naked eye. Upon looking toward Dover, the pier seemed completely disorganized; it appeared to be divided in half, longitudinally, with the sea in the midst, and the stone coping moved as if huge waves were agitating it. At four o'clock the phenomena ceased.

IMPROVED CORK EXTRACTOR.

This is a new, unique, and powerful instrument for extracting corks from champagne, porter, and other bottles where the corks are wired down; and it not only enables the cork to be quickly and certainly extracted, but obviates all previous cutting or breaking of the wire.

It consists of a stout, vertical shaft, actuated by a lever, toothed sector, and rack, and having at its lower end a spear with pivoted barbs. This spear is shown in detail at the left



of the principal engraving.

In operation the bottle is seized by one hand, and the top of the neck is thrust into a funnel-shaped projection at the lower part of the cast-iron plate to which the movable parts are attached. The bottom of the bottle is pressed back toward the wooden support of the apparatus, and rests upon one of a se ries of shelves about three eighths of an inch in thickness, and having their front edges recurved. The shelves above the bottom of the bottle are pressed backward against springs with which each shelf is supplied, so that when the bottle is removed they are again advanced uniformly. This arrangement gives a firm support to bottles of very different lengths.

The bottle being placed as described and as shown in the engraving, the hand grasping the lever is raised; this thrusts the spear into the cork and a reversed motion of the lever opens all the pivoted barbs in the position shown in detail at the left of the engraving, and draws the cork, breaking the wires etc., at the same time. Subsequent corks being drawn face the first up along the spear, until finally it is split by the conical end of the vertical shaft, and flies off out of the way.

Four motions, two with each hand, draw a cork in less time than the wire could be broken by the old method. By substituting a punch in place of the spear, and placing a small funnel to receive the cork, this machine can be used to cork bottles with great rapidity.

Patented through the Scientific American Agency, July 13, 1869, by Charles G. Wilson, of Brooklyn, N. Y., who may be addresed for the entire right at the Holske Machine Company's office, No. 528 Water Street, New York City.

FACTS CONCERNING THE SUN.

When we contemplate the benefits of the natural world, we do not often realize what a wonderful object is the sun, and how manifold are the kindly offices it constantly performs for us. From an inconceivable distance in space truly it rules the earth, imparting to it light, heat, and other subtile influences, and rendering it a possible abode for countless forms of life. The ancients were right in placing it foremost among the grand objects of creation, and we can hardly wonder that it was early chosen by idolatrous nations as an object of worship.

Of its size and distance the first astronomers had no true conception. Anaxagoras, who lived 430 years before Christ, claimed that it was as large as the whole territory of Greece, for which he was heartily laughed at. In later times, Leonard Digges, a quaint English philosopher of the sixteenth century, estimated its distance at 64,811¼ miles, which is, in reality, barely a fourth of the distance to the moon! At the present day we smile at such guesses, knowing that the Grecian peninsula would, if laid on the sun, be absolutely invisible when looked at through our largest telescopes, and that, as regards the distance of the great orb of day, our friend Digges does not give us a thousandth part of the truth.

If we attempt to obtain a conception of the vast magnitude of the sun, we find ourselves thoroughly bewildered. Were we at its center, our moon would revolve in its orbit but little more than *half way to the sun's surface*. If it were a hollow sphere, there would be sufficient room to accommodate more than 1,200,000 balls the size of our planet. The earth is a mere homeopathic pill in comparison with such a body; and if projected on its bright disk, would, from our orbit, be absolutely invisible to the naked eye. Illustrations like these do little more than show that by no effort of the imagination can we obtain a satisfactory idea of the gigantic proportions of the nearest fixed star—our sun.

When viewed with a small telescope, care being taken to shield the eye with dark-colored glass, dusky spots are often detected on the solar disk. At the present time they may be seen with the veriest toy spy-glasses, and I have frequently so seen them when, without such modest assistance, they could not be detected.

As the next two or three years will be rich in sun-spots, our young readers will have ample time to try their hands in this department of astronomical science. Either a spy-glass, or opera-glass, will answer; and if colored glass is not at hand, an ordinary piece, smoked in a candle flame, will do very well. You must not, however, give up the search, if at first unsuccessful, for the curious blotches are constantly coming and going, and sometimes appear quite suddenly on the disk. They pass slowly across from the eastern to the western side in about fourteen days, not, however, owing to their own motion, but because of the sun's rotation. Should a group continue in existence so long, it would reappear on the eastern edge after the lapse of another two weeks, but this does not often happen. It is by means of observations of this kind, made through a long series of years, that the time of revolution of the sun upon its axis has been ascertained as twenty-seven and a quarter of our days.

Astronomers describe sun-spots as consisting of three distinct parts; the penumbra, or "almost-shadow," the umbra, and the nucleus. The penumbra consists of a grayish appearance, not unlike a dark cloud, which encircles the black center, like the fringe to a mat. It is the most conspicous portion of the phenomenon, and from its varying character possesses the chief interest. It is most frequently made up of long, thin wisps of cloudy matter, extending inward to the center of the spot.

The nucleus is but a darker part of the already deep brown, or black umbra. It is only seen under favorable circumstances; as when the telescope is a large one, and in good working order, the atmosphere clear and still, and the observer's vision acute.

One of the most interesting features of the sun's surface is the delicate mottling which may at almost any time be detected, if the atmosphere is moderately free from vibrations, and the telescope a good one. To see it satisfactorily, an instrument, in which the principal lens measures two or three inches across, is necessary. We may compare this mottling to the appearance of tissue paper held up to the light; or better still, to the tufted surface of light gray chinchilla cloth, such as is used for heavy winter overcoats. But best of all, we may liken it to the snow-white ends of coral branches.

The mottling of the sun would seem to vary considerably in appearance from time to time; sometimes resembling a sky covered with mackerel clouds, and then again presenting the compact and well-defined arrangement of the coral tips.

Let us consider for a moment what happens in the case of the union of the little black points alluded to. The bright envelope called the *photosphere*—which is what we see when we look at the sun—is evidently pierced in some unaccountable manner; and the rent growing larger and larger, a deep cavity in the luminous covering ensues, and the penumbra is formed. Should the cause of the phenomenon prove sufficiently violent, the true body of the sun is then seen through rifts in the cloudy strata. But instead of being white—dazzlingly so we should expect to find it—it has a dark brown tint. This is, however, an effect of contrast, just as coal fires look dull in sunlight, and the calcium light positively black, if placed between our eyes and the sun. The central mass supplies the materials for the illumination, but is not as bright as the dazzling light it produces, any more than in the case of a candle, the intensely hot and luminous gases enveloping the glowing wick, give out light equal to the upper portion of the flame, where combustion is perfect. Thus a sun-spot is by some considered as a tearing aside of the long flames issuing from the liquid or gaseous sea beneath, revealing the less brilliant lower strata of flame (to our view the penumbra), and the still less luminous body of the sun itself, the latter appearing as the umbra, with or without a nucleus, as the case may be.

The materials of our sun are, doubtless, capable of producing greater heat, pound for pound, than the substances usually employed by us for the same purpose. Recent researches in chemistry would seem to point to a more elementary condition of matter in the stars and nebulæ, than any with which we are acquainted on the earth. Who can say but that the production of our terrestrial elements was accompanied by displays of light and heat similar in intensity to those now witnessed in the sun and stars. This theory has great support in the constantly accumulating facts which the spectroscope is bringing to our attention.

One of the most impressive sights which ever falls to the lot of man to witness, is that of a *total* eclipse of the sun. Such an event is comparatively rare for any one part of the earth's surface, so that one may live to a good old age, and die without having witnessed such a phenomenon. In London, for instance, there has been no total eclipse since the year 1715; and more than five and a half centuries had then elapsed since the previous one.

The characteristic features of such an occurrence are the following: The peculiar gloom which spreads itself, like a pall, over the landscape; the changing tints of the sky, black, orange, indigo, red, sickly yellow, and leaden hues appearing at one and the same time, in different portions of the heavens; the awful approach of the moon's shadow in the air; and lastly, the magnificent circle of light around the eclipsed sun, called the *corona*, which is compared to the "glory" around the head of a saint, in an old painting. We might add to these the rosy flames frequently seen issuing from the dark limb of the moon, but in reality connected with the solar atmosphere. These flames are often to be seen with the naked eye. During the past year they have been analyzed by the spectroscope, and found to be masses of self-luminous hydrogen. Finally, the larger planets, and some of the principal stars, are occasionally recognized by acute observers during the period of totality, as the gloomiest part of the eclipse is called.—*W. S. Gilman, Jr., in the Riverside Magazine.*

Purifying Water.

It is a well-known and generally observed fact that the water of rivers, canals, and some lakes is never quite clear. This turbidity, which often remains even after many days of quiet rest, is partly due to inorganic substances floating about in the water and suspended therein, but is far more frequently caused by matters of an organic nature too minutely divided and too small to be readily recognized, even by a powerful microscope. The researches of some of the members of this report have undeniably proved that, at least as far as the Netherland waters they submitted to research are concerned, this turbidity is due to extremely minutely divided clay, by the aid of which a great deal more of organic matter than could otherwise remain suspended is kept in such an extreme state of division as to pass through filters and not deposit, even after many days of rest. When, to such kinds of water, a solution of alum (from 1-50,000th to 1-100,000th of the bulk of the water) is added, it will be observed that after a longer or shorter lapse of time a flocculent precipitate is formed, which is either alumina or a basic sulphate thereof, which flocculent material takes up all the turbidity of the water, leaving that perfectly clear; the precipitate thus formed has been submitted to chemical tests, and it was found to contain a large quantity of organic matter, and to yield, on being heated with soda-lime, ammonia very largely.

Since the committee was instructed to ascertain and discover the means of improving the condition of the potable waters where it was required, this especially also applied to the towns and villages whose chief supply of water for domestic and drinking purposes depends upon that of the river Maas, along the banks of which, in the lower portion of its seaward course, the population is entirely dependent upon its water; which has been almost from time immemorial known to produce, in those not accustomed to its daily use, a diarrhea, which in certain individuals is accompanied by very unpleasant, if not always, therefore, dangerous symptoms.

The water of this river has been analyzed over and over again by many eminent scientific chemists, and has been submitted to microscopic research, but no trouble, nor anything science could, armed with its best weapons, bring to bear on this research, has ever revealed the precise cause of this peculiar property, which is not possessed by the water of the same river, nor also by that of the Rhine, higher up its course.

For curiosity's sake, we here quote the result of one of the most recent analyses of this water taken at flood tide at Rotterdam: Physical properties, very turbid, does not become clear on standing, is not rendered clear on addition of a few drops of hydrochloric acid; taste—not quite unpalatable; solid residue—dried at 120° C., yielded, for 1 liter, 0·195 grm., containing 0·055 of combustible matter; earthy salts 0·0975 grm., containing 0·048 sulphate of lime, chlorides of alkalies, 0·0233; ammonia, none; slight trace of nitrates; dry residue had a yellow color before ignition.

It is a highly important fact, and one of very general importance to learn, that Dr. J. W. Gunning, of Amsterdam, has found that the perchloride of iron added to this water (and the same applies to far more foul waters experimented upon) has the effect of rendering it perfectly wholesome and even agreeable for use. To one liter of water, 0·032 grm. of the dry salt just alluded to, and previously dissolved in pure water, are added, and, after well stirring the liquid, it is left quietly standing, to settle, for full thirty-six hours.

A series of very carefully made experiments has proved that no free hydrochloric acid (the quality thereof contained in the above-stated weight of perchloride of iron only amounts to 0·021 grm.) was left in the clarified and purified water, but in order to suit the application on the large scale, and to make assurance doubly sure, as regards any acid or perchloride being left undecomposed, or rather uncombined, with the organic and inorganic matter of the water, Dr. Gunning has advised that a small, but equivalent, quantity of crystallized carbonate of soda should be also added some hours previous to beginning to take the purified water for use. At Dr. Gunning's request, a scientific gentleman of high attainments, who happens to have an excellent opportunity, near Rotterdam, to try on the large scale this process, has submitted it to practical test, and a quantity of no less than about 240,000 liters of Maas water, taken at all times of the year, has been treated by this process, and thereby rendered perfectly fit for use, and consumed by various parties, has proved to have been entirely deprived of its property of causing diarrhea; moreover, the medical officer in charge of the crew of Her Majesty's corvette the *Lynx*, moored off Rotterdam, in the river, has applied this process to the water taken from the river, and found by experience that the thus purified water has even the good effect of restoring to health such of the crew as had been incautiously drinking the not previously purified Maas water. It is, when using this means of purifying bad water, of great importance to let the sediment quietly settle; it occupies about 4 per cent of the bulk of the water, which on the large scale will, for security's sake, be submitted to a filtration through fine well-cleansed sea-sand before being sent through the mains of the large waterworks intended to be established near Rotterdam for the supply of that town.

The quantity of crystallized carbonate of soda which is equivalent to 0·032 grm. of dry perchloride of iron is 0·085 grm.; both these quantities are the maximum required to render the Maas water perfectly pure, even at the time when it is most turbid; comparative experiments have conclusively proved that the application of this process is very superior to filtration of the water, even through animal charcoal. The result obtained with the Maas water having been so eminently successful, the committee has applied this method to the purifying of water otherwise non-drinkable, such as is met with in many of the smaller canals, brooks, and also pumps yielding surface water of bad quality in many parts of the kingdom, and the results obtained are such as to justify the order that this method of purifying must be applied by authority to a class of waters which, thus treated, become available for use. The precipitate formed by the addition of the perchloride of iron and carbonate of soda, both previously dissolved, has been proved, by accurate analysis, to contain a large quantity of organic matter, which, on being ignited with soda-lime, yielded ammonia very largely; analysis has also proved that, as regards the Maas water, the only addition to its inorganic constituents is that of one part of chloride of sodium, by weight, in 40,000 parts of water by the application of this process. Dr. Gunning has found that the effect of the perchloride is not so conspicuous with some well waters containing much carbolic acid; while, moreover, there may exist in some of these kinds of waters, either in quantity or quality, inorganic salts which delay or altogether impede the peculiar mode of flocculent precipitation observed with the aboved-named Maas and other waters to take place after addition of the iron salt.—*Chemical News.*

Forms of Saw-Teeth.

The rules for regulating the forms of saw-teeth must necessarily be arbitrary, as much depends upon the nature and quality of the wood, and the direction in which it has to be sawn. In cross-cutting, the object is to sever every fiber or thread, and as the material in this direction is almost non-elastic or unyielding, teeth of an acute and nearly lancet-shape must be employed, so that acting like a series of knives in rapid motion, they cut the threads asunder rapidly and sweetly, the saw-dust produced having a fine granular appearance. On the other hand, in ripping or cutting with the grain, the desideratum is to separate the texture, as it were and as in so doing the teeth do not meet with so much resistance and resilience from the filaments as in cross-cutting, they may be made much larger and coarser, thereby producing small shavings or chips, rather than saw-dust. The nature and quality of the material to be sawn has considerable bearing on the configuration of the teeth, which, following the general law of cutting tools, and agreeably to common usage, have to be more obtuse or acute according to the disposition of the substances opposed to them. Soft and pliable woods, such as pines, willow, alder, limes, etc., require the use of large teeth with acute points and considerable pitch, whereas hard woods, or those of a tougher and denser consistency, as oak, mahogany, rosewood, etc., necessitate the adoption of teeth of perpendicular pitch and diminished space. Yellow deal, pitch pine, larch, etc., are of so gummy and resinous a character, that the teeth require not only more set but the blades themselves have to be smeared with grease, to keep them cool and decrease the friction arising from the adherence of the resin during motion. Similar results are experienced in working soft woods; the teeth become choked by the damp consolidated saw-dust, and obstinately refuse to perform their duty without extra force.—*Worssam on Mechanical Saws.*

LIGHT.

The palace keeps out the light, and the sanctuary keeps out the light. If rich men build their houses on broad avenues instead of the narrow lanes, which were streets in the former ages, they are not any more ready to let in the light from these open spaces; the drawing-rooms on the boulevard are just as dark as the chambers in the alleys of Rome or Cairo. In quantity and quality of brightness, there is nothing to choose between a house on Fifth Avenue and the interior of a house in the Jew quarter of Frankfort during most hours of the day, and most days of the year. You see as little light upon the gay and flowered carpet as upon the smirched and dingy floor. If the windows are wide and numerous, they are effectually hindered from their proper service by double or triple folds of drapery hung behind them, curtains of red and brown, thick shades, or opaque shutters. But the chances are that some false model of the architect has lessened the number of the windows themselves. How many of our newest houses seem to copy those medieval castles of German and Italian cities, and show rare slits or loop holes in place of the many windows of the last age of Puritan building.

In church building this tendency to shut out light is carried to even worse excess. The narrow lines of aperture in the walls between the useless buttresses are plated with ground glass, or with that cheap imitation of the ancient painted glass which exhibits the faces of Apostles and the scenes of the Gospel story in tawdry ugliness, varying this libel upon art by signs which mean nothing to the worshipers. Instead of the cheerful light upon the faces and forms of living men, we have the painful postures of leaning and agonizing saints, which transmit the hues, but not the shades and softness of the rainbow.

Another method of shutting out the light from house and church, more respectable, but not less sure and injurious, is in excessive tree planting. Trees are good, but we may have too much of a good thing. Trees are good, but sunlight is better, and if we cannot have them both, we had best keep the light and dispense with the trees. Trees are good in their place, but their place is not in front of windows, or anywhere that they can stop the sun from entering the house. There is sanitary virtue in the resinous breath of a pine forest, yet it is suicidal folly which will environ a house with thick evergreens, whether in city or country, destroying so the landscape of the rooms and doubling the desolation of winter. Such delicate and swaying shade as the branches of an elm can throw to break the blaze of the summer sun is well enough, but the somber shade which is solid and unyielding, fixed for all seasons, and stubborn against the sun, is only evil before our windows. For eight months, at least, of the year, the sunlight should have no barrier of any kind to hinder its entrance to the house; and for the remaining months, it should have easy evasion of the light foliage. Trees are not ornamental when they hide the house, and they are not healthful when they darken it.

This exclusion of sunlight from house and church has, nevertheless, its confident pleas of defense. There are weak eyes which cannot bear the light, and they must be protected. There are precious carpets, and their colors must not be faded. There are draperies which the sun's rays will spoil, and fine furniture which will be ruined, if too much brightness be thrown upon it. In summer, heat goes with light, and only darkness will keep in the air a tolerable tone. Only a few can afford the luxury of a new upholstery for every year, and it is mortifying to see that tapestries just hung in their place are already antiquated. Light may be pleasant, but if it brings opthalmia, it nullifies its own work. The argument which would shut it out seems very practicable and unanswerable. Until some saving process for furniture and for sight shall be invented, we must be content to live in the shade.

The doctors are unanimous in urging the sanitary virtues of sunlight. On this point all the schools agree—homeopathic, Allopathic, Hydropathic—and all consent that the sun has a first rank as a "healing medium." No pills, no powders, no lotions, no fluids are so potent in their influences, so infallible in their "exhibition" as this imponderable ray, which is never spent. Galen, Hahnemann, and Priessnitz alike, assume that light is essential to the effect of their remedies. The medical theory that a sick chamber must be gloomy and dark has ceased to have favor in any method of practice. A first requisite in choosing a site for a hospital is that it shall be sunny. This is quite as important as that it shall be dry; and, indeed, if it is not sunny, it can not be dry. The perfect hospital will be that which shall have the sun on all sides all the day, if the light can be so twisted by any Irish genius—which shall let it fall on all the beds in all the wards. In our recent war, the unlucky patients who found themselves billeted on the shady side of the hospital wards, had the trial of knowing that their confinement would probably be doubled; a severe wound on the sunny side would heal more quickly than a slight wound on the shady side. Even with the best ventilation, the malaria would cling in the blood which had only a northern light to drive it out. One could note the contrast, in passing between the beds of the patients who were sitting or lying in the sun, with those who were condemned to the shade. This large experience of the hospitals in the war converted many who were skeptics about light as a healing agent, and who went into the service with the lingering prejudice that the sick should be kept dark as well as kept quiet. Actinic influence is now not a fancy to be laughed at, but a fact to be considered and used. Hereafter, curtains on sick beds will be not only superfluous but a positive nuisance, to be put aside with all speed.

The exact reason, and the exact way of this sanitary influence of sunlight are not yet fully understood, but the fact is acknowledged. It is an influence which works in all kinds of disease. Inflammatory diseases, nervous diseases, digestive troubles, are all cured by a full supply of the sun's rays. These rays assist other remedies, and are the substitute for many remedies. They work in the Allopathic way upon jaundice and bilious maladies, bringing light out of the darkness; and they work in the Homeopathic way upon pale, lymphatic disorders, changing the unhealthy pallor to the whiteness of health. The direct action of the sun upon the skin is, indeed, dreaded by many, and it is not probable that any protest of a journal of health will lessen the sale of French kid gloves, or drive veils out of use. A white hand and a fair cheek will still be preferred to the bronze and tan of a sun-browned skin. Some protection against the burning of the sun may be allowed. The best sanitary influence of the sunlight is not that of the hot ray directly upon the skin, but rather of the light in the air that is around the body, the light that envelops, rather than the light that impinges upon the frame. The sunny atmosphere, more than the battery of rays, forces the frame into vigor. Reflected sunlight, if we can have plenty of it, is even better than the direct sunlight. The diffused stream, more than the exuberant fountain, dispenses the blessing. It is enough if we are only in the light, and it is not necessary to be always "under the sun." By an arrangement of pivoted mirrors, such as the damsels of Amsterdam use to bring images of the street into their chambers, one may get the disk of the sun itself into the room; but there is no need of that, if the reflected light is allowed to enter freely. This light does not lose its virtue, though it may have been beaten back from wall or tower, and may have taken many paths on its capricious race from its orb in the sky. We may get all the good of the sunlight without being either burned or dazzled, without feeling too sharply the hot hand of the sun upon our head.

The health-giving influence of light is undoubtedly largely upon the mind. It makes us cheerful, hopeful, and buoyant. Whether that cheerfulness comes from the quicker flow of the blood or any change in its globules, or whether it makes the blood flow more swiftly and so gives more strength is of no importance. This we know, that low spirits are not nourished by the sunlight. Happiness in the light is the congenial state, and melancholy is driven back.

We may condense into a few practical rules the substance of these rambling remarks. First, in building, or buying, or hiring a house, choose always a site where there is abundance of light. Avoid dark lanes, neighborhoods where there are high walls, or thick groves, or any obstruction which shuts out the sun. A cottage with three rooms and light in them, is better than a palace with thirty halls and chambers, where the light must be made by artificial aids.

Then, secondly, live in those rooms of the house in which the light has freest entrance, sit in them, eat in them, sleep in them. If any are to be shut up and kept for state occasions, or for the reception of rare visitors, let them be the darkest rooms of the house, the north and east rooms, rather than the south and west. Let the sunny rooms be those which are the most constantly used.

In the third place, have such finish of the house in walls, ceiling, furniture, drapery, decorations, as shall assist and multiply, not absorb and destroy the light. As far as possible, let the brightness that comes into the house be met and repeated by the brightness that stays in the house. Have colors in the furniture that will be brought out and not ruined by the light falling upon them.

In the fourth place, give the light plenty of room to come in at the windows. When a bay window is built, with its treble surface of glass, do not neutralize its excellent gift by a treble fold of damask, and so destroy its beauty and its use. It is bad when two bay windows on the same side of the house, hinder each other's freedom, like the Siamese twins with their fatal ligament. But it is worse when within the house the heavy folds of cushion make the projecting window a useless excrescence, "a wart and a wen," on the side of the house, as Emerson says of the man who has no place in his soul for the sense of God with him.

And perhaps we ought to add a fifth rule, to get as much sunlight as we can in the day by early rising. That constant phenomenon which kindles the rapture of so many makers of verses, but is rarely witnessed in the cities, the rising of the sun, should not be altogether taken for granted. The morning light is good light for health as well as for song. Gaslight destroys more eyes than sunlight, and the wear and tear of evening riot ruin more furniture than any bleaching of the sun through the windows. It is safe to say that at no season of the year should the quantity of artificial light which we use be greater than the quantity of natural light. In the dead of winter the sun ought still to be the first of the torch-bearers. When we have artificial light we ought to have enough of it; and the discovery of kerosene has been a boon to the race, in giving a new lightness to the night. But no amount of artificial light, whether of candles, or oils, or oil from the rock, or magnesium, or oxygen, or the electric current, can match or reach the bounty of that great ever-flowing reservoir in the heaven. What amazing folly, for men who have such large estate in lands and houses and stocks, to shut themselves all day in dark corners, and scheme and figure by gaslight how they may add to their stores! Wiser is the farmer, who sows and reaps under the open sky, than he whose wealth is gained by a light which warms only to lameness and premature old age. The gospel of light needs especially to be preached to those whose work is among warehouses and in the haunts of traffic.—*Herald of Health.*

Moss-Agate Hunting in the West.

