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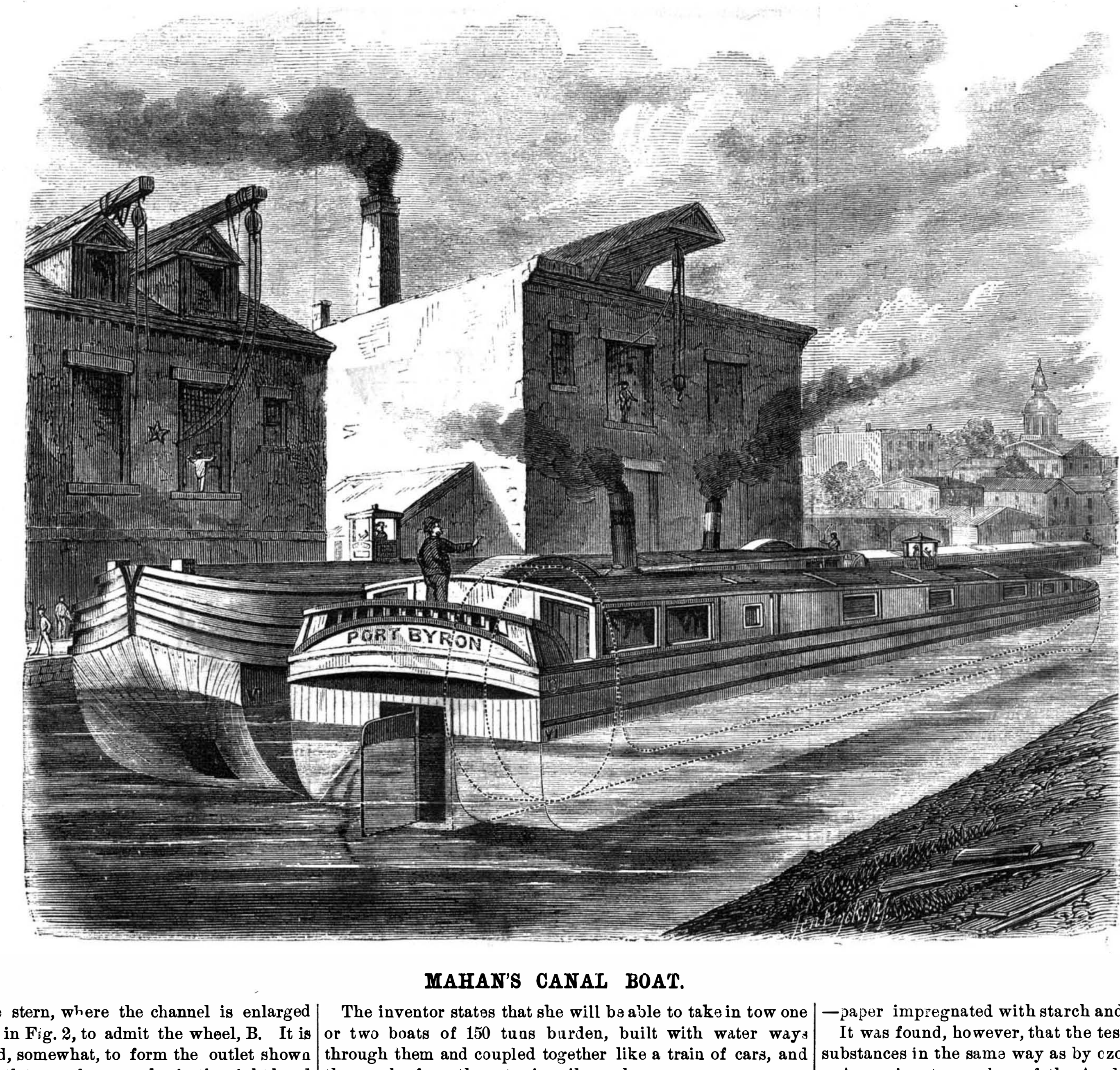
IMPROVED CANAL BOAT.