A correspondent of the Cincinnati *Commercial* writes from Sherman, Black Hills, Wyoming Territory:

"Pretty nearly every visiter to these hills and the plains is an anxious and excited seeker after 'moss-agates'—a name applied to a species of silicious formation that has been wonderfully and beautifully figured and flowered through the united agencies of iron solutions penetrating it, and then, becoming exposed to the action of the air, going through a sun and wind-drying process after the waters of some river bed or lake had evaporated. Some of these moss-agates are very tastefully inlaid with exact imitations of pine trees, vines, cedar forests, hedges, trains of cars, stars, figures, and almost every imaginable drawing. The agates found along the line of the Union Pacific Railroad are of four different colors, partaking of the names of the places where found, as follows: The Cheyenne brown agate, Granger Water agate, Church Buttes light blue agate, and the Sweetwater cream agate. The two latter are the most valuable, and most delicately formed.

"The most extensive agate beds are found in the vicinity of Church Buttes and Granger, distant about eight hundred and eighty miles west of Omaha. These beds are about fifty yards wide and nearly one hundred yards long, being isolated from each other at a distance of from one to two miles. As you approach them you observe a large patch of smooth, black, round cobble stones, and between these lie, almost concealed, the different sized and shaped moss-agates, and, occasionally sparkling among them, a bright topaz, and brown and yellow streaked carnelian. The intrinsic value of the agate consists in its display of moss, the vine and cedar forest being the most prized for jewelry sets. In one hours time I have gathered a half gallon, some of which are extremely pretty, and I know of no pleasure, either in hunting buffalo or catching trout, half so exciting and so full of glory as the finding of a choice agate. I have seen staid old men search in silence for a few minutes for a 'real shiner,' and when they came upon it pick it up suddenly, take off their hats, swing them in the air, jump up and shout aloud, like schoolboys that had just been let out for a two-weeks' vacation. The very novelty of finding precious stones among black rocks, far out on the plains, many miles from home or habitation, is a delight so pleasing and intoxicating that it takes a mighty nerve to resist the pressure of one's making a most stupendous fool of himself. Good agates are worth, as jewels, from three to five dollars apiece. As novelties they are invaluable."

Mineral Caoutchouc.

Recent communications from Adelaide, South Australia, says the *Chemical News*, have made known the discovery in the southern portion of the colony of a remarkable carboniferous substance, which hitherto has only been found in small quantity in the coal strata of Derbyshire (England). It is a mineral caoutchouc, so called from its general appearance and elasticity. In Australia it is found on the surface of the sandy soil, through which it would appear to exude from beneath, as, burnt off occasionally by the bush fires, it is again found after the winter season, occurring in quantity and of varying thickness. Analysis proves it to yield 82 per cent or more of a pure hydrocarbon oil; its value for the manufacture of gas there will be great, and it is also believed to be applicable to the making of certain dyes. The discovery is also important from its indication of the existence of oils or other carboniferous deposits. This material, known in mineralogy as elaterite, is also found in a coal pit at Montrelais, near Nantes, France, at Neufchâtel, and on the Island of Zante. According to the analysis of the late Professor Johnston, of Durham University, it is a hydrocarbon, containing from 83·7 to 85·5 per cent. of carbon, and from 12·5 to 13·28 per cent. of hydrogen. The variety found in Derbyshire (near Castleton) has a specific gravity varying between 0·9053 to 1·233; the substance is highly inflammable, its color blackish-brown, its luster resinous.

Antiquity of the Wheelbarrow.

M. Le Duc corrects an error that has prevailed in France with regard to the invention of this useful little vehicle. It has been attributed to M. Dupin, who it has been claimed devised it in 1669. M. Le Duc says he has found mention of them in the thirteenth, fourteenth, and fifteenth century MSS., and gives an illustration taken from a vignette of a manuscript of the thirteenth century, of a man propelling a wheelbarrow, the form of which differs but slightly from those now in use.

A Gothic Cottage Villa.

In this illustration, extracted from *Sloan's Architectural Review*, published by Claxton, Remsen & Haffelfinger, 819 and 821 Market street, Philadelphia, we present a design for a rural residence of a size warranting the designation of cottage villa, which, it will be observed, is in the Gothic style.

The intention here is, not to present a conception exhibiting all the elaborate and costly display of the domestic Tudor style, for instance, but one, which, suited to any projector of moderate means, would be characterized by convenience, propriety, and the utmost simplicity of decoration compatible with architectural effect, combined with the most essential of all requisites, economy of construction.

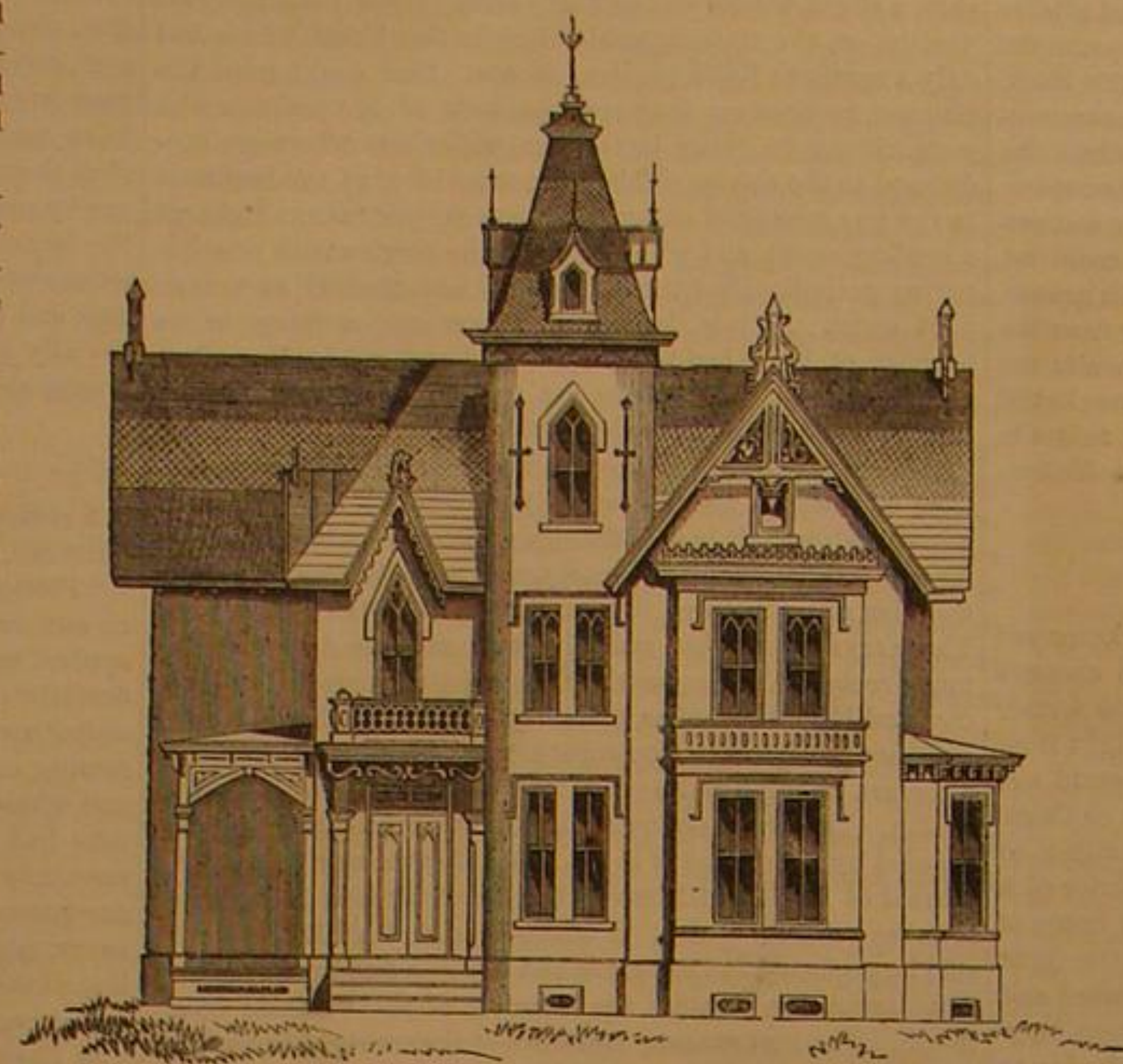
Its general character, and various accommodations will, it is hoped, be easily comprehended by a comparison of the ground plan with the following detailed description of the parts, through the reference letters thereon.

Before proceeding, we may first, however, briefly notice the external decorative peculiarities of the Gothic style in its relation to domestic architecture, as contrasted with its corresponding characteristics in ecclesiastical.

In the first instance, we may name one of the most striking, namely, that domestic Gothic rarely uses pointed windows, but most generally square-headed ones; with a hood molding, conforming with the head, and terminating in elbows. This peculiarity will be observable in the example before our readers.

Another difference is in the doors, the domestic never using the common high-pointed doors with pyramidal labels.

Next to the windows and the doors, the most marked characteristic of this style is the gable, of which there are the simple gable of two lines, following the slope of the roof, and the stepped gable. The apex of the gable is also frequently crowned by the introduction of a slight octagonal shaft, with pinnacle, enriched with ornamental moldings. The high roof is one more peculiarity which we may name; and, although this scarcely admitted much ornament, it was not, however, neglected. Relief from sameness was obtained by the employment of shingles, tiles, or, as in this case, slate of different shapes, producing a pleasing alternation of lines. We have hurriedly noticed the most striking differences, which exist in the Gothic style, according to its application. This subject, nevertheless, deserves a more extended consideration.



GOTHIC COTTAGE VILLA.

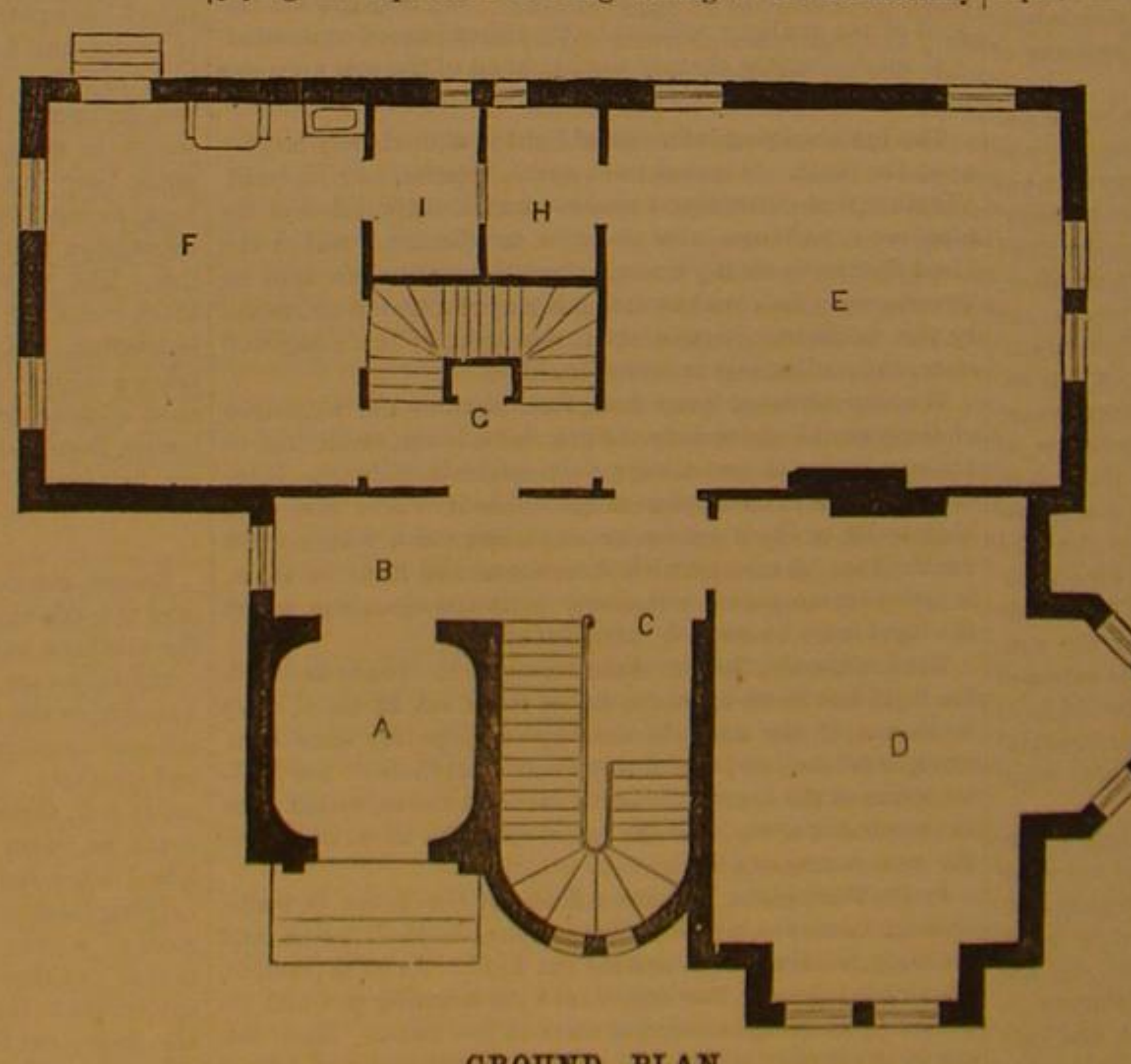
This villa is intended to be constructed of brick, of an ordinary quality, laid to a smooth even surface, with flat joints; will be two stories high, with an attic story within the roof; and painted French gray, or some neutral tint.

We will now proceed to explain the references on the ground plan.

In the first story: A is the vestibule, with rounded corners and tile floor, having glass doors, opening into the hall, B. These doors are made in pairs, and equal in width to the front doors. The hall, B, entered through these vestibule doors, is six feet wide by eighteen feet six inches long, with a return, toward the front, of eight feet wide. This latter portion contains the main stairway, C, is semi-circular on the front, and is continued up above the roof, forming a circular tower, a most effective and striking feature in the design.

Passing through the hall, we enter the parlor, D, an apartment nineteen feet long by fourteen wide, with two bay windows. The one on the side is octagonal, containing three divisions, and that in front is square. This latter projects two feet six inches, with a double, or, as it is usually termed, a twin window; and is carried up two stories in hight, as will be seen at a glance on the elevation.

In the rear of the parlor, but not communicating with it, and also entered from the hall, is the dining-room, E, twenty feet long by fifteen feet wide, a well-lighted and convenient sized apartment, communicating at the rear, through a pantry, H, four feet six inches square, and a kitchen pantry, I, of the same dimensions, with the kitchen, F, fifteen feet by sixteen feet, which is provided with a range and sink.



GROUND PLAN

There is another mode of communicating between the dining-room and kitchen, namely, through the private passage, G, which opens out into the main hall, B, and contains the private stairway.

The porch, on the front, and along the side of the entrance, is accessible from the hall through the end window, which extends to the floor for that purpose. The main entrance door has a slight projecting porch, finished with an ornamental balcony above.

The second story may be arranged to suit the taste of builders, and some alteration would be admissible in the ground plan to suit individual requirements.

Those who are capable of modifying plans ought to be able to originate them, and therefore the elevation of a design is the most important thing for practical builders in rural districts, where services of expert architects are hard to obtain.

History of the Argand Lamp.

No improvement had yet been devised in lamp or candle, when, in 1784, a Swiss philosopher, Argand, invented the circular wick, inclosed in a cylinder of glass. He was a man of uncommon ingenuity, who had already made various useful inventions in other branches of industry, and devoted himself to the study of this great question, how more light could be obtained. He needed lamps in great numbers for his manufactories, and as he had learnt by experience that the wick could not be made thicker without diminishing the light, it occurred to him to extend it in a circle. This increased the size, and at the same time gave him a central space within the ring, through which a current of air was brought to play upon the wick, which prevented the forming of soot and increased the illuminating power. The discovery, which was thus in part accidental, as he had not originally counted upon the advantages derived from the strong draft within created by the heat of the flame, was, nevertheless, at once fully appreciated by the intelligent inventor. He immediately determined to seek a market, and as the English were then enjoying the reputation of being willing to reward liberally every invention that could aid them in developing and perfecting their manufactures, he determined to offer it for sale in London. On the way he came near losing the whole fruit of his labors. Like King Joash of old, Argand could not resist the temptation of exhibiting his treasures to the Assyrians, who were in this case represented by the *savans* of Paris, and one of them at once caught at the principle. While Argand went to England, and there, during the rigid examination to which his invention was subjected, was led to add the chimney, the same discovery was made in France by his rival, l'Ange. Both men had been led almost necessarily to the conviction, that an outer current of air must needs be at least as useful to the flame as an inner current, and as they needed for this purpose a cylinder that should be transparent and yet capable of resisting great heat, both fell upon the same contrivance, the glass chimney of our day. Thus it came about, that while Argand is undoubtedly the sole inventor of the circular form of the wick and the inner current of air, he must share the not less important invention of the glass tube, with the Frenchman, l'Ange. The latter had, in the meantime, presented himself, lamp in hand, before the French Academy, and as the report on his invention was made a few days before his Swiss rival obtained a patent in England, the French people are apt to claim the whole proudly as their own invention. The matter was still further complicated by the strange retribution which befell the favorite of the Academy. He lost, in the annals of science and in the memory of the public, the fame of his discovery. First, it so happened that he thought it best, after the manner of the day, to engage the interest of the leading journal of Paris in his behalf; as he did not know the editor, he prevailed upon a certain Mr. Quinquet to introduce him to the former. The editor, from carelessness or ignorance, stated in the article which he wrote on the subject, and which created a great sensation, that this marvelous lamp with its brilliant light had been presented to him by Messrs. Quinquet and l'Ange. The public, always equally careless and ignorant, did not take the trouble to retain both names, and to this day the lamp is in France simply called a *quinquet*, after a man who had nothing whatever to do with the invention. *Sic ruunt fata.*

Poor M. l'Ange was equally unfortunate, as we learn from Friedrich Mohr's interesting monograph on that subject, when the Government at last decided to bestow upon him the well-earned reward.

Argand had been signally unsuccessful in England, where his patent was attacked on all sides, and rendered utterly unprofitable to him. He returned almost broken-hearted to France, and endeavored to obtain there a like patent. It was granted, in the shape of an exclusive monopoly for fifteen years; but this apparent injustice roused the indignation of his competitor and the judges of the Academy, who jointly remonstrated with the Government. To cut the Gordian knot, both inventors were joined in the patent, and it was ordered that every lamp of the kind should bear a stamp with the words: *Argand et l'Ange invenerunt.* L'Ange was speedily forgotten, and in Europe and this country Argand alone is known and honored as the inventor. After all, however, he also had, like most inventors, to be content with the fame; for, very shortly after the patent had been granted, the French revolution broke out and swept away this monopoly with so many others.—*Putnam's Magazine.*

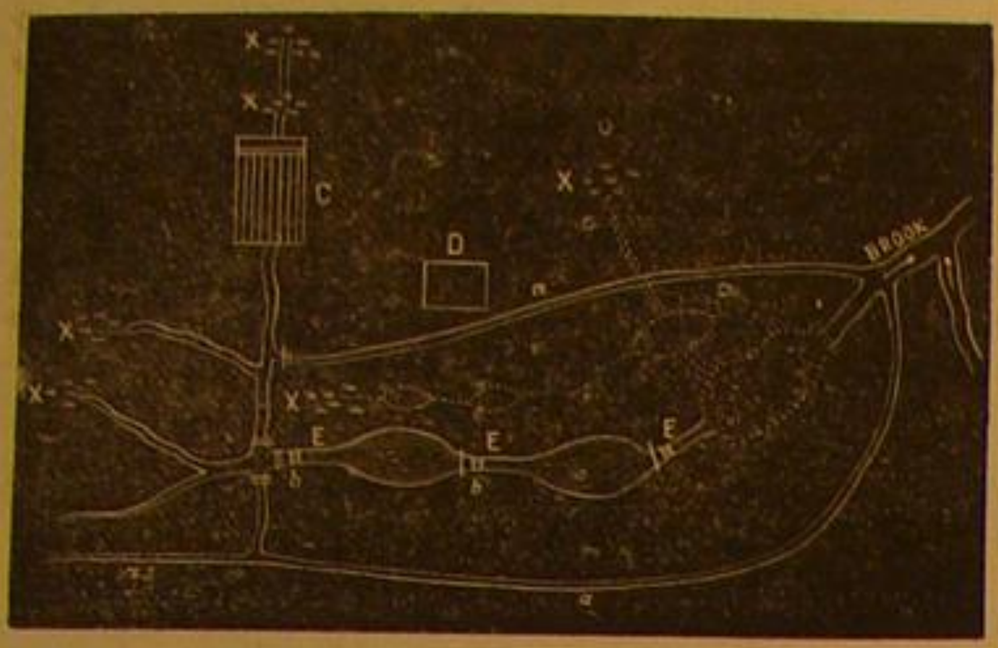
Researches on Resins.

M. Sacc observes that resins have been very little studied at all; and his researches recorded in this paper extend to copal, amber, dammar, colophony, lac (or shellac), elemi, sandarac, mastic, and carnauba wax (a resin). The author has studied the more or less degree of readiness wherewith resins are reduced to powder, the action thereupon of boiling water, of alcohol of 86 per cent strength, of ether, of ordinary acetic acid, of a hot solution of caustic soda of 1·074 specific gravity, of sulphide of carbon, of oil of turpentine, of boiled linseed oil, of benzine, of naphtha, of sulphuric acid of 1·83 specific gravity, of nitric acid of 1·329 specific gravity, and of caustic ammonia. All resins were applied in powdered state; and the solvents three times as large a bulk as that of the resins have acted for at least twenty-four hours, at temperatures varying between 15° and 22°. The results arrived at are briefly as follows: All resins submitted to experiments fuse quietly when heated, excepting amber, shellac, elemi, sandarac, and mastic, which swell up, and increase in bulk. Only the carnauba wax melts in boiling water; colophony becomes pasty therein, while dammar, shellac, elemi, and mastic agglutinate. Copal, amber, and sandarac do not change. Alcohol does not dissolve amber nor dammar; agglutinates copal, partly dissolves elemi and carnauba wax; while colophony, shellac, sandarac, and mastic are readily soluble therein. Ether does not dissolve amber and shellac; makes copals swell, and partly but slowly dissolves carnauba wax; dammar, colophony, elemi, sandarac, and mastic are readily dissolved therein. Acetic acid does not dissolve amber and shellac; causes copal to swell; somewhat acts upon carnauba wax, and does not at all act upon any other of the resins above-named. Caustic soda solution readily dissolves shellac, with difficulty colophony, and has no action upon the rest. In sulphide of carbon, amber and shellac are insoluble; copal swells therein; elemi, sandarac, mastic, and carnauba wax are with difficulty dissolved therein, while dammar and colophony are readily so. Oil of turpentine has no action upon amber or shellac; causes copal to swell; dissolves readily dammar, colophony, elemi, sandarac, carnauba, and very readily mastic. Sulphuric acid does not dissolve carnauba wax; all other resins are dissolved and colored brown, excepting dammar, which becomes bright red. Nitric acid does not act upon the resins, but colors carnauba wax straw-yellow, elemi a dirty-yellow, and mastic and sandarac bright brown. Ammonia does not dissolve some of these resins, but causes copal, sandarac, and mastic first to swell, afterward dissolving them; colophony is easily soluble therein.

A FISH FARM.

BY E. DEXTER.

The fish-hatching establishment at West Barnstable, Mass., was begun in the spring of 1868. The experiments have as yet been confined mostly to trout, of which we have hatched this year some 60,000, as well as 2,000 salmon ova which were procured in New Brunswick by the State Commissioners of Fisheries, by whom they were presented to us. As the process of hatching goes on during the transport of the eggs in wet moss, we lost several by their hatching on the way in the cars.