We have already illustrated in the SCIENTIFIC AMERICAN several proposed improvements in the construction of canal boats designed for steam propulsion, which had not then been put to practical trial. Conjecture, only, could therefore be made as to their fitness for the intended purpose. We now place before our readers engravings of a newly invented boat which has been subjected to actual trial on the Erie canal. It is the invention of Mr. Frank M. Mahan, of Memphis, Tenn., and was designed by him in view of meeting the conditions imposed by the State act of last year, which offered to reward the profitable introduction of some motor, for canal boats, other than animal power.

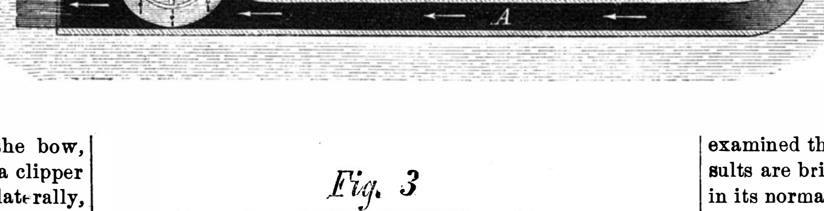
The bow of the boat is shown on the left in Fig. 1. It is shaped somewhat like a funnel, so as to cut the water with its outside edges and throw it into and through a channel or water way formed in the boat from stem to stern. The nature of this channel will be better understood by referring to Fig. 2, which is a longitudinal section of the boat. Here A is the channel or water way, which passes along the bottom of the boat in the middle. It is shown in cross section in Fig. 3. It maintains this form of cross section uniformly until near the stern, where the channel is enlarged sufficiently, as shown in Fig. 2, to admit the wheel, B. It is afterwards contracted, somewhat, to form the outlet shown at the stern. This outlet may be seen also in the right hand boat in Fig. 1, where the dotted lines indicate the course of the channel and the position of the wheel.



MAHAN'S CANAL BOAT.

The wheel, B, which is the propelling instrument, is constructed with vertical buckets, so as to economize power and prevent back water. It was invented and patented by Captain Prime Emerson, of Memphis, Tenn., in 1868.

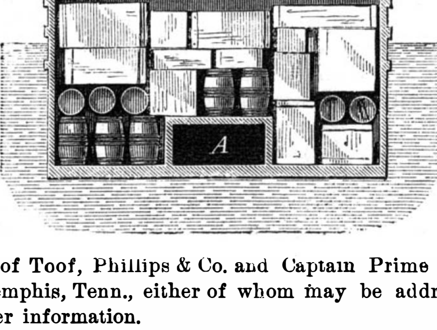
Fig. 2



The power employed is steam, and the boat is steered by the rudder shown in Fig. 1.

In propelling the boat, the action of the wheel tends to produce a vacuum in the front portion of the channel, A, and causes a current of water right through it in the direction indicated by the arrows in Fig. 2. The shape of the bow, which is the reverse in form and effect of that of a clipper ship, prevents the escape of the displaced water laterally, and throws it all into the channel; and it has been demonstrated by experiment that it passes so much more rapidly through the channel than the boat does through the water as fully to insure the passage through the channel of all the water displaced by the bow. In this way, the banking up of the water and consequent side swells, which are caused by the common bluff-bowed boat, are entirely avoided. A high rate of speed is therefore attainable without giving rise to the ordinary attendant heavy swells. This boat does not "bury" or settle down in the water while running with a heavy load, as is the case with the boats used hitherto, but, on the contrary, the faster it is driven through the water the more buoyant it appears to become. The channel or water way makes but little difference in its capacity for freight carrying. The disposition of the freight around the channel is shown in Fig. 3.

Fig. 3



The boat *Port Byron,* from which our engravings are made, was built last fall at Rochester. She carries 210 tuns and her fuel. She took a load at Buffalo, but was too late to get through the canal, and was frozen in at Rome. In spite of the disadvantages attending the use of old engines and boiler on this trial, she made four and a half miles an hour. She is now having new boiler and engines put in at Albany.

The inventor states that she will be able to take in tow one or two boats of 150 tuns burden, built with water ways through them and coupled together like a train of cars, and then make from three to six miles an hour.

The invention was patented July 25, 1871, and is the property of Toof, Phillips & Co. and Captain Prime Emerson, of Memphis, Tenn., either of whom may be addressed for further information.

Ozone.

Everybody has heard of ozone, a subject of research by the ablest chemists and physicists. Ozone, it is known, is oxygen which has its properties exalted; it emits a sensible odor, oxidizes silver, and decomposes almost instantaneously iodide of potassium, on which common oxygen has not any action. About 1785, a physicist in Holland, Von Marum, produced ozone by electrization. Van Marum was forgotten, with his experiments; but in 1840 a celebrated professor in Basle, M. Schönbein, renewed the discovery, and immediately gave it great importance by demonstrating the presence of ozone in atmospheric air.

One readily understands the immense interest that attached to this fact. The question arose: What was the action of ozone on organized beings, and what effect had it on the salubrity of the air we breathe? Many difficulties connect themselves with this research. Ozone can not be obtained in a pure state; it is in some sort deluged by ordinary oxygen; and such, nevertheless, is the energy of this odorous oxygen that even in infinitely small proportions it produces very distinct effects of oxidation. For ascertaining the presence of ozone, and its variations, M. Schönbein proposed to employ a very sensitive test,—paper impregnated with starch and iodide of potassium.

It was found, however, that the test was affected by other substances in the same way as by ozone.

An eminent member of the Academy of Rouen, M. Houzeau, has largely extended our knowledge on this subject. Ozone had been produced by electric sparks in the air; M. Houzeau obtained it by a purely chemical process, the action of hydrochloric acid on binoxide of barium. A sure test of ozone in the atmosphere was still a desideratum; M. Houzeau appears to have met this want.

He found that paper, rose colored by litmus and coated in part with iodide of potassium, was not acted upon by the substances, other than ozone, which disturbed M. Schönbein's experiments. With this test, then, he examined the influence of ozone in the atmosphere. The results are briefly these: Odorous oxygen exists in country air in its normal state, reaching, at its maximum, the proportion $\frac{1}{140000}$. From day to day the quantity varies in one locality, and its quantity is different in different localities. Ozone may be found frequently in small towns, but it is almost entirely absent from great centers of population. In spring, it appears very abundant; in winter, it shows very little action. From violent motion of the atmosphere in storms, ozone accumulates to a prodigious extent. One must exercise reserve in drawing conclusions; but it seems very probable that ozone is the cause of the salubrity of country air. A recent experiment comes in to throw new light on its properties. By a simple apparatus, the Rouen chemist has obtained in a liter of common oxygen from 60 to 120 milligrammes of odorous oxygen. In such proportion, ozone has no longer those beneficial effects which are seen in Nature to result from its minute distribution; when concentrated, it is dangerous for respiration, burns the organic tissues, blackens and corrodes silver, and has even greater discoloring power than chlorine. On contact with it, a mixture of equal parts of phosphureted hydrogen and oxygen explodes with violence. It is hoped that ozone will yet become of important use in industrial pursuits.

PAPIER MACHE FOR INTERIOR DECORATION.

It seems hardly possible, when admiring the rich bas reliefs or the delicate moldings which ornament the proscenium or boxes of our principal theatres, to believe that these beautifully designed decorations are merely a hollow sham, and really nothing more than shells of common brown paper Such, nevertheless, is the fact, and we hope to convey to our readers some idea of how this most prosaic of materials is, by the molder's skill, transformed into objects of art and beauty.

Prior to the days of Queen Elizabeth, in England, those heavily fretted and vaulted ceilings, found in old English residences, were made entirely of hard stucco and modeled by skilled artists. These last mentioned individuals were, or rather esteemed themselves to be, very important personages, for history tells us that they went to their work in gold laced garments, with rapiers at their sides, and altogether led a free and easy sort of a life, laboring when they chose, asking what they pleased, and always getting the entire amount of their demands. The people, however, eventually grew tired of the extortionate prices of these gentry, and a desire arose for cheaper work and less expensive material, resulting in the invention of a rude kind of papier maché composed of coarse pulp mixed with plaster. This was the first introduction of the material which, at the present time, after having undergone countless improvements and changes in its composition, is now gradually superseding plaster for interior decoration.