X, X, X, X, X, X, springs. *a, a, a,* drains. C, hatching house. D represents a series of ponds for young fish. E, E, E, spawning ways. *b, b,* plank troughs. The two ponds between E, E, E, are for spawning fish. The large pond represented by dotted lines, on the right of this, is used as a reservoir for fish. The dotted lines on the cut above the ponds represent a proposed series of ponds. A tank is also placed at this point, indicated by the X on the left of this series of proposed ponds.

The place selected for building the ponds to contain the parent trout, was a swampy piece of land at the head of a brook of considerable size, running into the salt water after a course of a mile and a half or two miles, and containing a half dozen or more pure springs, the waters of which formed the fountain head of the stream. Two ponds have thus far been made by excavation, each about forty feet long by twenty feet wide, and from three to four and a half feet deep. They are connected together, the same water being used for both ponds. The supply of water is about eighteen square inches, and is taken from tanks made of plank, varying in size from ten to fifteen feet in length, and from four to ten feet in breadth, sunk in the soft mud at the points where the springs come to the surface, and as deep as was necessary to reach the substratum of sand, which was generally about five feet. These tanks have no bottom planks, and the water wells up through the sand at the bottom, forming reservoirs of living water of even temperature, summer and winter, and not subject to freshet or variation in quantity. The temperature of the springs varies but little from 48° throughout the year.

There are now about seven hundred parent trout in the two ponds, ranging from three-quarters of a pound to three pounds in weight. It is calculated that the first pond will sustain over 2,000 fish of the larger size, while in the second three times that number of smaller fish will thrive. This is allowing one large fish or three of the smaller size to the cubic foot.

They are fed daily with live minnows and shrimp caught on the adjacent salt marshes, or, when they cannot be conveniently obtained, with chopped liver, the roe of codfish, etc. The ponds are stoned, and one of them which was built in low, wet land, is cemented on each side of the stones. Having learned by former experience that trout will spawn in the pond, and the ova thus be lost if its bottom is sandy or gravelly, we covered the bottom, where its nature seemed to invite the fish to this operation, with flat stones, thus obviating the difficulty so far as we have observed. Aquatic plants, mosses, etc., were introduced and now cover the bottom, not only providing a large amount of food in the form of crustacea, snails, etc., but also supplying to the water the necessary chemical elements which are being constantly exhausted by the respiration of the fish.

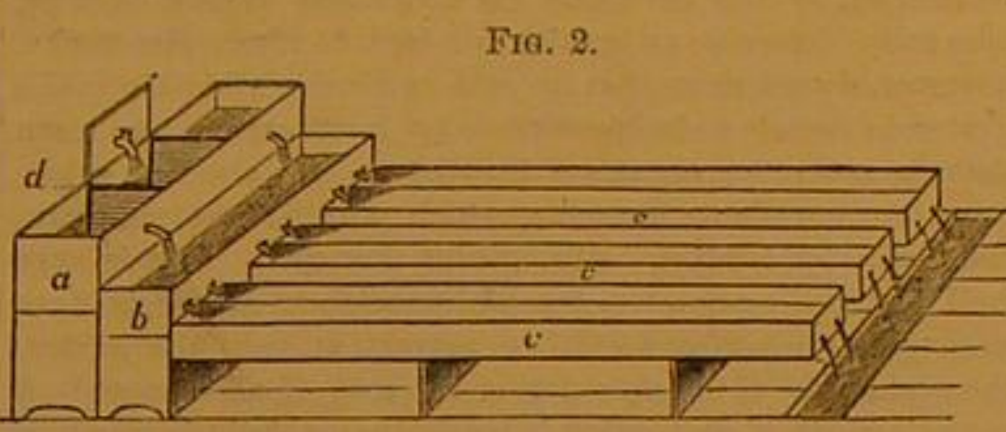
The water enters each pond through a plank trough, the sides of which are sunk nearly to the level of the ground. These troughs are fifty feet long and three and a half feet wide, and are filled to the depth of six inches with coarse gravel, over which there are six inches of water flowing with a slight current to the ponds. As it is the habit of the trout to seek shallow running streams to spawn, they eagerly resort to these *spawning ways* when ready, and are taken by closing the bottom of the way, and driving the fish into a bag net at its entrance into the pond. They are then removed in tubs to the *hatching house*, for the purpose of taking the ova from the female and impregnating them with the milt of the male fish. The modus operandi is as follows: The female fish is grasped with one hand by the back and shoulders, the vent being held under the surface of the water in a tin pan or other vessel partly filled, while with the other hand the abdomen is gently rubbed or pressed toward the vent. If the ova are mature and ready to be shed, a slight pressure is sufficient to extrude them. The same operation is then gone through with the male; if his milt is mature, it will flow in a small quantity into the vessel. A few drops are sufficient to impregnate thousands of eggs. The milt and the ova are then gently stirred together, and allowed to remain undisturbed for five or ten minutes. The water is then poured off, new water is gently admitted to wash the eggs, and they are ready to be placed in the hatching troughs.

It may be as well to state here that the spawning time for trout is from October till March, the principal spawning months being November and December. It is generally calculated that a trout weighing one pound will produce 1,000 eggs; the larger and smaller ones in the same general proportion. I have known, however, during the past season, a trout of less than half a pound in weight, to deliver 1,000 eggs by actual count.

The first requisite now is a supply of pure *spring* water for hatching the eggs,—neither too warm nor too cold. From 45° to 50° is the best. Every degree warmer or colder will make from six to eight day's difference in the time of hatching. From 37° to 54° is considered the limit within which to hatch trout. By a calculation in Mr. Norris' book(" American Fish Culture "), it will take one hundred and sixty-five days with water at 37°, and thirty-two days with water at 54°.

The hatching house in the establishment we have spoken of is a wooden building twenty feet long by twelve feet wide, into which water is admitted about three feet above the level of the floor, from springs immediately in the rear, inclosed in sunken tanks, as before described, and covered so as to be out of reach of cold or heat. To enable the water to be brought in at this hight from the floor, the house is sunk three feet in the ground, and the boards are covered with a heavy coat of pitch inside and out, to a point above the level of the surrounding ground to prevent their rotting. The amount of water now used in the house is what will flow through two faucets, one inch in diameter, with a moderate pressure. This is led, in the first instance, into a straining trough (Fig. 2), running across the width of the building, where it passes through flannel strainers, *d*, to insure its purity. It then flows into a *distributing trough* (*b*), which is parallel to the straining trough and a few inches lower, from which, by means of faucets, it is let on to the hatching troughs in such quantity as may be best.

FIG. 2.



The hatching troughs (Fig. 2, *c*) are placed at right angles to the others, and are sixteen feet long, fifteen inches wide, and eight inches deep, and are six in number with covers upon hinges, the top of them being about fifteen inches from the floor. They are lined with slate, one-half of an inch thick, upon the sides and bottom, with transverse subdivisions; every two feet made of the same material and two inches in hight. A fungus growth, very detrimental to the ova, is unavoidable when wood only is used. The bottom of the troughs is covered with about one inch of moderately fine gravel, and over it flows a constant stream of screened spring water about an inch deep, the lower end of the trough being depressed two inches. On this gravel the impregnated ova are placed in a single layer. In about three weeks the eyes can be seen in the impregnated eggs, appearing simply as two black specks; the blood-vessels of the future fish may also be seen, and from this time its development may be traced daily in the shell. With the temperature of the water at 48°, we may look for the hatching of the ova from the forty-fifth to the fiftieth day. A trout just hatched is about three-eighths of an inch in length, and has attached to it an umbilical sac of several times its own bulk, which sustains the young fish for about forty days, when it is absorbed. The young fish may now be let out into the waters it is desired to stock. They will thrive if placed in a brook even at this early age, such waters supplying an abundance of minute particles of food. If reared in confinement, however, they must be fed with raw liver chopped to the consistency of blood and mixed with water, with the yolk of eggs grated very fine and treated in the same way, or thin sour curds. The latter food is perhaps the best as it sinks more slowly, and trout seize their food *in transitu*, paying little attention to it after it reaches the bottom.

We have sought only to give such a general description of a fish breeding establishment, and of the habits and treatment of the fish, as would give some idea of the practical parts of the art of pisciculture. There are many details connected with the subject which we have not touched upon. They can be found very thoroughly treated of in any of the modern works on pisciculture, of which Norris' " American Fish Culture " is the latest and most practical.

In the above all general considerations have been avoided. It would, perhaps, have been as well to have stated that the arguments in favor of artificial hatching of eggs are based on the small proportion of them that are hatched when deposited in a stream, by the fish following the course of nature, and the very large proportion when hatched by artificial arrangement. The many enemies of fish spawn (other fish, water insects, birds, rats, not to speak of sediment, freshets, ice, etc., etc.) reduce the number of the eggs sadly. it has been calculated by English pisciculturists that not one salmon reaches the proper size for the table out of every thousand eggs deposited in the stream. As the salmon migrates to the sea when weighing only a few ounces, it would, however, be more subject to casualty than the trout.—*American Naturalist.*

Improved Awnings Wanted---A Suggestion.

In the midst of the great advance of mechanic art, and the cultivation of all those means of comfort which go to make what we may well consider refined civilization, there is often a strange and unaccountable neglect of certain very palpable matters, the inconvenience of which, strangely enough, is constantly recurring to us, and yet brings no reform.

Every city in our Union is, and has been subject for many years to the positive nuisance of what are called " awnings ;" a stupid device to protect goods in store windows from the action of the sun—and this at the expense of the public comfort. To effect which purpose the plan, almost without an exception, is to use sail-cloth, either stretched or on roller. In very heavy rain the awnings that through a negligence, far too common, are left spread out over the sidewalks get filled with rain-water, and ever and anon, deluge the passengers who are necessitated to walk under them. They all are claimed to be water-proof; and such is the actual fact, for they do discharge the water as in the manner stated; and in proof of which so many witnesses can seriously testify. The wind frequently assists in this ejection of water; and does more, for it makes such serious rents in these sail-cloth ceilings that the rain, like the express trains, " goes right through, without stoppage!"

And, even where the things are fairly rolled up (more through economy on the part of the proprietor than for any regard for the comfort of the dear people), the framing yet remains to catch the falling rain and transmit it in heavy drips to the recipient dresses and silk hats whose wearers have the luck to be on hand.

A cry of " stand from under!" would be altogether vain, for there is a forest of such bare poles or bars still awaiting the unfortunate in his fancied escape. It is literally running the rain-let.

Now, in sober sadness let us ask—why is this shameful nuisance permitted? Have we no better means of shedding the sidewalks from the sun than by this antiquated makeshift?

Our areas have been made pleasant with the light of day transmitted through ground-glass. There surely is no reason why ground glass, of a much less thickness, could not be used in sliding-frames for the purpose now so barbarously monopolized by sail-cloth. Whether it rained or not, the glass would prove a protector to the foot passenger. And moreover, the merchant might have his sign on the glass, and with the aid of artistic taste this sidewalk covering might be made a most desirable decoration as well as a necessity to our street architecture.

We merely make the suggestion in the hope that some ingenious inventor may turn his mind to a subject that all have more or less a feeling appreciation of.

Let some fitting substitute be given to the public, and municipal authorities peremptorily abolish the existing trespassings on our streets in the form of those awnings; a sound so closely akin to the other expression—awful, as to be truly suggestive.—*Sloan's Architectural Review.*

The Nichols Steel Patents.

For the past few months we have heard much talk about the Nichols patent processes for the conversion of malleable iron and white cast-iron articles into steel; but, more from the want of time than curiosity or interest, we did not visit the works of the Canton Malleable Iron Company, where the experimenting has been done until recently.

Five patents have been granted to Mr. Nichols and the members of the Malleable Iron Company jointly, and although they are for different processes, each does its work so thoroughly that we could not decide upon a favorite. Two are for converting malleable iron castings into steel. One of these is an instantaneous process, and the other requires from one to twenty-four hours, depending upon the size of the articles. The one we esteem for its quickness of action and the other for its superior production.

Another patent is for converting white cast iron into steel. The article was taken right from the foundery floor and packed in annealing pots, and then placed in the ovens precisely after the manner of making malleable iron, differing only in the chemicals used in the pots. This patent we look upon as especially valuable. We were shown plow points thus made that were heated under our observation, hammered to a fine edge and thus tempered so hard that after breaking off a point to see the quality of the steel we readily scratched our name upon the window glass. We were also shown many other articles, among them knife guards used by reaper and mower manufacturers, and by them made of wrought iron at great expense.

By far however the most interesting experiment we witnessed was under a patent for refining steel or restoring burnt steel. We saw a piece of steel broken, one half of which was thrown into the fire and burnt until the particles looked lifeless and granulated easily. This same piece was again heated and plunged into the chemical bath and in a moment came forth, not only restored to life, but in comparison to the piece held in our hand it was much finer, and upon test much superior in strength.

Another patent secures a process by which cast iron is hardened more thoroughly and permanently than by any other known means. The saving that will accrue from the use of this process in the manufacture of car-wheels alone must be enormous.

We look upon these processes as wonderful and, in our opinion, will in a year's time develop themselves into immense value, and we feel proud that the patents are held by Canton citizens.—*Canton (O.) Repository and Republican.*

THE English parliamentary committee upon the proposed channel tunnel between England and France, have had an interview with the Emperor of the French, and have obtained a copy of the report of the French special commission appointed to examine into the practicability of the proposed work. The report is favorable, and indorses the plans of the English engineers as feasible.

Correspondence.

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

Grindstones.---Where they come from, and How they are Made.

Messrs. Editors:—The sandstone formation overlying the coal beds of England furnishes the grindstones of that country, the principal quarries being located at Newcastle-upon-Tyne, and at Wickersley, near Sheffield.

These quarries are worked by hand, and all the grindstones are made with mallet and chisel, and have been imported into this country for over one hundred years.

The grindstones from the provinces of Nova Scotia and New Brunswick, are also the over-lying sandstone formations of the coal districts bordering on the Bay of Fundy, and extending across the Province to the Gulf of St. Lawrence. These immense deposits contain a great variety of grits, known as the Nova Scotia grindstones. These quarries are generally worked by the French people known as "Acadians," from the name they gave this country, "Acadia," and are the descendants of the "Huguenots," who were driven out of France by religious persecution.

They are a very industrious and simple-minded people, and the females retain to this day the style of dress brought over from France by their ancestors.

The tides of the Bay of Fundy rise and fall from 60 to 70 feet every twelve hours, and these people avail themselves of this power to work the quarries, which extend from a high bluff on the mainland, down to low water mark in the bay.

At low water a huge mass of stone is loosened from its bed and a heavy chain is passed under it and over a large boat, which is placed alongside. As the tide rises, the stone, attached to the bottom of the boat is floated into a sand cove at high water, and made into grindstones after the tide recedes. This work is done with mallet and chisel, the rough parts being first chopped off with a heavy ax. Machinery has been recently introduced, and the small grindstones are now turned in a lathe by steam power. The sandstone deposits of this country which are made into grindstones, are found along the shores of Lake Erie, and extending for a considerable distance east and west of Cleveland, and inland as far as Marietta, on the Ohio. They are also found on the shores of Lake Huron, above Detroit.

These deposits are of a different character from the foreign stone, and do not seem to be the overlying strata of coal formations, but appear to be a later formation, as the quarries look as though this part of Ohio had once been the bottom of the Lake, the sand of which had become solid, and been up-heaved by some convulsion of nature. Nearly all the Ohio grindstones are made by machinery driven by steam power.

The blocks of stone being loosened from the quarry bed, are roughly hewed out, with a square hole in the center. This is placed on a heavy square iron shaft furnished with a 9-inch collar, against which the stone is securely fastened by means of another collar keyed against the side of the stone. The shaft and stone being driven by steam power, two men on opposite sides of the stone turn it off perfectly true, by means of soft iron bars about 6 feet long, and 2 by ½-inch thick, which are drawn out to a thin point, which is curved upward. This was formerly a very unhealthy occupation owing to the shaft dust being inhaled by the workmen, but this difficulty is now obviated by means of blowers which drive it away.

J. E. Mitchell.

Philadelphia, Pa.

Defense of Patent Right Dealers.

Messrs. Editors:—I notice in several late newspapers that a professor in an agricultural institution of this State, who evidently sets no common value on his own sagacity, warns farmers of the dangerous character of "patent-right men," advising them in no case to have anything to do with the men, or their goods, affirming that in ninety-nine cases out of a hundred these men are robbers, and that their machines are altogether worthless, etc., etc. Now admitting that some of these inventions are of no value, and that persons engaged in selling them have, in some instances, taken undue advantage of the inexperience, credulity, or ignorance of the parties with whom they have dealt, it appears to us to be making rather wholesale work of it to condemn all new inventions indiscriminately at "one fell swoop"—together with the persons engaged in introducing them.

We think that not many farmers will see proper to follow the professor's advice, so gratuitously offered. It should be regarded as only an insult offered to their understanding.

Farmers, as a class, are sensible men, why not let them examine new machines, and decide for themselves?

The professor's method seems to us to do great injustice to inventors, as well as dealers in patents. It may be asserted that no class of men are more indebted to inventors than farmers. They can now, with their improved machinery and implements, accomplish more in a day than they formerly could in a week. Much of the work then performed by human muscle exclusively, is done in one tenth part the time, and less than half the expense, by steam or horse-power.

Now, for farmers to "go back" on the men by whom they have received most benefit, would be as unwise as it would be unjust.

Intelligent farmers who study the best books on farming, and who are regular readers of such excellent journals as the *American Agriculturist* and Scientific American, are in very little danger of being "robbed" by "patent-right men."

Joseph R. Parks.

Muscatine, Iowa.

Ripening of Wine---America Ahead of France.

Messrs. Editors:—Your number of July 31, page 68, states the effects on the wine by the method of heating called Pasteur's process. Permit me to explain the cause of the effects aforesaid, so that your readers may intelligently judge of the merits of the heating process. All fermentation results from the presence of certain microscopic fungi, short-lived, but multiplying with astonishing rapidity under favorable conditions of temperature and atmospheric oxygen in liquids, that contain nitrogenous parts; on these glutinous albuminous parts they feed, and on them their existence depends, the want of gluten precludes their existence. While their action in maturity is to convert the sugar of the fluid into alcohol, a certain high proportion of alcohol terminates their existence, as well as a very large excess of sugar extinguishes their function; fermentation ceases. But this species flourishes only when supplied with atmospheric oxygen. This wanting, they barely exist but in the state of spores or seeds, ready to take maturity and propagate by obtaining the proper conditions to their support. Still, while the species of mycoderms, that causes beneficial or purely alcoholic fermentation, finds insufficient atmospheric oxygen in the fluid for their support, other kinds, able to do with less or differently composed air, can obtain a foothold—provided always there is gluten—and by their presence cause putrefaction, decay, diseases, or under certain conditions of continued surface contact with atmospheric oxygen acetic acidification. Now, all this organism, and the spores or seeds from which they originate, are killed in a brief time at a temperature exceeding about 135° F., or slowly die if 121° to 135° F., is proportionally longer continued.

The principal part of the foregoing has been satisfactorily established by the laborious investigations of Mr. Pasteur, who fully deserves all praise allotted to him. His works, however, do not show that he paid particular attention to the gluten in liquids to be preserved by heating, but we learn that the spores or organism floating in the air, may subsequently contaminate the wine, which will be restored again and again by heating—still, gluten remains. This is very well, but as the organism cannot live without gluten, is it not so much more perfect a cure to extract at once the gluten, the sustenance of the mycoderms, the root of all disease? A penny's worth of prevention is better than a dollar's worth of cure.

Air-treatment, while it promotes, accelerates, and controls all fermentation, eliminates from all fermenting (and other) fluids the gluten by oxidation, which renders it insoluble, and therein lies a total and economical prevention from all further injury by destructive mycoderms; and without the expensive, and to the common producer of fermented beverages, impracticable and impossible arrangements for carefully heating wine, cider, beer, etc. Thus America is ahead of France.

P. O. Box 6,844, New York city. R. d'Heureuse.

Novel Mode of Obtaining Capital.

Messrs. Editors.—I have been unfortunate in business and am anxious to make another start. I propose insuring my life in favor of any one in a mutual life insurance company for $20,000 the party paying the premium receiving the dividends and who will give me $12,000. I will insure in any company the party may wish, and take out any kind of policy. I will pay the premium the first year. If you will exert yourself and make this arrangement for me, I will come on as soon as I receive a notification from you, and as soon as I receive the money will pay you $1,000. It appears to me that almost any of the large capitalists in New York who desire to invest their money in something safe, would make this arrangement, as it would be perfectly safe, at the same time paying a dividend annually. Let me know from you what you think of the proposition and whether you think it practicable or not. I am only 24 years of age, therefore the premium would be very trifling.

A. C. McRae.

Macon Depot, Ala.

[We unfortunately do not know of any capitalist likely to take a venture in the manner our correspondent suggests. If this should meet the eye of any person having $12,000 to thus invest, he may correspond and remit as above. The thousand dollars promised us, may be sent direct to this office.—Eds.

Explanation of Singular Phenomena.

Messrs. Editors:—In answer to your inquiry in the present volume, page 70, for an explanation of the curious phenomena noticed in an oil jar, I think I can give one. When the jar is placed upon a painted board or a hard pine board, the oil exuding from the jar forms with the paint or the pitch in the hard pine board, a gum which prevents further leaking. On the contrary, black walnut being a dry wood the oil cannot form a gum, and consequently it escapes.

Sunbury, Pa. E. H. Schneider.

Another.

Messrs. Editors:—In answer to your inquiry in number of July 31st, under article headed "Curious Phenomena," may not the reason for the oil exuding from the jar when placed upon a black walnut bench, be on account of the openness of the fibers producing capillary attraction, which would not be the case with a painted board, the paint filling the pores on the surface and destroying this attraction; and the same result would be produced by substituting the hard pine board, as the pitch closes the pores the same as the paint on the painted boards?

If your correspondent would place the jar upon a piece of ash or chestnut board with the same result as upon the painted board; I should think the theory of capillary attraction might be erroneous.

A. T. A.

Lowell, Mass.

A Remedy for Lockjaw.

Messrs. Editors:—I am extremely sorry to learn of the death of my old friend, Mr. John A. Roebling. If I had known in time that he had lockjaw I could have saved his life, and would willingly have traveled many miles to do it. Let any one who has an attack of lockjaw take a small quantity of spirits of turpentine, warm it, and pour it on the wound—no matter where the wound is, or what its nature is—and relief will follow in less than one minute. Nothing better can be applied to a severe cut or bruise than cold turpentine, it will give certain relief almost instantly. Turpentine is also a sovereign remedy for croup. Saturate a piece of flannel with it, and place the flannel on the throat and chest—and in very severe cases three to five drops on a lump of sugar may be taken inwardly. Every family should have a bottle of turpentine on hand.

D. A. Morris.

New York city.

[We would not be understood as indorsing the above remedy, because we have not tried it. It is a simple matter, and can be easily tested. In all serious ceses the application should be made under medical advice.—Eds.

(For the Scientific American.)

INDELIBLE INK FOR MARKING LINEN.

By Dr. Reimann.

The following are a number of formulæ for preparing indelible ink to be made use of in marking linen. As they have all been thoroughly well-tried, and found effectual, it is to be hoped they may prove of some use to the public.

The linen is first moistened with a fluid, consisting of a mixture of, 2 parts carbonate of soda in crystals, 2 parts gum-arabic, 8 parts of water, and then dried. When quite dry, it is rubbed with a glass cloth to render it as smooth as possible, so that it may be easier to write upon. The composition of the ink itself is as follows: 1½ pts. nitrate of silver, 16 pts. distilled water, 2 pts. gum-arabic, and ½ pt. of sap green. The nitrate of silver is first disolved in the distilled water, and the gum-arabic and sap green are subsequently added.

It is necessary to write with a quill pen, all metallic pens except gold ones, decomposing the ink. It is a good plan to trace the letters on the linen with a pencil before writing them.

Marking linen is most conveniently effected by using a pencil and a small copper plate with perforations corresponding to the letters required. This plate is laid upon the linen, and the ink is applied with the pencil to the cut-out spaces, so that these spaces, and these alone are smeared with the ink.

The following ink is of service for marking linen with a pencil, when a metallic pattern-tracer is employed: 2 pts. Nitrate of silver, 4 pts. distilled water, 2½ pts. gum-arabic, 3 pts. carbonate of soda crystals, 5 pts. liquid ammonia.

The best way to prepare the ink is to first dissolve the nitrate of silver in the liquid ammonia, and the gum-arabic and soda in the distilled water. The two solutions are then mixed together and slightly warmed, when the whole mixture becomes brown. A few drops of a solution of magenta, makes the ink somewhat more distinct. It is of course unnecessary in this method to previously moisten the spot with gum-arabic solution.

For very fine linen the following ink is best employed: 4 pts. Nitrate of silver, 24 pts. distilled water. To this solution liquid ammonia is added, until the precipitate which is first formed, is re-dissolved. Then a little sap green, indigo, etc., are ground together, and dissolved in a solution of 4 pts. gum-arabic, and this soution and that of the nitrate of silver are mixed together. The whole is then diluted until it occupies 32 parts. This ink is very limpid, and easy to write with.

When dry a hot iron need only be passed over the surface of the linen, when the letters will at once make their appearance, their tint being a deep black. The ink does not injuriously affect even the finest linen.

The discovery of an aniline black has led to the employment of this coloring matter in marking linen.

This ink has the advantage of being cheaper than the ink prepared from nitrate of silver. It has also another advantage over the latter salt, viz. that is it chemically indelible. The ink made with nitrate of silver can be removed by washing the linen with a solution of hyposulphite of soda, or by moistening it with a solution of bichloride of copper and then washing with liquid ammonia. This is not the case with the aniline ink, the color of which cannot be removed by any chemical agent whatever. Linen therefore marked with this ink can never be appropriated by other persons than the rightful owner.

Such aniline ink may be prepared in the following way: 8½ grs. of Bichloride of copper are dissolved in 30 grains of distilled water, then are added 10 grains of common salt, and 9½ grains of liquid ammonia. A solution of 30 grains of hydrochlorate of aniline in 20 grains of distilled wtaer is then added to 20 grains of a solution of gum-arabic, containing 2 pts. water, 1 pt. gum-arabic, and lastly 10 grs. of glycerin. Four parts of the aniline solution thus prepared are mixed with one part of the copper solution.

The liquid which results has a green appearance, and may be at once employed for marking linen, since it invariably becomes black after a few days. A steel pen may be employed as well as a quill. If it is desirable not to wait so long for the appearance of the black color, a hot iron may be passed over the writing when the ink is dry, or the linen may be held over the flame of a spirit lamp, or over a hot plate, or hot water, when the black tint will readily appear.

It is a good plan to put the linen when marked into a tepid solution of soap, which has the effect of bringing out a fine bluish tint. The ink must be so limpid that it is able to permeate the tissue of the linen, so that the marks appear on both sides.

It is advisable to mix the solutions together, only when the ink has to be made use of.

The ink is perfectly indelible, and so easy to write with that the finest devices may be drawn with it.

A very cheap brown marking ink may be prepared from binoxide of manganese, as follows: 4 pts. Acetate of manganese dissolved in 12 pts. of water.

The place on the linen where the marks have to be made, must be previously moistened with the following solution: 1 pt. Yellow prussiate of potash, ½ pt. gum-arabic, 3 pts. water. The linen having been saturated with the above solution, is then dried, and afterwards marked with the manganese solution. On the letters becoming dry, the following solution is spread over the spot with a pencil: 4 pts. Carbonate of potash, 10 pts. water. The letters then become brown, and their color cannot be removed by alkalies, nor by acids, with the exception of dilute hydrochloric acid.

A purple marking ink can be prepared by employing bichloride of platinum: 1 pt. Bichloride of platinum, 16 pts. distilled water.

The place where the letters have to be written, must be moistened with a solution of 3 pts. Carbonate of soda, 3 pts. gum-arabic, 12 pts. water. The spot is then dried and made smooth. After the letters have been written with the platinum ink and become dry, the linen is moistened with a solution of 1 pt. Chloride of tin, 4 pts. distilled water, when an intense and beautiful purple-red color makes its appearance.

Importance of Extensibility in Materials employed for Construction of Machinery and Buildings.

A certain degree of extensibility is indispensable, in most parts of machinery or of buildings which may be supposed to allow, without fracture, any slight alteration of form that may arise from irregularity in the construction or from any extraordinary strain. The importance of this should by no means be overlooked in those structures which consist of several separately-wrought pieces, such as an iron bridge or a boiler; for these can never be so constructed that the strain is from the beginning evenly distributed throughout. If then the component parts are not sufficiently extensible, they may be broken successively long before reaching the strain for which the bridge or the boiler was calculated. In such a case the elastic elongation which the separate parts could assume is commonly an insufficient guide.

When the parts, in order to be joined together, have become weakened at any point, either by some of the material having been removed as by riveting, or by the material having at any point been overheated, it must by no means be expected to show in all parts as great an extensibility as it exhibited in experiments on tensible strength. If, however, we know to what extent a bar or a plate has been weakened at a certain part by diminution of area, or by heating, and also know the limit of elasticity in the other parts of the material, together with the absolute strength and elongation on rupture, it will then be easy to estimate approximately, in every case, the elongation which the bar or plate may assume before being broken. If, for instance, a stay be taken, manufactured of soft steel with a limit of elasticity at 41,172 lbs., and the breaking load at 68,620 lbs., per square inch, and which, on fracture, has shown an elongation of 10 per cent; and if the area, at any part, has been diminished 20 per cent, or the absolute strength of the material has been lowered to the same extent by overheating, then the stay must break with 0·8 of the strain required to break the unweakened part of the bar (that is, when the load at this part amounts to nearly 54,896 lbs. per square inch); but since the permanent elongation, as previously shown, will increase almost in the same proportion as the excess of the loads above those at the limit of elasticity, and this increase is generally greatest when approaching fracture, the stay, therefore, when loaded with 54,896 lbs. per square inch can elongate, at most, only half as much as with the load of 68,620 lbs. on the same area, or 5 per cent of the original length.

If the absolute strength were diminished at any place, to the amount of 60 per cent of the original strength, the stay would (under the same conditions and if made of the same material) break with a strain of 41,172 lbs. per square inch on the unweakened part: thus rupture would take place at the limit of elasticity and, consequently, before the part last mentioned could assume any considerable elongation.

In like manner, if in riveting an iron plate, whose absolute strength is 48,034 lbs., and the limit of elasticity 30,879 lbs. per square inch, the riveted part becomes 40 per cent weaker than the rest, it is of little avail that the plate possesses great extensibility, for it will break at the rivets when the strain on the other parts reaches 28,820 lbs. per square inch, and it can then only give way a little in the actual line of rivets. If, however, the plate were constructed of puddled steel, Bessemer steel, or cast-steel, having a breaking strain of 68,620 and a limit of elasticity of 34,310 lbs. per square inch, and could elongate on fracture 10 per cent, but was only 0·7 as thick as the former plate; then, on the same supposition with regard to the strength of the riveted portion in relation to the rest, the part riveted would break with the same absolute weight as in the previous case, corresponding to 41,172 lbs. per square inch on the rest of the steel plate; but the plate last mentioned has elongated nearly 2 per cent, that is, almost ¼ inch per foot. The latter structure would, therefore, be more worthy of reliance than the former, although it required 30 per cent less material.

As the ratio of the breaking load to the limit of elasticity is generally greater in rolled puddled steel and other kinds of soft steel than in puddled iron, the employment of such steel would consequently allow the structure to assume a greater change of form than would be permitted if soft iron were employed. When, however, these materials are compared with each other in the form of homogeneous bars, the steel usually shows less extensibility.

From what has now been advanced with reference to the disadvantage of weakened points in machinery and building structures, it will readily be understood how desirable it is, both for economy and security, that the girders and stays employed in the construction of lattice-work and suspension bridges should have bosses or swellings at the points where they are penetrated by bolts or rivets.

In employing steel for purposes in which the material must be heated for further working, especial attention should be paid to the diminution of strength consequent upon such heating. For this diminution, as proved by the experiments on fracture, is greater in steel than in iron; and in different kinds of steel is greater according as the metal is harder, or richer in carbon.—*Sandberg's Translation of Styffe's Treatise on Iron and Steel.*

Faults in Cheap Building.

These are set forth as follows in the *American Builder*:

"1st. Cramping a house down to the smallest possible space, so as to make more 'yard room,' which will never be used.

"2d. Making no calculation as to the size of rooms or the location of furniture.

"3d. Building chimneys by guess, so that one has to have a dozen lengths of useless stove pipe, or else place his stoves in the most inconvenient locations.

"4th. Arranging windows and doors so that one opens against the other, or in the very spot to be occupied by a piece of furniture, or so placing them that no fresh air can get through the house, even though the whole should be open.

"5th. Providing no means of ventilating rooms, save by open doors or windows; hence all the impure air which is generated by breathing, cooking, and fermentation, as it is rarified, rises to the top of the room, and there remains to breed discomfort, disease, and death.

"6th. Nailing sheathing to the outside of the studding, and clapboards (or siding) close to the outside of that, leaving small or no air chambers between them, and, as in nine cases out of ten, green materials for each covering have been used, they shrink and rot, soon making a honey-comb of the shell, though plastered with paint and cement.

"7th. Laying the lower floor directly upon joists, or at best lining it with culls, full of knots and shapes which are but little better than nothing, and as a consequence the floor is always cold and uncomfortable.

"8th. In finishing, first laying the bases, pilasters, and casings (perhaps of green lumber), and then lathing and plastering up to them, so that when they dry large orifices are left to let in cold and moisture.

"9th. Letting his work out, as a whole, trusting to the honesty of the contractor to do it, without having plans or specifications properly drawn, and without any one to oversee, criticise, or direct it."

General Observations on Fatty Substances.

The industrial fatty bodies are the products of the two living kingdoms, vegetable and animal.

DIVISION OF FATTY BODIES.—According to the state in which the fatty bodies occur under ordinary circumstances, they receive particular names; thus they are called oils, butters or concrete oils, greases, tallows, waxes.

The oils are liquid at the ordinary temperature; they are vegetable or animal.

The butters or concrete oils are vegetable oils, soft or solid at the ordinary temperature, soft at 64·4° F., and fusible at 96·8°.

The greases and tallows are extracted from the animal organism; the first are soft and very fusible, the tallows are solid and melt only at 100°.

Lastly, the waxes may be of vegetable or animal origin; they are hard and brittle, begin to soften at 95°, and generally melt at 147°.

IN THE VEGETABLES.—In vegetables, the fatty oils are generally met in the seeds; they are contained in the part which gives birth to the cotyledons, but the substance of the plumule and the radicle does not contain any. The seeds of the *cruciferæ*, *drupaceæ*, *amentaceæ*, *solana*, and *papaveraceæ*, deserve to be named on account of their richness in oils.

It is very rare that fatty substances are met with in the pulpy parts of the fruits. We know only the olive, the cornel tree, and the laurels, the fruits of which contain oil in their pulpy part. The *cyperus esculentus* presents the very rare case of an oil in its root.

In the seeds of plants, the oils are generally accompanied by vegetable albumen; thus, when they are triturated with water, the albumen keeps the oil in suspension in this liquid, which then becomes white and opalescent like milk, and takes the name of *emulsion*.

Among the vegetable oils there are some which are as hard as mutton tallow; they receive then the name of concrete oils or butters. Such are those of palm, coco, nutmeg, cacao, laurel, etc.

IN THE ANIMALS.—The fatty matter, grease or tallow, is found in the cavities of the cellular tissue, but it principally affects certain parts of the body; ordinarily it is abundant under the skin, at the surface of muscles, around the kidneys, and near the intestines. It presents modifications in the different classes of animals.

In the herbivorous, it is firmer, more solid, less odoriferous than in the carnivorous. The grease of birds is soft, unctuous, and very fusible. That of fishes and cetacea is nearly fluid and very odoriferous. White and abundant in young animals, it becomes yellow and diminishes in quantity with age.

ANIMAL WAX.—Waxes are animal or vegetable concretions. Animal wax is produced by a few insects of the family of the *hymenoptera*, by bees in particular; it is secreted under the rings of the stomach of these precious insects.

Vegetable wax is abundantly met with in vegetables. It constitutes the greater part of the chlorophyl, or green substance of the different organs of plants; it exists in the pollen of flowers, in the fruit of the beech tree, poplar, etc.; it covers the envelopes of many stone fruits; it forms the varnish of leaves, is met at the surface of the leaves of the palm tree (carnauba wax), on the bark of the violet sugar cane; it surrounds the berries of the *myristica* of Para and French Guiana, of the *Chinese fustic*, of all the *myrica* of the Indias, America, and Louisiana.—*Dussauce's Treatise on the Manufacture of Soaps.*

Products of Coal.

Mr. C. A. Moon, in a recent lecture delivered to working men in Whitehaven, after enumerating the more common and well known products of the distillation of coal, including carbolic acid, says:

"But another of the discoveries of chemistry is the manufacture of the most fragrant scents, the greatest variety of odorous essences from coal-tar. The young lady arrayed in her ball-room dress, with her finest cambric pocket handkerchief in her hand, perfumed with the celebrated "millefleurs," would be astonished, perhaps shocked, if she were told that she positively carried the product of coal-tar about with her. But startling as the information might be, it would nevertheless, be an undeniable fact. It may seem strange that from this black compound, which is so offensive to our nasal organs, chemistry can really manufacture the sweetest scents. But strange as it may appear, it is a positive chemical fact.

"Lastly, alcohol is mentioned as one of the products of the Boghead coal, and is said to be more stupefying in its effects than that extracted from malt. Now, as we have an ample supply of this fiery element for all needful purposes, we shall vote that the coal keeps its alcohol undisturbed, and, instead of inflaming our tongues and stomachs with it, we turn it to illuminating and heating purposes.

"Still this enumeration does not exhaust the stock of the useful products of coal which the wondrous power of chemistry has discovered and applied, but it is neither necessary nor desirable that we should add to the list. Sufficient has been said to show that from coal alone we derive warmth, light, easy motion, beautiful dyes, and rich perfumes. And what more do we require? In fact, there seems to be no end to the solid, liquid, and gaseous things which the chemist can call forth from this black, compact substance, disinterred from the bosom of our venerable Mother Earth."

Patent Block Fuel.

Various methods have been employed in this country to consolidate coal slack into portable and convenient blocks for fuel. As yet, from various causes, none of these have proved successful. We are now informed a new patent block fuel has been introduced in England, being a mixture of small coal, coal dust, lime coal slack, culm, or other bituminous substance, which is ground fine, and to which is added, during the process of grinding, coal shale clay, and, in preference, the shale usually found associated with coal underground. This is mixed in a pan with pulverized resin, asphalte, or natural bitumen, and a vegetable glue made in the following manner: To fifty gallons of water are added five pounds of rice and five pounds of glue or gluten extracted from Indian corn, maize, or meal, which when boiled for half an hour is fit for use. The paste thus formed is then removed from the pan and molded into cakes or bricks, and afterwards dried. This fuel is said to be free from odor, and is not liable to spontaneous combustion; properties which would if combined with great heating power, as asserted, render it an admirable fuel for ships' use.

Steam vs. Mortar.

In the New York SCIENTIFIC AMERICAN, of May 15th, is a communication from Fairfield, Iowa, reporting the fall of a chimney of a flouring mill in that place which caused the entire destruction of the mill in question. The origin of the catastrophy was the turning of the escape steam into the brick flue. Now, it is strange that such errors can be committed by thinking men as to let such a subtile agent as steam in upon such an absorbent material as brick. With the exception of oil, there is no more searching power than that possessed by steam. And when we consider how liberally brick admits water into its pores we cannot be surprised to see what the effect of the injection of steam must be on it. It is not impossible that common lime mortar was used in the brickwork, and that there was a total absence of pargeting. We should under these circumstances, be very much surprised indeed if such a chimney, under such a destructive influence, could stand for any length of time.

The writer alluded to, says, that the escape pipe was let into the chimney near its base, and that at this point the bricks could be crushed between the fingers, while the balance of the chimney was perfectly solid.—*Architectural Review.*

THE landing of the French-American Cable was celebrated at Duxbury, on the 27th of July, with appropriate ceremonies. A battery came from Boston to fire the salute, and about four hundred sat down to dinner in a tent on Abram's Hill.

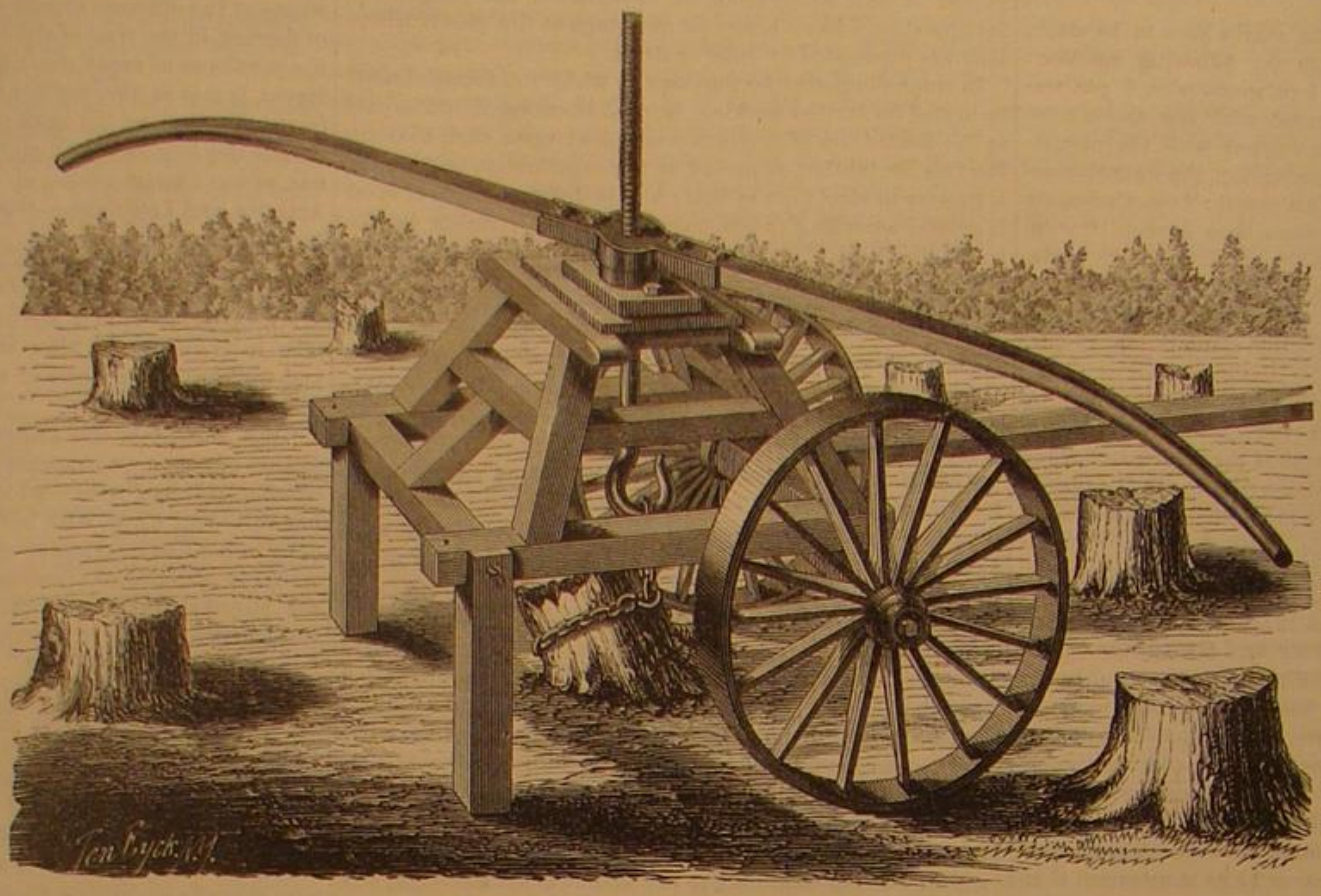
Improvement in Stump-pulling Machines.

We present herewith an improved stump puller; it combines great power and simplicity with efficiency and facility of operation.

The engraving will convey so clear an idea of the machine as to render a detailed description unnecessary. It depends for its power upon a large screw and a long lever. These are mounted in a peculiar manner upon a pair of broad-tired timber wheels.

To the rear of the wheels is a strong framework of wood in the form of a truncated pyramid, with one of its lower edges resting on the axle of the wheels. On the top of this pyramidal framework, rising above the top of the wheels, rests an iron plate, through which passes a powerful screw, with a hook or other equivalent attachment at its lower end. The nut of the screw has two lateral sockets into which are fastened the two long drooping levers which pass entirely over the wheels.

When a stump is to be pulled the outer or rear edge of the pyramid is supported on two stout hinged legs or props. These legs, when the machine is to be moved, are hooked up underneath the framework by their lower ends



ROBERTSON'S STUMP PULLER.

When the machine is to be operated it is wheeled into position, by the team, directly over the stump, the outer props or legs are let down, and the pyramid is thus supported at every corner—by the two wheels at one edge and the two props at the other. In case the ground is soft, pieces of broad thick plank may be placed under the wheels and props. The levers are then put into their sockets at the nut, and the screw is run down. A chain or gripper is then fastened around the stump, or under some of its roots and attached to the hook of the screw. The levers are then revolved to raise the screw, either by hand or animal power, and the stump must come. The top of the stump is drawn up into the hollow of the pyramid, and when it is clear of the ground the levers are detached and placed along the tongue, the props are knocked loose and hooked up, and the stump may then be hauled off out of the way. The long and heavy tongue or pole, in conjunction with the lever, will fully balance the stump and the framework.

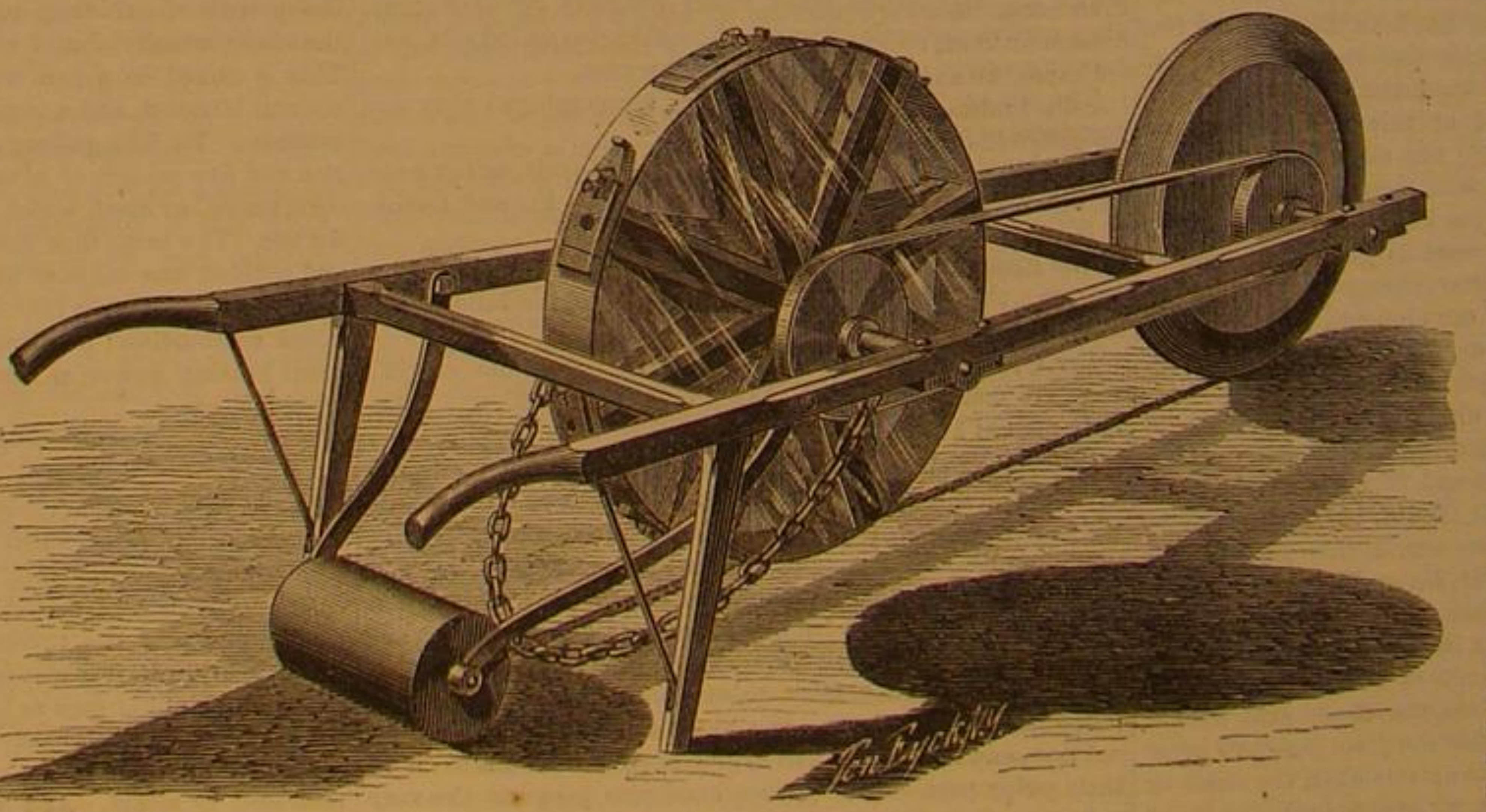
This machine may be made of any size and power to suit the region where it is to be used, and was specially designed for use in river bottoms, where the stumps are six and seven feet in diameter.