Several different methods are practiced for manufacturing the paper and for causing it to assume the required forms. In England, a mold made of brass or type metal is first oiled and its interior covered with a thin coating of gilder's composition, a mixture of whiting, resin, glue and oil. Over this, coarse paper pulp is poured, and the whole is forced into the minute indentations of the mold by a strong screw press. Small objects, ornaments, snuff boxes etc., are made from a fine quality of pulp, the surface of which, on drying, is rubbed with pumice, colored, varnished with shellac, and heated to a temperature of 280°, when a brilliant surface is obtained by polishing with rottenstone or by hand rubbing. For large works, the mold is covered with powdered talc and the paper in sheets is pressed in by means of the fingers or small tools. Another English process is to mold the paper into thick blocks or slabs, from which the articles are carved or turned, the same as from wood.

The newest and most improved method of manufacture of papier maché is that introduced by a well known decorative artist in this city. The first step in this process is to carve the required object out of plaster, the utmost care being taken to make the lines of the work perfectly sharp and delicate. From this model, a plaster mold is made in several pieces, so as to render it easily taken apart or put together. Into this mold a thin layer of the finest paper pulp is poured, care being taken that every portion of the mold is thoroughly covered. To back this thin covering a thick pulp, made from cane fiber, generally bamboo, is employed. This substance is used because it is perfectly homogeneous and sets firm and hard in the mold. So strong are the casts thus made that they can be constructed as thin as canvas in pieces of twelve feet square. Whole ceilings, cornices, and sides of rooms can thus be made of any degree of elaborate ornamentation, and apartments completely finished without the use of plaster, the paper being attached to the walls by ordinary nails and screws. Besides being used for ceilings and cornice work, this material has been found to answer every purpose as an imitation of heavy carvings on furniture. A curious bed of decayed vegetable matter, somewhat resembling peat, has lately been discovered in a forest near Paterson, N. J., portions of which, when mixed with the cane fiber pulp, give the composition, on its becoming hard, the exact color and appearance of black walnut, resembling the wood so closely as to require careful inspection to distinguish it therefrom.

For delicate tracery in cornices, papier maché is far superior to plaster, on account of its strength and superior lightness. Mixed with clay, glue and an alkali, it is perfectly fireproof, and the addition of silicates renders it impervious to the action of moisture. It is in use, as we stated in the beginning, in many of our finest theatres; and even in churches, it is largely employed to imitate the stone capitals of pillars or the heavy groined arches which apparently support the roof.

CRACKERS AND THEIR MANUFACTURE.

Not many of our readers are, we think, aware of the large scale in which the manufacture of so simple an eatable as the ordinary cracker is carried on in this city. In their own homes, the article is perhaps but little used, but if they visit the hold of a vessel fitting for a voyage, or glance into the commissary store room of any army post, they will see heaped up tiers on tiers of barrels packed with the hard tack which serves, to the sailor or soldier, as a substitute for the ordinary home made or baker's loaf.

The process of manufacture is accomplished almost entirely by the aid of specially devised machinery. The flour is first hoisted to one of the upper floors of the factory and then emptied into a large bin; thence it passes to an elevator which carries it to a revolving sieve. Here it is thoroughly sifted of its impurities, and then allowed to fall through a shoot leading into the mixer. The latter consists of a cylinder containing a rotary axle on which knife blades are fastened. At the opposite end, from that at which the flour enters, is an opening through which the mixed dough is pushed out of the machine by the action of the revolving blades. The flour, on entering the mixer, is immediately moistened by a stream of water pouring in from above.