This stump puller was patented, January 7, 1868, by Judge J. B. Robertson, of New Orleans, La., one of our oldest patrons, and one who claims to have acquired his mechanical education and taste from the SCIENTIFIC AMERICAN. He has other valuable inventions he will soon bring forward. The entire right of this stump puller is for sale. Address John B. Robertson, New Orleans, La.

Improved Seeder.

This is a simple, light, and seemingly effective implement for sowing seeds with rapidity and uniformity, or it may be advantageously applied to the distribution of artificial manures.

It is of the barrow form, and the seeding wheel is driven by a belt running from a pulley on the shaft of the wheel on which the machine rolls when the handles are grasped, and the seeder is propelled by the operator. Cone pulleys may be used to adjust the speed of the seeding wheel, which needs to run fast when used for distributing manures. The seeding wheel has numerous chambers radiating from the center of the wheel, each provided at the perimeter with detachable, perforated plates, with openings of various sizes for different kinds of seeds.



TUNSTALL'S SEEDER.

The seed is thus deposited in a furrow, made by the wheel upon which the machine rolls, its perimeter being so shaped as to make a furrow of the width and depth required. The seed is covered by a chain attached to the machine, which drags over the furrow behind the seeding wheel, and which is followed by a roller, also attached to the frame-work of the seeder, as shown in the engraving.

Seed can be thus sown and covered in a single operation, as fast as a man can walk. The whole is so simple that it must be durable, and it will, doubtless, prove a valuable addition to the improved agricultural implements already in the market.

The inventor informs us that this machine has been thoroughly tested, and found to work admirably; sowing, covering, and rolling the seed with singular accuracy and regularity, and with light labor on the part of the workman.

Patented through the Scientific American Patent Agency, June 15, 1869, by Robert B. Tunstall, of Norfolk, Virginia, who may be addressed for the entire right for the United States.

Wooden Railways in Canada.

Some time ago we gave a description of the wooden railroad from Carthage to Harrisville, N. Y., a distance of 47½ miles, and alluded to the importance of cheap wooden railways as a substitute for the more perfect iron road, to be used with light locomotives. Experiments made in Canada seem to justify the belief that heavier locomotives can be employed than we were then inclined to suppose. The Montreal *Gazette* gives the following summary of a report made by a committee appointed to report on the Clifton Wooden Railway, which contains points of general interest:

The locomotives weigh ten tuns without wood or water, have taken from 30 to 40 tuns freight a trip, and cost $6,500 each, American currency. They have since been supplemented by engines weighing twenty tuns and costing $8,500, which will draw double the weight on the general down grade from the mines to Ogdensburg, over, in some places, an up grade of from 80 to 90 feet to the mile as soon as some portions of the road bed have been strengthened, some of the rails now springing under the immense weight.

The cost of keeping up the track, continues the committee, has been, and will not hereafter, Mr. Hurlbert (engineer of the road) says, exceed the wages of two men for every three miles of road, and these men will keep it in good running order and replace the worn out rails as fast as required. This does not include renewal of trestle or crib work. We notice that from one to two new rails per mile were put in this spring, and this was rendered necessary from the difficulty of obtaining good sound maple when the road was built, and some of the rails had got "warped" before being used, so that they were laid on the ties "heart side" up; they will not last so long that way as if the heart of the rail was laid downward. We counted 21 track men on the 20 miles we passed over, the track was required to be made ready for the large locomotives as quick as possible. It is estimated that these 20-tun locomotives will take easily 80 tuns per trip, and they intend to make two trips daily. It takes 22,000 feet maple to lay a mile of track, and from $80 to $100 States currency will pay for the labor required to replace it in position.

We may mention that we came down from the mines at the rate of 8 miles an hour, including all stoppages, having about 25 tuns of freight aboard. Mr. Hurlbert is strongly in favor of the gage in use generally in the United States for railways, and thinks that a narrower gage than 4 feet 8½ inches will not be found an improvement, though at the same time he acknowledges that rolling stock can be built much cheaper for a gage say 3½ or 4 feet than for the other gage. We noticed that where in building an iron railway there would have been "deep fills" that trestle work was used for cheapness; and in some cases for a long distance where, say a mile or more of low wet land had to be crossed, the track was made by placing logs crosswise of the road, with stringers upon these logs, the ties being placed in the usual way upon the longitudinal stringers. This gives a cheap roadway perfectly safe for a number of years. When we traveled over the railway the rails were quite wet, and in going up the steepest grades sand had to be used; the cars were loaded with from 15 to 18 tuns of castings for the works at the mines. The sharpest curves on the road were of 250 feet radius, which would seem hardly practicable, but it is beyond question that such curves are used in several places to avoid rock cuttings. A 14-tun engine can draw, on these wooden roads, on an occasional up grade of 250 feet to the mile, 20 tuns of freight easily; and from 100 to 140 feet grade is not considered very objectionable; of course the easier the grades the better for any sort of road, and the more level the route can be made, without too great expense, the better. The rails are made of maple, 14 feet long, 6 by 4 inches, laid edge wise. Mr. Hurlbert suggets that rails would be best 7 by 3½ inches. The rims of the wheels are like those used on iron railways, only wider and the flanges a little beveled, so that the flange in pressing against the rail does not cut it. We did not see a single rail "broomed up" or cut on the inside, and only a few on the outside, where the heart of the rail had been laid uppermost. The "switches" are made in the usual way, the rails being kept together with iron rods when required to be moved. The "keys" are made of maple plank. The rails are sunk into the ties (which are cut into six inches wide and four inches deep) and are kept in place by wedges or keys, twelve inches long by four inches wide and one and a half inches thick at one end, by ¾ of an inch at the other, and driven in on the outside of the rail, keeping it against the shoulder of the tie. The ties are put down without being sided. There has not been a single car off the tracks since the road went into operation. The country through which the Clifton Railway is built is not only broken but even mountainous, and there is no difficulty, in our opinion, in constructing such a railway in almost any part of these townships. From the information obtained as to the cost of labor, materials, etc., in the vicinity of the Clifton road, we are of opinion that the cost of grading, furnishing ties and rails, and laying the same, with a moderate allowance of rolling stock, sufficient for some years, will not exceed, for our railways, $5,000 a mile, exclusive of large bridges—and this to build in a more permanent manner than the Clifton road is built. We are fully convinced of the practicability of wooden railways, where the principal object is a freight traffic, at rates of speed from 8 to 12 miles an hour, and that next to an iron railway, or where the cost of an iron road is too great to be undertaken, that wooden railways can be cheaply built, economically carried on, and a large paying business done by their means.

NATURE unrelentingly punishes those who obey not her laws.

Scientific American.

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Contents:

(Illustrated articles are marked with an asterisk.)

CHINESE LABOR IN AMERICA.

The United States may as well look the subject of Chinese labor squarely in the face, and make timely provision to absorb and utilize this new accession to our population.

Some are bitterly opposed to their coming. This opposition is based upon groundless prejudice. The policy of the Government has hitherto opened the doors of immigration to people of every race and clime. Shall we now close it upon the Mongolian, and if so, why?

We have hitherto spoken of the intelligence, industry, frugality, and order-loving disposition of the Chinese. That our views in this regard are correct, is proved by the testimony of the bitterest opponents to their immigration. Thus the Hon. Eugene Casserly, in his recent speech at San Francisco, says:

It is the duty of every class of men to unite to prevent the introduction of the Chinese. If they come in contact only with the common laborers to-day, to-morrow they will be in competition with the mason, the bricklayer, the carpenter, and the machinist, for they are the most frugal, industrious, and ingenious people on the face of the earth. Look at the splendid granite building occupied by Wells, Fargo & Co., the stone of which was cut in China, and was built by Chinamen. Men who can do such work for less than half the price paid white mechanics were an injury to the State, and he would unite with any party that would use energetic means to keep them out of the country.

Now it may be the duty of American citizens to drive out and to keep out the Chinese, but, as yet, we have only Mr. Casserly's assertions, and those of others like him to prove it.

It would seem that John Chinaman has the principal qualities that have made the bee and the ant famous among insects; and which induced the wise Solomon to select the ant as a fit instructor for the indolent. If industry, frugality, ingenuity, and thrift are bad qualifications for citizenship, let us clear the workers out of the hive, and cultivate drones. The Indian is the reverse of the Chinaman in these qualities, and it is well known what kind of a citizen he makes.

But while we assert that the Chinese character possesses, in an eminent degree the qualities we have ever been taught to regard as the elements of citizenship, we do not see how it is possible, with any show of consistency, to attempt, either by persecution or legislation, to shut our doors against them. One thing is certain, if they do not come here, they must go elsewhere. The tide of population has been so long dammed up within the limits of the Celestial Empire that it must soon burst its bounds. But let us not condemn the Chinese without good reason. Let us not imitate the conduct of the wolf in the fable, and accuse him of soiling the stream when it flows from us toward him. Let us not make his virtues a plea against him. A land that is constantly importing vice by wholesale must stand in need of a little virtue. Our Atlantic cities are deluged with the very offscourings of humanity. We see in the Mongolian tide setting in upon our Western shores, an addition to our population, which will tend to neutralize the evils which must, unchecked, arise from the dirty stream now pouring in through our Eastern seaports. The New York *Sun*, in an able article on this subject, in its issue of July 15th, says:

The fact is, there is not such a widespread prejudice against the Chinese as Eastern people have been led to believe existed in California. The large majority of the respectable people of both parties consider their presence a blessing. The lower class of foreign laborers oppose their coming, and persecute them whenever opportunity occurs. The Irish are their worst enemies, but Irish capitalists who employ labor are glad to obtain their services.

Politicians, or rather the unscrupulous demagogues among politicians, have caused most of the trouble. To secure the support of the most reckless and vicious portions of the population, they have framed unjust laws, and winked at outrages and abuses which are a disgrace to the State. Against all this, John, by his skill, patience, exemplary conduct, industry, and moderate charges for labor, is slowly but steadily working his way.

Do we need labor? If yes, then let us select the kind we want, and permit it to enter the country in just such proportion as our necessities demand. It is admitted that labor is needed in many parts of the country. Then, are the Chinese best qualified to furnish this labor in proper kind and quality? The answer to this question must decide the main question, whatever false side issues may be raised in regard to it. Now, all who have had dealings with the Chinese, or who have had them in employ, unanimously concur in the praise of their good qualities as laborers, and, for the most part, unite in the opinion that they will furnish just the kind of labor of which we now stand most in need. There can be, it seems to us, only one conclusion in regard to this matter. The Chinaman wants to work for us, and we want him. Then let an end be speedily put to the disgraceful treatment he has hitherto received, a blot upon the history of the "Golden State," which makes humanity blush. Let us welcome him, with all the rest of the oppressed and suffering who now find refuge here, confident that, by the process of assimilation, we can absorb, and render homogeneous the mixed races which are destined to people this continent.

WORKING OUT AND PATENTING NEW INVENTIONS.

Inventors, especially those of little experience in working out new ideas, and obtaining patents, are likely to be led into some errors which they might easily avoid.

A common one is the supposition, that ill-built machinery will do to demonstrate a principle. Experimental machines are often so poorly constructed, that instead of satisfying the mind of the experimenter, they make him skeptical of success by their imperfect working. The principle may be perfectly sound, and would prove so, if properly tested, yet the idea is either abandoned, or a new and more perfect machine has to be constructed, and the money already expended thrown away. It is an old maxim that what is worth doing at all is worth doing well; and nowhere is the truth of the saying more strikingly demonstrated than in the performance of an experiment. An experiment is utterly valueless unless performed with care, and under all the conditions ultimately to be fulfilled.

Tinkering should be, by all means, avoided; and nice and good workmanship secured, whenever possible to attain it. It costs more at first, but it is more economical in the end.

A second mistake is the supposition, that almost any one possessed of some legal knowledge can properly prepare specifications, and claims for a patent. This is one of the most fatal mistakes inventors make. The proper preparation of the papers for an application requires not only knowledge of the patent laws, but matured judgment, based upon large experience. To claim more than can properly be claimed, is to insure the rejection of the application. To claim less is to force the client to obtain by reissue what he might have obtained at first. Even the most skillful and experienced men may err in judgment on this point; how much more likely to blunder is one who has had little or no experience.

Some inventors attempt the prosecution of their own claims. Most of these come to grief. Not that the Patent Office willingly refuses to recognize their claims, but that all legal procedure is, and from its nature must be, attended with the observance of technicalities, to neglect which is to jeopardize their rights and cause the applicants much annoyance.

A third mistake on the part of those inexperienced in obtaining patents, is the supposition that, because a patent is rejected on the first application, it is a gone case. Now, the fact is, that perhaps one third of all the patents issued are rejected on first application, and yet, upon amendment of claims, or, in some cases, argument to show that amendment is not needed, are subsequently allowed.

This ought not to discourage the inventor from proceeding with his application, but it frequently does discourage him. Many a good thing has been dropped in this way for want of pluck to prosecute claims on which an excellent patent might have been obtained.

THE INDISCRIMINATE USE OF FIREWORKS.

The catastrophe which occurred in Chatham street on the evening of July 28th, is another serious lesson teaching the insane folly of permitting the indiscriminate use of fireworks. Seven persons were all badly, and some mortally burned, while the running away of the team, scattering fire in all directions, endangered the lives of the multitude that at that hour always crowd the thoroughfare in which the accident occurred.

The present restrictions upon the dangerous pastime of exploding and burning all sorts of fireworks, are almost worthless. Though the general practice is limited to the National holiday, and to illuminations, processions, etc., it is never safe to permit their use in the immediate proximity of buildings or in crowded thoroughfares.

In the case alluded to, a party of intoxicated roughs bent on making a splurge on their return from an excursion, smoked their cigars and ignited lucifer matches in a wagon containing dangerous explosives. The punishment for their recklessness, which probably would never have been meted out to them by the city authorities, was swift and terrible. Few will shed tears, and some will even be inclined to recommend the distribution of fireworks among this class of men, provided they would blow themselves up, away from respectable people, and where property could not be endangered.

The sale of poisons is made the subject of restrictive legislation, and the law is pretty generally enforced. But poisons subserve a useful purpose, and it would be unwise to prohibit their sale. Fireworks, on the contrary, are of no general utility, and their sale should be totally prohibited, or their indiscriminate sale ought to incur severe penalties.

AN ARRANT HUMBUG.

Our attention has been called to the following recipe which our correspondent informs us has been sold largely in the section where he resides, but not used to a very large extent through fear of explosions:

Recipe and Directions for Manufacturing the Sun-Light Oil—To make one gallon, take 3 quarts of Benzine, 1 ounce pulverized Alum, 1 1-2 ounces Alcohol, 2 ounces Cream Tartar, 2 ounces Sal Soda, 1 pint of Potatoes (cut fine), 2 table spoonfuls of fine Salt, 2 drachms Oil of Sassafras, 4 drachms of Gum Camphor. Dissolve the Alum in the Alcohol as much as possible, then add the Gum Camphor, stir for a few minutes, then add to one pint of the Benzine, stir it well for ten minutes, then add all the other ingredients except the Benzine, stir well until it foams, then add the remainder of the Benzine; leave it open and exposed to the air; shake it occasionally, and in two hours' time it will be fit to use, although it should stand if convenient, for 48 hours before using.

This is the proportion for one gallon, and the person who purchases the ingredients of a retail druggist for a single gallon will be charged much more in proprotion than if he bought in larger quantities, and must expect that by some druggist he will be charged two or three times the wholesale price for a single gallon of Benzine, as many retail druggists often buy but a few gallons at a time and have to pay about twice the wholesale price.

You are to use Benzine of 65 or 72 gravity, which costs but 12 1-2 cents per gallon in New York, Chicago, or Cleveland, and but 8 cents in Pittsburgh.

The ingredients used in one gallon will answer for ten gallons by adding 8 1-2 gallons of Benzine, one quart Potatoes and one pint fine Salt. The Sun-Light Oil should always be used with a patent or Sun-Light Burner.

Any individual detected making or selling the Sun-Light. oil without a right from us will be prosecuted as an infringer

This recipe contains a large proportion of hydrocarbon oil of a highly inflammable character, in which certain substances are dissolved, ostensibly, to make it a safe material for consumption in lamps, for illuminating purposes. The public may rest assured that they cannot either use this or any similar mixture with safety, and we warn them against imposition from men, whose only excuse for making such compounds, if they have any excuse at all, is their ignorance.

Let any one who wishes to try the following experiment put a little of this oil into a watch-glass, in a room heated to about 90°, or into any other shallow vessel, and hold a lighted match over it. If the vapor takes fire, it is dangerous. On the contrary if the match can be smothered out in the oil without igniting it, it is safe. All good kerosene should stand this test.

No oil is explosive in and of itself, it is only when the vapor arising therefrom becomes mixed in the proper proportions with air, that it will explode. There should be no inflammable vapor from any oil used for burning in lamps at ordinary temperatures. A volatile oil is unfit for the purpose, and men who would, knowing the nature of their wares willfully peddle through the country such vile and dangerous compounds, deserve the fate of other incendiaries.

We have understood that this or similar oils are sold in different parts of the country by the gallon at a price ranging from seventy-five cents to a dollar. Any one can figure for themselves from the data given in the above recipe, the large profits made upon the sale of the villainous stuff. When these people wish to sell you such compounds in future, show them the door at once.

WHEN DOCTORS DISAGREE WHO SHALL DECIDE?

This knotty question, the puzzle of wise-heads for generations, has lately been decided by Judge Blatchford, in the case of the Rumford Chemical Works *vs.* Lauer, a report of which we publish in another column.

It appears that Prof. Eben N. Horsford, the distinguished chemist and *savant*, formerly of Harvard University, Cambridge, Mass., after long research and experiment, discovered a method of manufacturing the acid phosphates in such a form as to render them useful in the making of bread.

There is no cereal so well suited to the wants of man as wheat. Among its mineral constituents, highly necessary to the nutrition and building-up of the human system, are phosphates of potash, lime, magnesia, and iron. But in the bolting processes employed to produce the fine white flours which the public demands, these important minerals are more or less sifted out and lost.

The object of Prof. Horsford's improvements were to restore these missing ingredients to the flour, and also to furnish a more convenient and better leaven than yeast for bread making.

One of Prof. Horsford's preparations consists of a fine, white, dry, acid powder, containing the necessary phosphates, which is mixed with common flour and baked in the ordinary manner. For leavening purposes, bicarbonate of soda is combined with the phosphate and the flour, and when the mass is wetted carbonic acid is liberated, which leavens the dough perfectly, thus dispensing altogether with yeast.

The improvements of Prof. Horsford were duly patented, and the patents were purchased by the Rumford Chemical Works of Rhode Island. The manufacture of the phosphate preparation has become an extensive business, and other parties are now seeking to take it up. It was to restrain one of these infringers that the present suit was brought.

On the part of the defense, the learned Benjamin Silliman, Jr., Professor of General and Applied Chemistry, of Yale College, George F. Barker, Professor of Physiological Chemistry and Toxicology, of Yale Medical College, Prof. Austin Flint, Jr., Prof. Charles A. Seeley, and Mr. Place, all testified in the most positive manner, that by following an old formula of the celebrated chemist, Berzelius, given in Gmelin, they had produced an acid phosphate in the form of a fine, white, dry, non-hygroscopic, homogeneous powder, capable of evolving carbonic acid and producing phosphate of soda in its reaction with bicarbonate of soda, and otherwise presenting all the properties of the article described in the plaintiff's patent. These witnesses had repeatedly tried the formula and they exhibited specimens of the powders thus produced. One of the witnesses, Prof. Seeley, testified that when the formula of Berzelius was intelligently followed it was impossible to produce any other substance.

On the other hand, the distinguished Prof. R. Ogden Doremus, of the Medical Societies in this city, testified for the plaintiff, that the formula of Berzelius does not contain such a description as will enable him, as a practical chemist, to produce such a substance as the previous witnesses had described. He had, he said, made but one trial, which resulted in a white powder having an acid taste which soon became inert, and would not, when mixed with bicarbonate of soda, set free carbonic acid.

Professor Horsford testified that he had devoted much time to the subject, but had been unable from the formula of Berzelius to produce the article described by the witnesses for the defense. The substance which he had produced was sometimes sticky, and from day to day lost its strength, until it had no capacity to decompose bicarbonate of soda.

Here was a marked disagreement in the testimony of the learned doctors; but it does not seem to have troubled Judge Blatchford very much. He decided the matter readily, and at the same time gave the learned professors a very useful lesson in practical chemistry, by advising them to make their acid solutions a little stronger, when they would probably be able to produce the substance described by the *savans* of Yale.

Although this trial has resulted adversely, in part, to the very broad claims set up by the Rumford Chemical Works, it will not in any manner interfere with the continued manufacture of their excellent phosphoric acid preparations, which are made under the personal supervision of Prof. Horsford. If in point of law he is not the original discoverer of the acid phosphate powders, he is undoubtedly the first to develop a method of making them commercially available, and thus to put the public in possession of a valuable article, the use of which is of great importance as a constituent of food. The celebrated Liebig has stated that the nutritive value of ordinary flour is increased ten per cent by the use of Professor Horsford's phosphatic bread preparations.

THE THEORY OF BOILING---TOMLINSON'S EXPERIMENTS AND CONCLUSIONS.

There have been few who have contributed more to the general stock of knowledge during the past year than Charles Tomlinson, F. R. S., F. C. S. Especially valuable is his theory of boiling as applied to the useful arts, of which we can give only a brief and cursory review. We will, however, endeavor to give our readers some of the most prominent points and practical conclusions.

According to this theory, a boiling liquid is a supersaturated solution of its own vapor. This is proved by holding a nucleus *in any part* of the liquid. It will instantly become covered with steam bubbles.

But what is a nucleus? It is a promoter of vaporization, which acts by virtue of its stronger adhesion for the vapor of the solution than the liquid from which it is produced. Among the most common and well-known nuclei are the soap used by distillers, butter used by the sugar refiners, bits of cedar used in Dr. Bostock's experiments, the brass wire used by Oersted, the pointed or rough bits of platinum used in chemical experiments and operations, etc.

Mr. Tomlinson has shown that all these nuclei are imperfect, that if they act well at first, they are likely to become inert during a single operation, and, therefore, unreliable, and, as the result of his researches, he has discovered nuclei which will not only greatly facilitate the escape of vapor from boiling solutions, but which, acting upon an entirely different principle from the ones enumerated, and others similar to them, may be relied upon as permanent and uniform in their action: these will be named further on.

Mr. Tomlinson says "all the substances which have hitherto been used empirically, because the principle which led to their adoption was not known, must be renewed at each operation, and as they are liable to cease their action before any operation is completed, they are liable to objection." They will cease to act as nuclei whenever they become chemically clean.

In Mr. Tomlinson's paper upon this subject, read before the Society of Arts, he remarks: "It has been recommended to use sharp-pointed or roughened bodies, under the impression that steam is given off with greater facility from the points or the teeth. This is a mistake. Make these rough or sharp-pointed bodies clean, and they cease to act. Sharp, angular fragments of glass, washed in sulphuric acid and rinsed, no longer act as nuclei. A rat's-tail file passed through the flame of a spirit-lamp also becomes denucleized. A body such as a file is apt to collect between its teeth the greasy kind of matter that acts so well as a nucleus; and this has led to an idea in favor of rough bodies. The air is not a nucleus. When Dr. Bostock found his thermometer cease to act, and by taking it out of the liquid and waving it in the air it liberated vapor when restored to the liquid, the thermometer had caught from the air some unclean particles of dust, which acted for a moment as nuclei, until, by the action of the ether, they became denucleized."

Mr. Tomlinson states that he has performed a very large number of experiments on the action of nuclei on various liquids at or near the boiling point, and they all point to the same conclusion; namely, that the action of a nucleus is differential, there being a greater amount of adhesion between the nucleus and the thing dissolved than between the nucleus and the liquid. In the great variety of cases the nucleus is contaminated with some kind of oily, fatty, or greasy matter, and this, having a less adhesion for the liquid part of a solution than for the gas, or the salt, or the vapor of such solution, there is, consequently, a separation of gas, or salt, or vapor. The nucleus may be a solid thrown into t e vessel, or the sides of the vessel may act as a nucleus, or f tty matter may be thrown in, in order to make the vessel unclean, as in the case of the distillers and the sugar boilers. But in all cases of solid or liquid nuclei, we may always observe this differential kind of action, on which, he contends, the action of nuclei depends. The following experiment illustrates this:

Five ounces of distilled water in a clean flask boiled at $213\frac{17}{20}$° Fah. Some perfectly clean mercury was poured in, enough to form a ring at the bottom of the flask. The water rose to 214°, with much bumping, steam forming under the mercury, and distending it into hemispheres, each of which burst with a kick. It would have been dangerous to have entirely covered the bottom of the vessel with the metal, for, as it was, the bursts were of an explosive character. While this uneasy boiling was going on, a very little dirty mercury was added to the flask, and, although the mercury was not more than one sixth of that previously added, the effect was remarkable. Instead of the uneasy kicking, jerking bursts, the boiling became brisk, easy, and soft, rapid volleys of steam-balls being given off by the metal, breaking up the mass of water, while the temperature remained steady at $212\frac{2}{20}$°.

Further experiments will be alluded to in a future article, showing the reasons for selecting charcoal, coke, pumice-stone, and especially cocoa-nut shell charcoal as the best known nuclei. Our readers engaged in dyeing, distilling, etc., will not fail to see the importance of this subject, as well as its possible application to saving of fuel in steam boilers, since whatever tends to lessen the adhesion of steam to the water contained in boilers, helps to economize fuel. The experiments we shall give in our next bear strikingly upon this point.

THE ODORIFEROUS PRINCIPLES OF PLANTS---AND THEIR IMITATIONS---FUSEL OIL.

No doubt many of our readers have, while enjoying the delicate odor of a rose or a cape jasmine, wondered what it is that these and other plants possess which imparts such delicious perfumes. Chemistry has answered this question definitely, and has shown that these odors arise from volatile oils existing in the tissues of plants. Sometimes it is the flowers, sometimes it is the bark or wood that contains these essential oils. Some may be obtained by distillation of the flowers, leaves, bark, or wood, with water; others are so evanescent and destructible that more refined processes have proved necessary, and some elude all attempts to secure them.

The elements which compose these oils are only three, oxygen, hydrogen, and carbon. Charcoal and water, therefore, contain all that is necessary to their composition. Many of them are hydrocarbons mixed with an oxidized oil, and in others the oxygen enters as a chemical component. Of these last attar of roses is an example.

These oils have taste as well as smell, and give peculiar flavors to fruits, wines, and liquors distilled from fermented fruit juices. These flavors are called the bouquets of liquors. The composition of brandies, wines, and other liquors, being little else than alcohol, water, sugar, with coloring matter and a peculiar bouquet, the idea of making factitious imitations was a very natural one. In applying it to practice it was found that the chief difficulty lay in the imitation of the bouquet. Many of these have been since successfully imitated, and the substances produced form a class scarcely second in interest to any in organic chemistry.

The readers of the daily papers and the scientific press have seen so much said of fusel oil during the past year, that the name has become very familiar. They have, therefore, learned that this is a substance generated during the distillation of whiskey from potatoes, and also by other methods to which we need not refer. It is analogous to the alcohols in its reactions, and having for its base a peculiar radical called amyle, it has received the name of amylic alcohol. It has a very nasty smell, and most of its compounds and derivatives are characterized by their peculiar odors, which imitate to a nicety the odors of various plants, fruits, etc., as well as those of insects. From perfumes the most agreeable it is but a step to the utterly nasty and disgusting. A few examples will illustrate.

Drop amylic alcohol on platinum black. It immediately oxidizes to an acid which gives the smell of *valerian*.

Distil amylic alcohol with acetic acid obtained by the decomposition of acetate of potash with sulphuric acid in the retort, and an oily product smelling exactly like the *Jargonelle pear* is generated.

Distilling with chromic acid obtained in an analogous manner to the above, and an oil smelling like *apples* is produced.

Cognac and *grape oils* are imitated by the action of concentrated sulphuric acid upon the same radical.

Products having the odors of *bananas, oranges*, and many other kinds of fruits, are successfully imitated by analogous methods. In fact some chemists have affirmed that these oils are identical with those naturally compounded in the growth of plants.

But the odors thus produced, as we have already said, are not by any means all of them pleasant. The odors of disgusting plants, bed bugs, squash bugs, etc., etc., are equally attainable though not in general request.

Another class of substances possessing odors similar to those found in certain species of plants are the sulphur alcohols, as they used to be called, or the sulphides of ethyl, one of which corresponds to alcohol with its oxygen replaced with sulphur. This last is also called mercaptans on account of its affinity for mercury, (*mercurium captans*). The method by which it is produced from alcohol is indirect, and would scarcely be intelligible to the general reader. The composition of this alcohol is $C_4H_6S_2$, that of wine alcohol being $C_4H_6O_2$.

The odors of these sulphides of ethyl are like those of garlic, onions, leeks, etc. A similar compound prepared from methylic alcohol is a clear liquid, without color, but having an intolerably offensive odor of onions, which is very tenacious.

The sulphur in these compounds may be replaced by arsenic, giving rise to new compounds indescribably disgusting, and as noxious as they are offensive. Kakodyl is the name of one of these compounds, a name of ill portent, from the Greek *kakos* evil, *hyle* principle. It unites with cyanogen to make a frightfully poisonous volatile compound, a few drops of which evaporated in a room will produce almost instantaneous unconsciousness upon any unfortunate who chances to be present.

We may not extend this article further. Suffice it to say that we have mentioned only a few of the odors that may be successfully imitated by chemical compounds.

PREDICTION OF WEATHER.

The prediction of the weather from natural indications has been attempted from time immemorial; but hitherto the weather prophets have been compelled to confess that "all signs fail in dry weather." Professor Houzeau, formerly of the Royal Observatory at Brussels, has been making observations for years, and has finally published a general table whereby he claims the weather may be predicted for a short time in advance with considerable certainty.

The things to be observed are, the direction of the wind, the state of the barometer, and the state of the sky. These three states may be expressed thus: Barometer rising, falling, fixed, or very slow, falling fast, rising fast, rising slowly after sinking very low, sinking very low and for a long time.

The sky is described as being blue, cloudy, rainy, or snowy, fine, cloudy with rain or snow at commencement of wind, fine with light clouds, veiled, hot after rain, covered, fine rain falling, hot after westerly rain, etc., etc.

The directions of the wind are expressed in the points of the compass as usual.

In the absence of all definitions we must say we think these terms exceedingly indefinite. To us, the differences between a fine sky and a blue sky, or a veiled sky and a covered sky are not quite apparent. The looseness of this terminology is scarcely indicative of scientific accuracy, although the antecedents of Professor Houzeau would lead us to expect it.

We cannot give the table of indications prepared by Prof. Houzeau, but will give only some examples.

A rising barometer, with blue sky and wind N., indicates cold and dry weather. Same, with cloudy sky, weather will clear up. Same, with rain or snow, wind will change to N.E., with alternate showers and sunshine.

Barometer fixed, or very slow, with fine sky, wind N.E., the wind will continue, and weather become dry. Same, with cloudy sky, rain, or snow at commencement of wind, the same result may be expected as before.

These examples will serve to show the method employed. It must be remembered, however, that if the predictions thus made should prove very accurate for the locality of Brussels, they would not be likely to be so in other places remote from that point, though it is fair to infer that if the states of the barometer, sky, and the wind are sufficient data in one place, they would, also, be enough in another. The interpretations would, therefore, be subject to amendment.

For ourselves, we confess our faith is small, but as there is nothing apparently impossible nowadays, there may be something in Professor Houzeau's table.

Compressed Fuel from Coal Dust.

In Great Britain the quantity of coal dust remaining unemployed is calculated at 28,000,000 of tuns. Various methods have been attempted to convert it into useful fuel by compressing it into cakes, but the operation is not sufficiently remunerative. In Belgium they follow another plan, which seems to answer better. They mix coal dust with 8 per cent of tar, and then press it into cakes, which are found to make excellent fuel for steam engines. The dross accumulated in iron works, to the amount of millions of tuns, is known to contain from 25 to 50 per cent of iron, but the difficulty of extracting is very great, the metal being intimately combined with various silicates, and other substances, which are not easily separated by fusion. Lime, indeed, will decompose these silicates, but the iron thus obtained is brittle. Nevertheless, M. Fleury has recently made a successful attempt to obviate this drawback by slacking the lime used for the purpose in water containing a certain proportion of some alkaline chloride.

The Architectural Review contains a description of a patented frost-proof tin pipe for gutters. Instead of being cylindrical like ordinary pipe, it is corrugated longitudinally, so that when water in it expands by freezing, the pipe also expands approximating the cylindrical form. The idea of making corrugated pipes for the above purpose is quite old, and has been the subject of applications for patents.

BRIDGE ACROSS THE BRITISH CHANNEL.

We have received the description and drawings of a projected bridge across the British Channel designed by a French engineer, Mr. Charles Boutet.

The bridge is to extend from the Dover Hills, near Shakspeare Cliff to Cape Blanc-nez, near Calais. The distance between these two points is 32,822 yards. Nine colossal iron piers and two abutments are designed to form the supports of the entire structure; so the bridge will have ten spans each of 3,282 yards, or almost two miles. The piers are to extend 120 yards above the sea level, to allow the largest vessels to pass under the bridge. Each pier measures at the lower end 130 by 87 yards, and the foundations reach from 28 to 52 yards into the ground. The piers are to be built on shore, and floated by immense buoys to their final resting places. They are at their lower parts, provided with screw supports, which, when turned, are worked into the foundation to secure and retain the piers in position.

Each cable consists of 120 two-inch wire ropes. Buffers made of wire rope, are arranged around the piers, to prevent vessels from striking against the same, and within each pier is a staircase, extending down to the water's edge, to serve as a means of escape for shipwrecked persons. Furthermore, each pier is constructed to be used as a light-house.

The entire expense of the structure is estimated not to exceed £8,000,000. One half of this sum we are informed has already been subscribed in France.

Interesting Researches upon the Effects of Lightning Stroke upon Animals.

Benjamin W. Richardson M. D., F. R. S., has been making extensive researches with the great induction coil at the Polytechnic Institution in London to ascertain the effects of lightning stroke upon animals with a view to throwing light upon some hitherto doubtful points connected therewith. The importance of being able to ascertain whether a person is dead or otherwise after being struck by lightning will not be disputed. Dr. Richardson asserts that it would be the easiest mistake in the world to look on a man struck by lightning as dead when in truth he is only stunned.

He says: I am free to confess, and it is right to confess, I have seen an animal so seemingly dead after electrical discharge that at first I adjudged it dead, and yet it has spontaneously recovered. If then I, who am somewhat conversant with the effects of these shocks on living organisms, might, by too hasty an examination, be deceived, how much more so those who by mere accident first approach the victims to the lightning discharge; and how shall all men be guided toward a more correct knowledge as to the positive signs of death? I answer on this point with much less of knowledge than I could wish, but I may perhaps so answer as to prevent one of the most serious of errors. The positive signs of death after lightning stroke, as far as I know them up to this time, are—

(1.) ABSENCE OF ALL INDICATION OF MOTION OF THE HEART—This sign must be accepted with the understanding that there may be action of the heart which does not declare itself by audible sound or sensible motion detectable through the walls of the chest.

(2.) ABSENCE OF REFLEX ACTION.—As a rule, an animal which has been stunned simply by the electrical shock shows signs of reflex motion, so-called, when an irritant is applied to the eye or when the skin is pricked over a muscle. Whenever there is an exhibition of reflex action, the evidence is almost certain that living action is not absolutely suspended. But it must also be accepted with this understanding, that in batrachians, at all events, its absence does not of necessity denote death. We give a shock to a frog, for instance, and we see, on applying an irritant, that the animal shows no reflex action. Yet the probabilities are that the animal will be restored to life.

(3.) DECREASE OF ANIMAL TEMPERATURE, IN THE CAVITIES, TO THE TEMPERATURE OF WATER LEFT EXPOSED TO THE SURROUNDING AIR.—This, in our present state of knowledge, is a fair proof of actual death in warm-blooded animals. It does not prove the impossibility of recovery.

(4.) ABSENCE OF COLOR IN SEMI-TRANSPARENT STRUCTURES.—The passing of a strong light through the hand, or other semi-transparent structure, and observing if the red color which is seen in the living parts is absent, is a good sign of death; but is not, I think, absolutely reliable, inasmuch as there may be so much resistance to conveyance of blood through the vessels that coloration due to the presence of blood in them may be absent in the hands, or even in the cheeks, while yet there may be motion of the heart.

(5.) RIGIDITY OF MUSCLES.—If muscular rigidity be general, and the muscles of the chest be rigid, the evidence of absolute death is sufficient. But a partial or local rigidity of muscle is not of sufficient evidence. Rigidity may occur in one limb, so we saw at the last demonstration, in the line in which the electrical current has coursed through the body, and may not designate total extinction of living action.

(6.) COAGULATION OF THE BLOOD IN THE VEINS.—This is at once a ready and good sign of death. In the human subject the largest vein that can be found immediately under the skin should be laid freely open, a fillet being first applied above the place for the opening. If, then, in the vein there be found a coagulum, the inference is fair that the process of coagulation is complete, and that restoration of life is impossible.

(7.) DECOMPOSITION.—Lastly, the occurrence of decomposition of the body is the final proof of actual death; and although when the blood in the venous system is distinctly coagulated, and there is general *rigor mortis*, it may not be necessary to wait for decomposition of the body before committing it to the earth, in the absence of the two changes just named—coagulation and rigidity—evidence of decomposition ought always to precede the act of burial.

A Remarkable Surgical Operation.

One of our old subscribers, who is a medical practitioner at Chicago, took part in the following case, which is described by the *Chicago Tribune*. The subject was a lady from Lee Center, Ill. A careful examination by Dr. Beebe, revealed the fact that the intestine involved in an old rupture had mortified, and to allow this to remain would inevitably destroy the woman's life. He, therefore, decided to remove so much of the intestine as had undergone decomposition, and by securing the extremities of the sound intestine, to restore at length the natural passages, and thus preserve the unfortunate lady's life. Assisted by Drs. L. Dodge, J. S. Mitchell, and A. G. Beebe, this dangerous and difficult operation was accordingly performed, and four feet six inches of the intestine were removed from the patient's body, and may now be seen preserved in alcohol, in Dr. Beebe's office. The operation completed, the abdomen was carefully stitched up, the patient enjoined to preserve perfect quiet, and to abstain from solid food. Thirteen days have now elapsed, and, astounding as it may seem, the good lady has well-nigh recovered, being now allowed the freedom of her room and a generous diet, which is heartily relished. What will not the surgeons do next?

Utilizing Garbage.

The New York *Sun* says that a company has been formed in Chicago, and will soon be in operation, for distilling alcohol and extracting soap grease from ordinary city garbage. The process is a patented one, and consists in taking the garbage just as it is hauled off in the city carts, dumping it into tight tanks, and boiling six hours at a temperature of 212°. This dissolves the whole mass, which is run into fermenting tubs and worked with yeast. The soap grease and impurities rise to the top of the tubs, and are skimmed off, and the residuum is distilled in the regular way. It is estimated that each barrel of garbage will yield three pounds of soap grease and four gallons of proof spirits. The soap grease is, of course, as good as any other, but the alcohol betrays its origin by an odor which requires further processes for its removal. For many uses, however, it is as good as that derived from grain or molasses, and, if its distillation is not too costly, will yield a considerable profit.

Composition of the Milk of Different Animals.

1,000 parts contain:

	Water.	Butter.	Cheesy Matter.	Sugar.	Mineral-Matter.
Woman	889·08	26·66	39·30	43·68	1·30
Cow	864·30	31·30	48·80	47·70	6·00
Goat	844·90	56·87	35·14	36·91	6·18
Ewe	832·32	51·31	69·78	39·43	7·16
Mare	904·30	24·36	33·35	32·76	5·23
Ass	890·12	18·53	35·65	50·46	5·24
Sow	818·00	60·00	53·00	60·70	8·30

Proportions of solids and water in different kinds of milk:

	Woman.	Cow.	Goat.	Ewe.	Mare.	Ass.	Sow.
Water	889·08	864·30	844·90	832·32	904·30	890·12	818·00
Solids	110·92	135·80	155·10	167·68	95·70	109·88	182·00
	1,000·00	1,000·00	1,000·00	1,000·00	1,000·00	1,000·00	1,000·00

Pig's milk is extremely rich, containing, as it does, nearly 50 per cent more nuitritive matter than is found in that of the cow. It is not unlikely that in certain forms of disease where a milk diet is prescribed the use of so concentrated a liquid food might prove serviceable.—*Chemical News.*

Dry Docks at Brooklyn.

Two very large dry docks are now in operation at South Brooklyn. No. 1 is 500 feet long, 60 feet wide at bottom, and capable of receiving vessels of 12 feet draft at low water, or 18 feet at high water. No. 2 is 447 feet long, and receives vessels drawing 17 feet at low water, and 22 feet at high water. By means of a central gate this dock may be divided into two separate parts each forming an independent dock.

The pumping is done by means of a superior horizontal engine of 100-horse power and two oscillators of fifty and thirty horse-power, respectively. The former of these engines connects with a double centrifugal pump, of mammoth proportions, and with a capacity for pumping and discharging forty thousand gallons of water per minute. At this rate, the average time required for completely relieving the docks from water is about 3½ hours; the docks ordinarily contain eight millions of gallons of water. The oscillators are attached to centrifugal pumps used for drainage, or keeping the docks free from water when occupied by vessels. Their average capacity is about one thousand gallons each per minute.

Diarrhea

Is a very common disease in summer-time. Cholera is nothing more than exaggerated diarrhea. When a man has died of diarrhea, he has died of cholera, in reality. It may be well for travelers to know, that the first, the most important, and the most indispensable item in the arrest and cure of looseness of the bowels, is absolute quietude on a bed; nature herself always prompts this by disinclining us to locomotion. The next thing is, to eat nothing but common rice, parched like coffee, and then boiled, and taken with a little salt and butter. Drink little or no liquid of any kind. Bits of ice may be eaten and swallowed at will. Every step taken in diarrhea, every spoonful of liquid, only aggravates the disease. If locomotion is compulsory, the misfortune of the necessity may be lessened by having a stout piece of woolen flannel bound tightly round the abdomen, so as to be doubled in front, and kept well in its place. In the practice of many years, we have never failed to notice a gratifying result to follow these observances.—*Hall's Journal of Health.*

How to Set a Slide Valve having Equalized Exhaust.

1. Place the crank at the 180° location, mark on the cross-head and one of its guides opposing "center punch" points.

2. Bring the crank to the zero and mark a second point on the guide. The two points thus found, measure the length of the stroke. Move the eccentric until the valve has the required lead for the forward stroke.

3. Advance the crank in the direction of the motion until the exhaust of the opposite stroke closes; scribe a line across the guide which shall pass through the point on the cross-head.

4. Move the crank until the other exhaust closes and scribe a second line on the guide.

5. If now the exhaust should close at equal distances from the commencement of each stroke the motion would be in adjustment; if not, alter the length of the eccentric rod until the closure becomes equalized, then return the crank to the zero position, and alter the angular advance of the eccentric until the required lead of the forward stroke is secured.

The position of the valve at the moment of closure may readily be fixed by means of a "valve gage" fitting center punch points on the valve stem and its stuffing box.

The above process will serve also to equalize the cut-off if the valve be proportioned for this object.—*Auchincloss' Link and Valve Motions.*

How to Observe the Eclipse and Save Your Eyes.

A correspondent writes to the *Evening Post* as follows:

"Take a large card with a small round hole in the center, and hold it against the sun's rays, so that the shadow will fall on the floor, pavement, wall, or other dark and smooth surface. In the middle of the shadow there will be a true image of the sun, and the eclipse can be studied in its progress without straining the eyes, and without smutting face or hands with smoked glass.

"This simple process was suggested by the familiar circumstance, that the light spots in the shadows, during a solar eclipse, take the shape of the luminous portions of the sun's disk, and the perforated card has been used with perfect success."

A DURABLE CHAIR.—In response to an article published in these columns some time ago for a good chair we have received a number of specimens from different manufactures. One of the best and strongest is of the Shaker pattern, with arms, and splint bottom of generous width, made by Tarbel, Royse & Co., of Bellows Falls, Vt., under a patent granted to one of the firm, March 19, 1867. It is the embodiment of comfort, and looks as if it would endure for ages.

IT is said that a cheap outer cell for a Daniells battery can be made from a common tin canister by placing it in a solution of sulphate of copper, and putting in the porous cell, zinc and acid as usual, and connecting the zinc with the canister below water mark by a copper wire. After a little the inside of the canister will be coated with copper. It is said to be quite as good as a cell made entirely of copper.

TREATMENT OF CORNS.—Persons troubled with corns, and who is not, will find great relief, and sometimes absolute cure, by the application of a slice of lemon to affected parts, secured by a strip of cloth, on going to bed. We have tried it on a painful hard old fellow and found immediate relief.

A MONSTER CANNON.—A new twenty-inch cannon, smooth bore, weighing fifty-seven tuns, has lately arrived at Fortress Monroe from Pittsburgh, Pa. It is the largest piece of ordnance ever produced in this country. It will throw a ball weighing eleven hundred pounds.

IMPORTANT PATENT DECISION.

UNITED STATES CIRCUIT COURT, SOUTHERN DISTRICT OF NEW YORK. IN EQUITY. DECISION BY JUDGE BLATCHFORD.

The Rumford Chemical Works vs. John E. Lauer. Opinion of the Court. July 13, 1869.

In this case the original patent was granted to Prof. Eben N. Horsford, April 22, 1856, and was reissued to the plaintiffs, who are assignees, May 5, 1868, and reissued to them a second time, June 9, 1868. The infringement alleged in the bill is the making and selling by the defendant, of pulverulent acid, [illegible]

[illegible]

THE DEFENSE.

The defenses set up are, that Horsford was not the original and first inventor of anything which has been made and sold by the defendant, and that the defendant has not infringed the patent. [illegible]

[illegible] this phosphate is as follows: "4 Ca O, 3 PO5." [illegible]

EVIDENCE FOR THE DEFENDANT.

[illegible]

THE PLAINTIFFS' EVIDENCE.

[illegible]

JUDGE BLATCHFORD'S CONCLUSIONS.

In this condition of the chemical testimony, that on the part of the defendant far outweighs that on the part of the plaintiffs. The former is positive and affirmative, while the latter is merely negative. [illegible]

[illegible] in a mixture of muriatic acid and water, filters the product, adds sulphuric acid and dries the resulting mass by heat till it crumbles into a powder which is white and acid, and can be used, in connection with bicarbonate of soda, to liberate carbonic acid, to make bread. Bone black is burned bones. The muriatic acid dissolves the phosphate of lime in the bones from the carbon, the filtering gets rid of the carbon, the action of the sulphuric acid creates sulphate of lime, acid phosphate of lime, and free phosphoric acid, and the heat drives off the muriatic acid. Horsford removes the carbon from the bones by fire before he applies the sulphuric acid, while the defendant removes the carbon from the bones by muriatic acid, and then gets rid of that acid by heat. Horsford burns away the carbon from the phosphate of lime in the bones, while the defendant dissolves away the phosphate of lime from the carbon. The products produced by the two processes are substantially identical with each other and with the product produced by the process of Berzelius and Gmelin, as powders containing phosphoric acid as an available agent to decompose alkaline carbonates, for the purpose of liberating carbonic acid, to give porosity to dough, but the three processes differ each from the other, in substance. It appears, from the evidence, that the use of sulphuric acid, to act on what is indifferently known as bone earth, or bone ash, or bone phosphate, being common bones containing phosphate of lime, and thus form sulphate of lime and liberate sulphuric acid or an acid phosphate of lime, was well known before the date of the alleged invention of Horsford. The defendant does not, by the use of the process described in his patent, infringe the second claim of the plaintiff's patent, considered as a claim to the process described in that patent for making the pulverulent acid therein described. If the second claim be considered as a claim to the acid, as a product, the conclusions arrived at in regard to the first claim apply to it.

As already remarked, the third and fourth claims of the plaintiffs' are not involved in the case. The questions, so largely discussed by the counsel for the plaintiffs, on the argument, as to whether Horsford was not the first person who used, as a substitute for yeast, a powder containing phosphoric acid as its active agent, and as to whether he is not entitled to a patent for applying phosphoric acid, in connection with an alkaline carbonate, to the raising of dough, and as to whether the third and fourth claims of the plaintiffs' patent are not valid, as containing inventions which involved the necessity of experiments, to determine whether phosphoric acid, when artificially introduced into bread, would be healthful, and whether and how the acid could be mixed with flour and with an alkaline carbonate, and remain inactive until moistened or heated, are questions which will arise on the patent when a suit is brought on it for the infringement of its third and fourth claims, but they are not presented in this case.

It may be that there are claims which Horsford could make and hold in reference to certain constituents and qualities of the pulverulent phosphoric acid that is made by this process, but the broad claim made to the acid described, is not tenable.

The bill must be dismissed with costs.

W. WHITING and C. A. SEWARD, for the plaintiffs.

E. W. STOUGHTON and C. M. KELLER, for the defendant.

Answers to Correspondents.

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

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

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

C. P. P., of Kansas.—The chemical symbol HO, signifies one equivalent of hydrogen combined with one equivalent of oxygen. The equivalent of hydrogen being 1 and that of oxygen 8, the equivalent of HO, or water, is 9. The equivalent of a substance in the old nomenclature is based upon the weights in which, or in some multiple of which, it generally combines with other bodies. The new nomenclature takes into account the volumes of substances when in a gaseous state, as it has been found that generally the molecules of compound bodies when reduced to the gaseous state occupy equal volumes, and that, also, a simple relation exists between the volumes of any two gases which combine together. It also makes a distinction between the terms *equivalent* and *atomic weight* and from the above considerations as well as others equally forcible, makes the atomic weights of many substances just double the numbers assigned in the old nomenclature as their equivalents. Hence, according to the new nomenclature, water is represented by H_2O. In our paper when we find occasion to use chemical formulæ we still use the old nomenclature, as many of our readers, who have all their lives been accustomed to it, have not probably found time to post themselves upon the new, which is now generally adopted in scientific schools, and in very recent treatises involving the use of chemical symbols.

A. M., of La.—We believe that no cheap ice machine suitable for use in families has yet been introduced. A cake of ice weighing 20 lbs may be kept easily 40 hours in a good refrigerator before it melts away, if the box is not too frequently opened. You can filter and cool water by passing it through an underground filter, but with the low head you have got it will not enter the house with much force. It will, however, probably answer your demands.

R. H., of N. Y.—You can cleanse barrels from must, by burning a small quantity of sulphur in each, after which they should be well rinsed with cold water.

M. L., of Vt.—The term *isomeric* is applied to compound chemical substances, which, having the same elements combined in the same proportions, still exhibit different properties.

A. A. S., of Wis.—The greater the hight to which a given quantity of water is raised in a given time, the greater the power required to raise it.

J. B., of Mass.—You will not in our opinion be able to punch wires in the way you described. The temper is already out of annealed wire and we don't see why you should seek to do what is already done.

W. F., of Pa.—Good pine or cedar is the best timber for making vats, etc., for holding boiling water. Soluble glass will not be of service to you for such purposes.

S. H., of Ind.—As soon as we can get a locomotive constructed that will run as fast as the initial velocity of a cannon ball we will try the experiment you suggest, and shall expect to find that the ball will drop perpendicularly from the mouth of the cannon to the ground.

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.

Recent American and Foreign Patents.

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

BEEHIVE.—George A. Robinson, Mount Pulaski, Ill.—This invention relates to a new and useful improvement in beehives.

BLIND FASTENING.—Leonard D. Howard, St. Johnsbury, Vt.—This invention relates to a new and improved fastening for blinds and shutters of windows.

SELF-ACTING MULE.—C. J. Greene, Olneyville, R. I.—This invention relates to improvements in selfacting mules, such as are known as Mason's mules, the object of which is to provide more simple and reliable "backing off" and "winding on" motions.

HAIR-CURLING APPARATUS.—Mrs. Marcia Adkins, Oswego, N. Y.—This invention relates to improvements in hair-curling implements. It consists in the application to a hollow heating and curling mandrel of a combing, pressing, and spirally-laying apparatus, whereby the operation may be rapidly and accurately accomplished.

GRINDING EDGE TOOLS.—Lorenzo Zimmerman, Waukeshaw, Mich.—This invention relates to a new and useful apparatus for holding edge tools in grinding them on a grindstone, and consists in an adjustable bar connected with the frame of the grindstone at its back end, with an adjustable lever attached thereto, with a jaw on the end of the lever for holding the tool to the bar and to the stone.

GAGE FOR SEWING MACHINES.—Mrs. Anna F. Rogers, Quincy, Ill.—This invention consists of an adjustable gage plate having a recess in its front edge, in which a presser pad having inclined serrated grooves on its lower face, is arranged and connected to the said gage plate by an adjustable spring which governs the pressure of the pad upon the cloth.

GUIDE ATTACHMENT FOR BORING INSTRUMENTS.—Arthur Amory, New York city.—This invention relates to improvements in apparatus for indicating the position of boring instruments, to assist the operator to guide them properly for boring horizontally, vertically, or angularly, as required. The invention consists in supporting a pair of spirit levels upon the shank of the boring instrument by a clamp which may be readily attached or detached, the levels being so adjusted as to indicate the position of the boring stock horizontally, vertically, or obliquely.

PLASTERING MACHINE.—Thomas McKinley, New York city.—This invention relates to a new and improved method of plastering, whereby the tedious and expensive operation of covering walls and ceilings of buildings with mortar is greatly facilitated, and it consists in moving over the floor of the room where the plastering is to be done, a machine resting on wheels, consisting of a box containing the mortar, with a piston to fit the box, which piston is forced upward by means of gearing actuated by the supporting wheels, the mortar being forced from the box by the piston in a thin sheet and pressed upon the lathing or wall as by a trowel.

REFRIGERATOR.—S. K. Scoggins, Baltimore, Md.—The object of this invention is to provide for public use a simple, cheap, and convenient refrigerator, which shall be properly ventilated, and shall be capable of keeping food, etc., nearly at the freezing point.

Mechanical Motion.—Nelson Read, Winchendon, Mass.—This invention relates to a new and useful improvement in means for transmitting motion from a rotary driving shaft to two or more rotary counter shafts. The object of the invention is to prevent irregularity of motion hitherto caused in crank connections by the difficulty of the crank in passing the centers of the shafts.

Medical Compound.—Thomas J. Butcher, Wenona Station, Ill.—This invention relates to a new and improved composition for medical purposes.

Ventilating Apparatus.—E. L. Roberts, Brooklyn, N. Y.—This invention relates to improvements in ventilating apparatus for buildings, and has for its object to provide a simple and efficient arrangement of passages, heater, and valve devices, which, while governing the volume of air admitted, either to cause it to pass into the room through a cold air passage or through a passage bringing it in contact with a heater, will always admit a full volume of air, thereby keeping up the maximum degree of circulation; the arrangement being such that a movement of a single hand-crank or other valve operating device effects the necessary valve adjustment for causing the air to pass in either direction.

Pedecycle.—Geo. Brownlee, Princeton, Ind.—This invention relates to a new device which is to be used for skating on ordinary roads, to be attached to the feet and rolled over the ground. The invention is also applicable to other vehicles, such as velocipedes, and wheelbarrows, and consists chiefly in suspending the weight of the rider or load to be conveyed from the top of the wheel.

Eye Glasses.—Richard Straubel, Williamsburgh, N. Y.—The object of this invention is to so construct the frame of a pair of eye glasses that the glasses when applied will be in a horizontal line as they are in spectacles, and that when the instrument is folded together, the ends of the U-spring will not project to be caught in the pockets or elsewhere.

Lace Machines.—Geo. Osborne, Brooklyn, N. Y.—The object of this invention is to so construct lace machines used for making fine silk or other net work of the kind used for invisible coverings of ladies' chignons and for other purposes, that the operation can with very fine material be successfully carried on.

Velocipede.—T. N. Morse, Fairhaven, Mass.—This invention relates to certain improvements in two and three-wheeled velocipedes, whereby their construction is simplified and their mode of operation facilitated.

Hay Elevating Fork.—T. C. Kelly, West Liberty, Pa.—The object of this invention is to provide a simple and effective hay elevating fork for raising hay by horse or other power.

Portable and Adjustable Scaffold.—F. Stein and H. Haering, New York city.—The object of this invention is to so provide portable and adjustable scaffolding to be used in erecting buildings, and conveniently adapted for moving from place to place, and for erection independently of the walls of the building, and whereby the flooring may be adjusted as to hight, by the persons thereon.

Ventilating Chimneys.—J. J. Pemberton, Oakland, Ill.—The object of this invention is to provide an improved means for ventilating chimneys of fireplaces, grates, etc., by the admission of the external atmosphere thereto, to facilitate the draft, to prevent smoking, also to facilitate combustion, and to prevent the cold air from rushing in through doors, windows, and cracks chilling the room.

Wagon Brake.—Irvin Willits, Deer Plain, Ill.—This invention is intended to provide a very reliable brake which will always be brought into action when the animals cease to drawn, and hold back sufficiently to allow the traces to slacken. The arrangement of the brake bar is such that it may rest on the ends of the hounds of the axle, when the brakes are resting on the wheels, so that the action of the brake shall cause no pressure upon the necks of the animals.

Metallic Kegs.—Wm. Hill, Pottsville, Pa.—This invention relates to a new and useful improvement in the manner of putting in the heads of kegs for containing powder and other articles, when the same are made of metal; and it consists in the peculiar form of joint made, and the bearings obtained for securing the contents and making the keg strong and durable.

Bolts for Folding Doors.—E. L. Roberts, Brooklyn, N. Y.—This invention relates to improvements in sliding bolts for folding doors, such as patented March 15, 1859, 23,262, the object of which it to provide for sliding the upper fastening bolt, and the laterally moving guard bolt, whether the lower slide bolt coincide with its mortise so as to fall into it or not, as it frequently happens that it does not on closing the door, owing to working or springing, which in the arrangement described in the aforesaid patent prevents the movement of any of the bolts until the said lower bolt is adjusted to coincide and pass into its notch.

Kniting Machines.—M. L. Roberts, New Brunswick, N.J.—This invention consists in a means of adapting them to be capable of knitting plain tubular goods with great rapidity. Also, in an arrangement of means whereby they may be readily adjusted from the conditions of a machine such as represented in a former patent, to the conditions more especially adapted for knitting the said plain tubular goods and from that to the said first mentioned condition.

Water Gage.—David Lithgow, Philadelphia, Pa.—This invention relates to a new and useful improvement in water gages for steam boilers and consists in providing means for excluding the steam and heat from the glass gage tube, and thereby protecting the glass tube from damage from expansion and contraction by heat.

Apparatus for the Manufacture of Bromine.—Herman Lerner, Pomeroy, Ohio.—This invention relates to the common apparatus used for the distillation of bromine from the bitter or refuse water left after the manufacture of salt from the saline products of certain earth wells, or from sea water.

Carriage.—John C. Ham, New York city.—This invention has for its object to improve the construction of the front part of the bodies of carriages so as to make them more convenient and comfortable for those riding in them, at the same time that their beauty and elegance are greatly increased.

Coffee Cleaner and Polisher.—James W. Brady, Catonsville, Md.—The object of this invention is to provide for public use a cheap, durable, and conveniently operated instrument, by means of which coffee or other similar article can be easily, quickly, and effectually cleaned and polished.

Window Sash Adjuster.—J. S. Elkins, Marquette, Wis.—The object of this invention is to provide for public use a simple, cheap, and convenient device for adjusting and controlling both sashes of a window, setting either or both of them, at the same time, at any required hight, and operating without the use of weights or springs.

Stump Puller.—D. C. Frazeur and Peter Ginter, Siddonsburg, Pa.—The object of this invention is to provide for public use a simple, convenient, and effective apparatus for pulling stumps.

Chair.—James Lee, New York city.—This invention has for its object to furnish an improved chair, which shall be simple in construction, strong, and durable, and at the same time so constructed and arranged as to fit closely to, and support the lower part of the sitter's back, which chairs constructed in the ordinary manner, leave wholly unsupported.

Ornamental Back for Open Fireplaces.—William H. Jackson, New York city.—The object of this invention is to construct ornamental back and sides for open fireplaces, which may be inserted in the said fireplaces forming the back of a grate, as may be required, and thus relieve the eye from looking on a blackened soapstone, as now used in handsomely furnished fire-places.

Steam Boiler.—Charles H. Franklin, Jr., New York city.—The present invention relates to a certain new and useful improvement in the construction of steam boilers by the introduction of a third combustion chamber, the object of which is to consume all the smoke and gases from the furnace, and at the same time give a greater heating surface than has heretofore been given to steam boilers.

Beehive.—Hiram Filson, Monongahela City, Pa.—This invention has for its object to furnish an improved beehive, which shall be so constructed and arranged as to not only adapt it to the natural habits of the bees, but also allow all its parts to be conveniently and successively taken away.

Combined Drill and Saw Gummer.—Wm. C. Marr, Peru, Wis.—This invention has for its object to furnish a simple, convenient, and effective machine, which may be readily used as a drill or saw gummer, as occasion may require, doing its work equally well in either capacity.

Combined Plow, Cultivator, and Potato Digger.—H. B. Smith, Tremont, Ill.—This invention has for its object to furnish an improved combined plow, cultivator, and potato digger, which shall be so constructed and arranged as to be easily adjusted and operated, and which will do its work well in either capacity.

Potato Digger.—John Sherwood, Ottumwa, Iowa.—This invention has for its object to furnish a simple, convenient, and effective potato digger, which shall be so constructed and arranged as to do its work easily and thoroughly, leaving the potatoes spread over the surface of the ground.

Improved Attachment to Pumps.—J. W. Williams, Syracuse, N. Y.—This invention relates to a new and improved attachment, by means of which the lower or stop valve box and valve may easily be removed from any pump, when from its being clogged or out of repair it becomes necessary to do so.

Needle Protector for Sewing Machines.—Thomas Huckans, New Baltimore, and J. Wesley Carhart, Troy, N. Y.—This invention relates to a new and improved protector for the needles of sewing machines, whereby the needle is prevented from being broken or injured during the operation of sewing.

Clothes Rack.—Elias Werden, Pittsfield, Mass.—This invention relates to a new clothes rack, which is of very simple construction, and which can, when not used, be folded together into a small space. The invention consists in fitting upon four vertical parts connecting rods, which are arranged in sections horizontally above each other, every section being supported by shoulders of the posts.

Clarinet.—Jacob Rebhun, New York city.—The object of this invention is to construct and arrange the keys and levers of a clarinet, that difficult passages which could heretofore not be produced, such as various kinds of trills and shakes, can without difficulty be obtained, and that the fingers will be relieved from the great strain to which they are subjected on the ordinary instruments.

Tachydrome.—Simon Wortmann, New York city.—This invention relates to a new vehicle, which is to be propelled by the upper and lower extremities of the person or persons that it supports, and which is provided with a fly wheel, in such manner that the same may at will be thrown into or out of gear. This fly-wheel will gather power in going down hill, and will then give it up in going up hill, thereby facilitating the ascending of hills, and preventing too great rapidity while going down hill. The invention consists in the general combination of parts, whereby two persons may be accommodated on the vehicle, and also in the arrangement of the fly wheel.

Official List of Patents.

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92,926.—Hair-curling Apparatus.—Marcia Adkins, Oswego, N. Y.

92,927.—Guide-attachment for Boring Instruments.—Arthur Amory, New York city.

92,928.—Velocipede. — Solomon Andrews, Perth Amboy, N. J.

92,929.—Carpet Sweeper.—J. B. Baker (assignor to himself Hiram R. Olmstead, and Richard W. Jones), Syracuse, N. Y.

92,930.—Tobacco Box.—George H. Bliss, Brooklyn, N. Y.

92,931.—Gas Heater.—A. L. Bogart, New York city.

92,932.—Sugar-boiling Apparatus.—Martial Bonnin and Charles Escudier, New Iberia, La.

92,933.—Manufacture of Braid.—John W. Bowers, Newton, Mass.

92,934.—Method of Preserving the Aromatic Principle of Hops.—Edwin D. Brainard, Albany, N. Y.

92,935.—Millers' Staff.—Potto Brown, Houghton, and Bateman Brown, Huntingdon, England. Patented in England, June 23, 1868.

92,936.—Pedecycle.—George Brownlee, Princeton, Ind.

92,937.—Medical Compound.—Thomas J. Butcher, Wenona Station, Ill.

92,938.—Braiding Machine.—James D. Butler, Lancaster, Mass.

92,939.—Corn Popper.—Wm. F. Collier, Worcester, Mass.

92,940.—Bobbin for Spinning.—John H. Crowell, Providence, R. I. Antedated July 23, 1869.

92,941.—Condenser for Stills.—T. J. Dean, St. Louis, Mo.

92,942.—Hand Mirror.—W. U. Dudley, New York city, assignor to himself and Lawrence W. Clark, Brooklyn, N. Y.

92,943.—Machine for Generating and Carbureting Gas.—Cleaveland F. Dunderdale, New York city.

92,944.—Stop-motion for Silk Stretching and Winding Machine.—P. Dunham, Leeds, Mass.

92,945.—Grain Drill. — Josephus Easterday, Frederick county, Md., and J. B. Crowell, Greencastle, Pa.

92,946.—Fodder Cutter.—John Eiberweiser (assignor to himself and Frederick Groene), Cincinnati, Ohio.

92,947.—Beehive.—Hiram Filson, Monongahela City, Pa.

92,948.—Front Gear for Wagon.—A. Finley, Bainbridge, Ind.

92,949.—Spring Bed.—Jeremiah Fisk, Augusta, Me.

92,950.—Shoes.—Wm. S. Foster, Montgomery, Ala.

92,951.—Corn and Seed Planter.—Daniel D. Franklin (assignor to himself and John S. Underwood), Flora, Ill.

92,952.—Steam Generator. — Charles H. Franklin, Jr., New York city.

92,953.—Three-horse Clevis.—Samuel H. Frederick, Matteson, Mich.

92,954.—Hose Coupling.—J. H. George, Newark, N. J.

92,955.—Match Safe.—John Gibbs, Brooklyn, E. D., N. Y., assignor to himself and Calvin H. Carter, Waterbury, Conn.

92,956.—Governor for Steam and other Enginery.—Thomas Gill, assignor to himself, John Stark, and John Stark, Jr., Waltham, Mass.

92,957.—Steam Pumping Engine.—Roscoe J. Gould, Newark, N. J.

92,958.—Mule for Spinning.—C. J. Greene, Olneyville, R. I.

92,959.—Device for Cleaning Plows.—Richard Groom, Albany, N. Y.

92,960.—Machine for Making Cord.—William Guest, London, assignor to James Buckingham, Walworth, England.

92,961.—Hedge Setter.—John H. Hobart (assignor to himself, Elias P. Read, and T. W. McFarland), Ottawa, Ill. Antedated July 5, 1869.

92,962.—Compound for Cutting and Polishing.—James P Hall, New York city.

92,963.—Whiffletree.—Israel C. Hall, Sanbornton, N. H.

92,964.—Carriage.—John C. Ham, New York city.

92,965.—Sewing Machine for Working Button Holes.—Alexander Harroun, Jr., Onondaga, Ill.

92,966.—Street Reflector for Windows.—Otto Hennig, Chicago, Ill.

93,967.—Corn Popper.—Benjamin B. Hill, and John R. Hill, Worcester, Mass.

92,968.—Gang Plow.—Laban Holloway, San Francisco, Cal.

92,969.—Screw Wrench.—H. A. House, Bridgeport, Conn.

92,970.—Shutter Fastener. — Leonard D. Howard, St Johnsbury, Vt.

92,971.—Grain Register.—Wm. C. Howard, Belle Plaine Iowa.

92,972.—Needle Protector for Sewing Machine.—Thos Huckans, New Baltimore, and J. Wesley Carhart, Troy, N. Y.

92,873.—Harness Buckle. — James Ives, Mount Carmel Conn.

92,974.—Ornamental Back for Fire-place.—Wm. H. Jackson, New York city.

92,975.—Horse Hay Fork.—Thomas C. Kelly, West Liberty, Pa.

92,976.—Velocipede.—John Lauer, Chicago, Ill.

92,977.—Chair.—James Lee, New York city.

92,978.—Turret for Vessels.—Johan Linnemann, Copenhagen, Denmark.

92,979.—Water Gage.—David Lithgow, Philadelphia, Pa.

92,980.—Probang, or Instrument for Treating Diseased Orifices.—George S. Lovell, and Mary F. Lovell, Philadelphia, Pa.

92,981.—Method of Extracting Iron and other Oxides from Clay, Porcelain-earth, etc.—Wm. John Lynd, Golden City Colorado Ter.

92,982.—Clothes Dryer.—Henry G. Mack, Oswego, N. Y.

92,983.—Combined Drill and Saw Gummer.—Wm. C. Marr, Peru, Wis.

92,984.—Corn Planter.—Daniel McCullough, Oxford township, Ontario, Canada, assignor to himself, Wm. J. Scott, Jr., and Patrick Harty.

92,985.—Plastering Machine.—Thomas McKinley, New York city.

92,986.—Card Case.—Geo. V. Metzel, Baltimore, Md.

92,987.—Coffee Pot.—Elie Moneuse and Louis Duparquet, New York city.

92,988.—Filtering Tube.—Daniel Moore and Edwin Moore, Brooklyn, N. Y.

92,989.—Hay and Manure Fork.—Edwin Moore, Brooklyn, E. D., N. Y.

92,990.—Throttle Valve Gear.—Samuel Moore, Providence, R. I.

92,991.—Velocipede.—T. N. Morse, Fairhaven, Mass.

92,992.—Plow.—Wilson Noble, New Haven, Conn. Antedated July 3, 1869.

92,993.—Composition for Curing Corns.—Geo. Oakley, Quincy, Ill.

92,994.—Nail Machine.—Geo. Osborn (assignor to himself, Fred'k Leonard, and J. C. Osborn), Lakeville, Mass.

92,995.—Lace-making Machine.—Geo Osborn Brooklyn, N. Y., assignor to A. G. Jennings, New York city.

92,996.—Guide for Gang Saw Gates.—R. A. Parsons (assignor to himself and Ten Brock & Noyes), Clinton, Iowa.

92,997.—Cotton-seed Huller.—George H. Peabody, New York city.

92,998.—Zincing Iron.—J. H. Peake, Washington, D. C.

92,999.—Ventilator for Chimney.—J. J. Pemberton, Oakland, Ill.

93,000.—Scraper.—T. G. Phelps, Belmont, Cal.

93,001.—Pitcher for Cooling Liquid.—Herman Pietsch, New York city.

93,002.—Finishing Split Leather. — Joel Putnam, Danvers, Mass.

93,003.—Mold for Casting the Cylinder and Dial Box of Water Meters.—H. F. Read, Brooklyn, N. Y.

93,004.—Mechanical Movement.—Nelson Read, Winchendon, Mass.

93,005.—Clarinet.—Jacob Rebhun, New York city.

93,006.—Bolt.—E. L. Roberts, Brooklyn, N. Y.

93,007.—Ventilating Apparatus.—E. L. Roberts, Brooklyn, N. Y.

93,008.—Knitting Machine.—Mark L. Roberts, New Brunswick, N. J.

93,009.—Beehive.—G. A. Robinson, Mount Pulaski, Ill.

93,010.—Guide for Sewing Machines.—Anna P. Rogers, Quincy, Ill.

93,011.—Adjustable Moldboard and Coulter.—G. D. Rowell, Menomonee Falls, Wis.

93,012.—Method of Manufacturing Vinegar.—Francis Schleifer, San Francisco, Cal., assignor to himself and Francis Cutting. Antedated July 16, 1869.

93,013.—Harvester.—W. A. Sharpe, Syracuse, N. Y. Antedated July 16, 1869.

93,014.—Stop for Preventing Retrograde Motion in Sewing Machines.—Wesley Sherman and Giles Bishop, Middletown, Conn.

93,015.—Potato Digger.—John Sherwood, Ottumwa, Iowa.

93,016.—Velocipede.—D. R. Smith, San Francisco, Cal., assignor to himself and Norbert Landry.

93,017.—Cultivator.—Walter Smith, Boonville, Ind.

93,018.—Composition for Pavements, Roofing, etc.—Hiram Staples (assignor to himself and E. M. Dudley), Nashua, N. H.

93,019.—Adjustable Scaffold.—Francis Stein and Henry Haering, New York city.

93,020.—Eye Glass.—Richard Straubel, Williamsburgh, N.Y.

93,021.—Steam Generator Feed Device.—J. B. Tarr, Fairhaven, Mass. Antedated July 12, 1869.

93,022.—Toy Hoop.—C. L. Taylor, Norwich, Conn.

93,023.—Breech-loading Fire-arm.—G. H. Todd (assignor to himself and C. W. Kennedy), Montgomery, Ala.

93,024.—Fountain Pen.—W. R. Walker, Concord, N. H.

93,025.—Clothes Rack.—Elias Werden, Pittsfield, Mass.

93,026.—Sliding Calliper.—A. E. Whitmore, Boston, Mass.

93,027.—Gate.—Maximilian S. G. Wilde, Somerville, assignor to himself and J. H. Noble, Pittsfield, Mass. Antedated July 15, 1869.

93,028.—Wagon Brake.—Irvin Willits, Deer Plain, Ill.

93,029.—Detachable Foot Valve and Seat for Pumps.—J. W. Williams, Syracuse, N. Y.

93,030.—Velocipede.—Simon Wortmann, New York city.

93,031.—Grinding Edge Tools.—Lorenzo Zimmerman, Waukeshma, Mich.

93,032.—Appendage to Blast Pipes of Blast Furnaces.—J. L. Agnew, Negaunee, Mich.

93,033.—Broom Head.—J. M. Allison, Salina, Pa.

93,034.—Saw-horse.—J. B. Andrews, Bridgeton Center, Me.

93,035.—Grain Binder.—John Baker, Fairbury, Ill.

93,036.—Plow.—John Ball, Canton, Ohio.

93,037.—Water Wheel.—S. H. Barnes, Lanesborough, Pa.

93,038.—Combined Harrow and Marker.—B. F. Barney, Pontiac, Ill.

93,039.—Tool for Forming Lips on the Necks of Bottles.—Thomas Barrett, Charlestown, Mass.

93,040.—Device for Suspending Picture Frames and Mirrors.—R. E. Bean, Franklin, N. H.

93,041.—Dumping Wagon.—Udney N. Beardsley, Lawton, Mich.

93,042.—Cultivator and Harrow Combined.—Hiram Benedict (assignor to himself and Allen Chaney), Detroit, Mich. Antedated July 16, 1869.

93,043.—Sawing Machine.—G. W. Benson and F. F. Doland, Sacramento, Cal.

93,044.—Compound for Destroying Insects. — Benjamin Best, Dayton, Ohio.

93,045.—Coffee Cleaner and Polisher.—J. W. Brady, Catonsville, assignor to M. W. Brady, Baltimore, Md.

93,046.—Refrigerator.—E. D. Brainard, Albany, N. Y.

93,047.—Bitting Harness. — Benjamin F. Brewster, Norwich, Conn.

93,048.—Dryer.—Joshua W. Brooks and Henry Rudoff, Ashley, Ill.

93,049.—Harvester Rake.—F. M. Buckles (assignor to himself and J. A. Stuckey), Altona, Ill.

93,050.—Potato Digger.—John M. Burke, Dansville, N. Y.

93,051.—Steam and Air Engine.—Charles Burleigh, Fitchburg, Mass.

93,052.—Water Tank for Railroads.—John Burnham, Batavia, Ill.

93,053.—Steam Engine.—W. H. Carr, New York city.

93,054.—Balance Scale.—Geo. W. Chandler, Fitchburg, assignor to himself and John G. Folsom, Winchendon, Mass.

93,055.—Car Coupling.—W. H. H. Clark, Burlington, Iowa.

93,056.—Cutter Head.—M. W. Clark, Worcester, Mass.

93,057.—Machine for Ginning and Cleaning Cotton.—L. T. Clement, Smyrna, Tenn.

93,058.—Hinge.—Calvin Cole Ithaca, N. Y.

93,059.—Car Brake and Starter.—J. A. Cole, Adams, N.Y.

93,060.—Sluice and Blanket for Collecting Gold and Silver.—Ezra Coleman (assignor to himself and Almond F. Cooper), San Francisco, Cal.

93,061.—Churn.—J. A. Cozad, Mercer, Pa.

93,062.—Sheep Tagging Box.—E. D. Crawford, North Star, Pa.

93,063.—Gathering Attachment for Sewing Machines.—J. A. Davis, Watertown, N. Y.

93,064.—Tuck-Creasing Attachment for Sewing Machines.—J. A. Davis, Watertown, N. Y.

93,065.—Sewing Machine.—J. A. Davis, Watertown, N. Y.

93,066.—Apparatus and Process for the Manufacture of Salt.—J. A. Davis, Watertown, N. Y.

93,067.—Carriage Wheel.—D. P. Davis, New York city, assignor to himself, W. J. Coombs, and G. H. Gardner.

93,068.—Covered Clasp for Hoop Skirts.—F. E. Day (assignor to himself and L. H. Day), New York city.

93,069.—Dumping Cart.—Fred. Dengler, North Vernon, Ind.

93,070.—Center-Board for Vessels.—Jonathan Dillon, New York city.

93,071.—Sash Holder.—J. S. Elkins, Marquette, Wis.

93,072.—Apparatus for Evaporating Ammoniacal and other Liquids.—L. S. Fales, New York city.

93,073.—Valve for Hydraulic Press.—J. B. Fenby, Birmingham, England. Patented in England, Oct. 30, 1867.

93,074.—Coal Sifter.—W. C. Frederick, Chicago, Ill.

93,075.—Manufacture from Bananas and Plantains.—Joseph Fry, New Orleans, La.

93,076.—Railway Frog.—W. B. Gage, Saratoga Springs, and W. H. Staats, Crescent, N. Y.

93,077.—Gang Plow.—C. F. Gay, Albany, Oregon.

93,078.—Hasp Lock.—E. L. Gaylord, Terrysville, Conn.

93,079.—Sash Holder.—Lewis Gibbs, Canton, Ohio.

93,080.—Hand Cultivator.—J. H. Gill, Mount Pleasant, Ohio.

93,081.—Beehive.—Miller Graham, Coshocton, Ohio.

93,082.—Scroll-Sawing Machine.—T. B. Greene and C. Greene, Abington, Ind.

93,083.—Manufacture of Sheet and Plate Iron.—N. C. Gridley, Milwaukee, Wis.

93,084.—Stench Trap.—J. S. Haley and Samuel Worrell, New York city.

93,085.—Metallic Kegs.—Wm. Hill, Pottsville, Pa.

93,086.—Composition Dental Plate.—Asa Hill, Norwalk, Conn.

93,087.—Lamp Burner.—George Hillegass, Philadelphia, Pa. Antedated July 21, 1869.

93,088.—Calendar Movement for Time-Pieces.—Ervin Homrighous, Shelbyville, Ill.

93,089.—Projectiles for Ordnance.—B. B. Hotchkiss, New York city. Antedated July 20, 1869.

93,090.—Hand Stamp.—T. S. Hudson, East Cambridge, Mass.

93,091.—Razor Strap.—Jabez Jenkins, Philadelphia, Pa.

93,092.—Oil Can.—W. E. Jenkins, Auburn, N. Y.

93,093.—Embroidering Attachment for Sewing Machines.—W. T. Johnson, Ottumwa, Iowa.

93,094.—Meat Cutter.—August Klein, New York city.

93,095.—Spittoon.—J. M. Klingenmeier (assignor to John H. Miller), Buffalo, N. Y.

93,096.—Spring-Bed Bottom.—Alois Kneppler, East New York, N. Y.

93,097.—Screw Press.—F. H. Laforge and Geo. E. Somers, Waterbury, assignors to themselves and N. A. Baldwin, Milford, Conn.

93,098.—Detachable Horseshoe Calk.—Perley Laflin, Warren, assignor to himself and Z. E. Cary, West Brookfield, Mass.

93,099.—Apparatus for Making Bromine.—Herman Lerner (assignor of three fourths of said invention to August Mayer, Geo. Bauer, and Henry Bectanus), Pomeroy, Ohio.

93,100.—Fulling Mill.—Wm. B. Lodge, Danbury, Conn. Antedated July 23, 1869.

93,101.—Attachment for Gas Burner.—J. C. Love (assignor to himself and Silas Fuller), Philadelphia, Pa.

93,102.—Compound for Rendering Fabrics Water Repellent.—R. O. Lowrey, Salem, N. Y.

93,103.—Boots and Shoes.—John Macintosh and William Bogett, London, Great Britain. Antedated July 22, 1869.

93,104.—Hot-Water Apparatus.—H. L. McAvoy, Baltimore, Md.

93,105.—Hydrocarbon Burner.—Edmond P. McCarthy, San Francisco, Cal.

93,106.—Apparatus for Bending Clevis Blanks.—Thos. Meikle, Louisville, Ky.

93,107.—Press for Operating, Bending, and Shaping Dies.—W. D. Mendenhall, Farmington, Ill.

93,108.—Drill Chuck.—G. W. Miller, Woonsocket, R. I.

93,109.—Galley Rest.—Edward Morgan, Washington, D.C.

93,110.—Roller Skate.—W. R. Morris, Cincinnati, Ohio.

93,111.—Trace Fastener.—F. B. Morse, New Haven, Conn.

93,112.—Door Latch.—Jacob Mosher, Mendota, Ill. Antedated July 24, 1869.

93,113.—Method of Exploding Nitro-Glycerin.—Geo. M. Mowbray, Titusville, Pa.

93,114.—Skate.—J. W. Nathan, Chicago, Ill.

93,115.—Harrow.—A. A. Nuquist, Oneida, Ill.

93,116.—Corn Planter.—John I. Patton, Tiffin, Ohio.

93,117.—Lamp Burner.—John M. Perkins, Cleveland, Ohio.

93,118.—Spring-Bed Bottom.—Jas. Potter, Portland, Me.

93,119.—Reamer.—A. J. Prescott, Catawissa, Pa.

93,120.—Slate.—Louis Pritchard, Brooklyn, N. Y.

93,121.—Filtering and Ventilating Apparatus for Wells and Cisterns.—B. B. Redfield, Pontiac, Mich.

93,122.—Steering Apparatus.—Nathan Richardson (assignor to himself and E. F. Stacey), Gloucester, Mass.

93,123.—Railway-Car Wheel.—John Rogers, Cincinnati, Ohio.

93,124.—Machinery for Breaking Cotton Seed.—Thos. Rose, Oxton, and R. E. Gibson, New Brighton, England.

93,125.—Steam-Engine Valve-Gear.—C. E. Rymes, Somerville, Mass.

93,126.—Rattan Cutter.—J. B. Sawyer, East Templeton, Mass.

93,127.—Process of Purifying and Refining Alcoholic Liquids.—Francis Schleifer (assignor to himself, and Francis Cutting), San Francisco, Cal.

93,128.—Refrigerator.—S. R. Scoggins, Baltimore, Md.

93,129.—Paint.—F. C. Semelroth, Logansport, Ind.

93,130.—Knapsack Attachment.—Jas. Sherlock, New York city.

93,131.—Preparation of Iron for Medical Purposes.—J. E. Siebel, Chicago, Ill.

93,132.—Sash Fastener.—H. B. Snyder, Cherry Grove, Ohio.

93,133.—Balance Slide-Valve.—Antoine Steber, Utica, N.Y.

93,134.—Sack Holder.—David Strollum, Union City, Ind., assignor to himself, Wm. A. Skellen, and E. M. Glick, Shelby county, Ohio.

93,135.—Machine for Varnishing Floor Oil-Cloth.—C. W. Strout, and Amos Wilder, Hallowell, Me.

92,136.—Water Wheel.—B. J. Talbott, Iowa Falls, Iowa.

93,137.—Alloy for Sabot of Projectile.—Thos. Taylor, Washington, D.C. Antedated July 15, 1869.

93,138.—Gig Sawing Machine.—Alex. Thompson and Zera Waters, Bloomington, Ill.

93,139.—Construction of Hot-Water Boilers.—John Trageser, New York city.

93,140.—Corn Planter.—W. F. Tunnard, East Baton Rouge parish, La.

93,141.—Chewing-Gum Compound.—Amos H. Tyler, Toledo, Ohio.

93,142.—Concrete Pavement.—A. Van Camp, Washington, D. C., assignor to himself, and M. M. Hodgeman, St. Louis, Mo.

93,143.—Liniment.—W. H. Wallack, Corunna, Ind.

93,144.—Combined Abdominal and Uterine Supporter.—Zera Waters, Bloomington, Ill.

93,145.—Oven.—W. C. Wedge, Chicopee, Mass.

93,146.—Railway-Car Truck.—Ashbel Welch, Lambertville, N. J.

93,147.—Binding Attachment for Sewing Machines.—Washington Wendell, Milwaukee, Wis.

93,148.—Shingle Machine.—G. F. White, Aurora, Oregon.

93,149.—Breech-Loading Firearm.—Eli Whitney, C. Gerner, and F. Tiesing, New Haven, Conn., said Gerner and Tiesing, assignors to Eli Whitney.

93,150.—Railway Car Axle-Box.—W. E. Wilcox (assignor to himself and T. H. Wills), Peoria, Ill.

93,151.—Railway Car Axle-Bearing.—W. E. Wilcox, Peoria, and T. H. Wills, Beardstown, Ill.

93,152.—Rain-Water Spouting.—Garret Williams, West Middleburg, Ohio.

93,153.—Coffee Pot.—P. B. Willoughby and H. G. Phelps, Judd, Wis.

93,154.—Combined Plow, Cultivator, and Potato Digger.—H. B. Smith, Tremont, Ill.

93,155.—Manufacture of Iron and Steel.—J. J. Johnston, —Allegheny City, Pa.

REISSUES.

33,068.—Ventilating Cap for Tents.—Dated August 20, 1861; reissue 3,565.—Thomas Boyd, Boston, Mass.

59,951.—Saw.—Dated Nov. 27, 1 66; reissue 2,695, dated July 23, 1867; reissue 3,566.—E. M. Boynton, Grand Rapids, Mich., assignee of Alfred Boynton.

86,380.—Manufacture of Tarred Paper, Pasteboard, etc.—Dated Feb. 2, 1869; reissue 3,567.—H. F. Evans, Beloit, Wis.

29,479.—Device for Separating Coal from Slate.—Dated August 7, 1860; reissue 3,568.—L. P. Garner, Ashland, Pa.

76,925.—Blast Gun.—Dated April 21, 1868; reissue, 3,569.—Chas. Kirchhof, Newark, N. J.

81,010.—Case for Rotary Blower.—Dated August 11, 1868; reissue 3,570.—P. H. Roots, and F. M. Roots, Connersville, Ind.

78,328.—Cutlery.—Dated May 26, 1868; reissue 3,571.—Moses Rubel, Chicago, Ill.

18,175.—Type-Setting and Distributing Machine.—Dated Sept. 15, 1857; reissue 3,572.—The Alden Type-Setting and Distributing Machine Company, New York city, assignees, by mesne assignments, of Timothy Alden.

DESIGNS.

3,585.—Coal-Hod Spout.—W. H. Brown, Rochester, N. Y.

3,586.—Teapot Handle.—L. C. Clark, Plantsville, Conn.

3,587.—Gate.—J. J. Ferris, Philadelphia, Pa., assignor to himself and Murphy and Brown. Antedated May 18, 1869.

3,588.—Fork or Spoon Handle.—E. C. Moore, Yonkers, N. Y., assignor to Tiffany and Company, New York city.

3,589.—Box.—J. J. Philbrick, Zanesville, Ohio.

3,590 and 3,591.—Plates of a Stove.—Garrettson Smith, and Henry Brown (assignors to Abbott and Noble), Philadelphia, Pa. Antedated June 29, 1869. Two Patents.

3,592.—Casket Handle.—H. C. Wilcox (assignor to the Meriden Britannia Company), West Meriden, Conn.

EXTENSION.

Mortising Window Blinds.—Jos. A. Peabody, of Philadelphia Pa.—Letters Patent No. 13,271, dated July 17, 1855.

NEW PUBLICATIONS.

A General Treatise on the Manufacture of Soap, Theoretical and Practical; Comprising the Chemistry of the Art, a Description of all the Raw Materials and their Uses, Directions for the Establishment of a Soap Factory, with the Necessary Apparatus, Instructions in the Manufacture of every Variety of Soap, the Assay and Determination of the Value of the Alkalies, Fatty Substances, etc., etc. By Professor H. Dussauce, lately of the Laboratories of the French Government. Author of "A Practical Guide for the Perfumer," "A Complete Treatise on Tanning, Currying, and Leather Dressing," etc. With an Appendix, containing Extracts from the Reports of the International Jury on Soaps, as Exhibited in the Paris Universal Exposition, 1867, numerous Tables, etc. Philadelphia: Henry Carey Baird, Industrial Publisher, 406 Walnut street. London: Trubner & Co., 60 Paternoster Row.

That this work was not called a cyclopedia of the soap manufacture was not, certainly, that the extent of the information contained in it would not justify the title. It is a very thick octavo volume, containing 807 pages of carefully-prepared matter pertaining to one of the most important branches of industry. The best review that could be given of it would be the transcription of its copious index, in itself occupying 25 full pages. The topics comprised in this extended list, not one of which is superfluous, are each discussed with clearness, force, and simplicity, the author never losing sight of the practical bearings of his subject, and treating the whole in the happy style which has made his other industrial works deservedly popular. It would be useless for us to attempt an elaborate review of this work in the limited space we could spare for the purpose. Our readers will find in another column an extract from it, containing general observations on the industrial fatty bodies. The work is undoubtedly the most complete treatise upon the subject ever published. Price, by mail, free of postage, ten dollars.

A Compendious Manual of Qualitative Chemical Analysis. By Charles W. Eliot, Professor of Analytical Chemistry and Metallurgy, and Frank H. Storer, Professor of General and Industrial Chemistry, both in the Massachusetts Institute of Technology. New York: D. Van Nostrand, Publisher, 23 Murray street, and 27 Warren street.

This treatise is confined to the theory and practice of qualitative analysis in the wet way, and is intended to form an introduction to the study of chemical analysis, but comprises all that is requisite to meet the wants of those who do aim at becoming professional experts. The latter class of students will find, however, that the study of this work will be an excellent preparation for a more extended course. It is further confined to the examination of inorganic solids and liquids. The metallic elements are put into seven classes: Class first being those precipitated as chlorides; class second those precipitated as sulphides insoluble in dilute acids, and not redissolvable alkaline liquids; class third, those precipitated as sulphides insoluble in dilute acids, but redissolved by alkaline liquids; class fourth those precipitated by ammonia usually as hydrates—namely, iron, aluminum, and chromium, together with certain salts which require an acid solvent; class fifth, those precipitated as sulphides insoluble in alkaline fluids; class sixth, those precipitated as carbonates; and class seventh, remaining elements distinguished by special tests.

While we do not approve this classification for an extended course of analysis, we are inclined to believe that for the purposes of the present treatise it is a good one, and that for the examination of such substances as do not contain the more rarely occurring elements it will be found more serviceable than many which have preceded it. Altogether, we like the book, and would recommend it particularly to those who are desirous of pursuing a course of analysis without a personal instructor. Such will find a full catalogue of the necessary apparatus and reagents appended.

Wedlock; or, the Right Relations of the Sexes; Disclosing the Laws of Conjugal Selection, and showing who may and who may not Marry. By S. R. Wells, 389 Broadway, New York city. 12mo, pp. 238, cloth, $1·50. For sale by all booksellers.

We are in receipt of the "Twelfth Annual Report of Commissioners of the Central Park, for the Year ending December 31, 1868." It is an ably-written and interesting document.

APPLICATIONS FOR EXTENSION OF PATENTS.

Machine for Sawing and Edging Clapboards.—Aretus A. Wilder, of Detroit, Mich., has applied for an extension of the above patent. Day of hearing Oct. 11, 1869.

Mill for Grinding Apples.—W. O. Hickok, of Harrisburg, Pa., has petitioned for the extension of the above patent. Day of hearing, November 1, 1869.

Loom.—James O. Lynch, of Ballston Spa, N. Y., has applied for an extension of the above patent. Day of hearing October 11, 1869.

Inventions Patented in England by Americans.

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

PROVISIONAL PROTECTION FOR SIX MONTHS.

2,024.—Water Meter.—Pratt, Whitney and Co., Hartford, Conn. July 5 1869.

1,557.—Stop Cock.—Z. E. Coffin, Newton Center, Mass. May 29, 1869.

1,965.—Breech-Loading Firearm.—R. E. Stephens, Owensound, and Jas. Ferrier and G. D. Ferrier, Montreal, Canada. July 1, 1869.

2,006.—Liquid Meter.—J. P. Smith, Cleveland, Ohio. July 2, 1869.

2,009.—Spring for Railroad Cars, etc.—P. G. Gardner, New York city. July 3, 1869.

2,018.—Implement for Drawing Nails.—Willis Churchill, New York city. July 3, 1869.

2,025.—Manufacture of Bar Iron and the Machinery for Rolling the same into Various Forms.—Jas. Montgomery, New York city. July 5, 1869.

2,037.—Refrigerator.—Wilson Bray, Stockton, N. J. July 6, 1869.

2,050.—Puddling Furnace.—James Montgomery, New York city. July 7, 1869.

2,052.—Chandelier.—I. P. Frink, New York city. July 7, 1869.

2,054.—Preparing and Preserving Meat.—A. S. Lyman, New York city July 7, 1869.

2,103.—Apparatus for Generating Hydrogen Gas, and for Carbureting Hydrogen Gas or Atmospheric Air for Illuminating and other Purposes.—C. F. Dunderdale, New York city. July 12, 1869.

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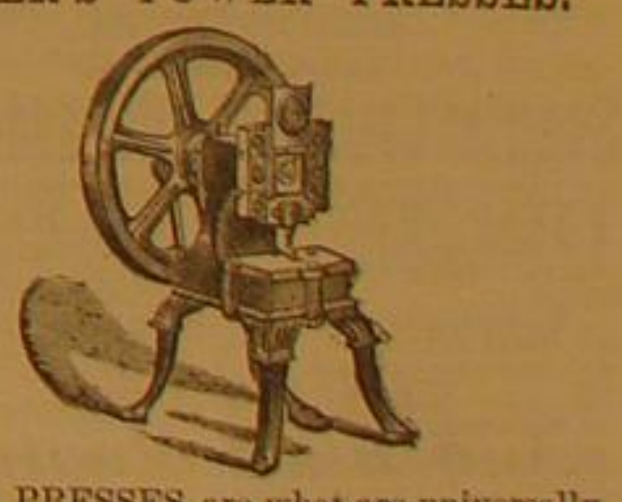

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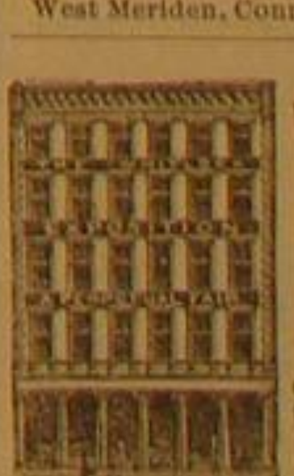

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