Except for the fancy varieties of crackers, flour and water constitute the sole ingredients, not even salt being added, as it is considered that that substance renders the biscuits liable to spoil. As fast as the dough is pushed from the mixer, it is received in large masses by a workman who passes it through a machine technically termed the "breaker." This is nothing more than a pair of heavy metal rollers, which squeeze the dough into a kind of thick sheet. Still further rolling follows until the material is made into sheets of about one half an inch in thickness. The dough is now ready to be made into crackers. Once more it is rolled to bring it to the exact thickness required, and then, from between the rollers, it travels under a set of dies which, working very rapidly, stamp out the crackers in quantities at a time. As fast as the latter are cut, they slide along on a sheet of canvas, one workman removing by hand the dough from between them, while another, as soon as a sufficient number are completed, passes a flat tray under them and places them in the oven.

This last mentioned receptacle is arranged in a very peculiar manner. It consists of a huge brick compartment heated from below by large furnaces. Within is an iron wheel resembling the paddle wheel of a steamer, trays, however, which are so arranged as lie always horizontal, taking the place of the buckets on the latter. This wheel revolves, bringing each of the trays, of which there are twelve, in turn before the open door. Upon these trays the unbaked crackers are placed, and those already finished being removed, each batch travels once around the oven, the time occupied in so doing being sufficient to admit of their becoming thoroughly cooked. They are then packed in boxes, barrels, or tins, and are ready for the market.

A single oven of the kind above described will bake one hundred barrels of flour made into dough in ten hours; and we are informed that, with three such ovens in operation, as many as eight thousand barrels have been made into crackers in the space of three weeks.

The quality of crackers varies according to the materials used in them. Some are made of simple flour and water, others contain lard, sugar, or flavoring extracts, while others again are leavened with ammonia. For the cheaper biscuits, the ordinary grades of flour are used. The price of crackers depends upon the market value of the grain: at present they vary from four to twenty-five cents per pound, according to quality.

Curious Facts about Iron.

It is well known that nitric acid in a diluted condition attacks the metals more energetically than when concentrated; the red fuming liquid containing hyponitric and other nitrogen oxides is here excepted. With this fact, some curious results are connected.

If iron is immersed in concentrated nitric acid (the pure monohydrated acid answers best), it will be momentarily attacked, as will be evinced by the evolution of gas bubbles from its surface; this, however, very shortly ceases, and no further action is visible.

If a similar piece of iron is immersed in the same acid diluted with an equal bulk of water, chemical action at once ensues and continues with energy until either iron or acid is exhausted. So much for the relative oxidizing effects of concentrated and diluted acid. Let the experiment be varied as follows:

Prepare two glasses, the one containing the monohydrated, the other the diluted, acid. Plunge into the latter a rod of iron, which will be vigorously dissolved. Remove it now into the first glass, and the dissolving action will almost instantly cease; return it after a few moments to the diluted acid, and it will remain there entirely unaffected.

The contact with the concentrated acid appears, therefore, to have so altered the surface of the metal as to render it entirely indifferent to the presence of chemical agents, to which before it was highly sensitive. Without implying the possibility of the transmutability of the elements (which, it may be incidentally remarked, seems far less absurd with our present knowledge than it did twenty-five years ago), it really appears that the surface of the altered iron has acquired the properties which render it more electro-negative than normal iron; so that if the two are brought in contact, immersed in an exciting liquid, they will generate a galvanic current, an effect which is universally considered to predicate the contact of two unlike elements. The liberation of hydrogen *in statu nascendi*, on the surface of the altered metal, appears, however, to have the effect of bringing it back again to its normal condition; for the current shortly ceases to flow. To illustrate the foregoing, the following experiment will suffice:

Let the altered rod, which remains unaffected in the diluted acid, be touched for a moment with a rod of iron which has not previously been immersed in concentrated acid, and it will instantly be attacked; or, dip such a rod, after immersion in a mono-hydrated acid, into a copper salt solution, and it will be found to remain entirely free from copper (a proof, it would seem, that the altered surface is electro-negative even to copper); remove it now and touch it for a moment with a piece of normal iron, and it will instantly coat itself with copper, reducing the thin film of the salt remaining on its surface. Upon the explanation above mentioned, which may or may not be correct, the contact of the two pieces of metal generates an electric current; hydrogen is liberated on the negative or altered iron, converting again to its ordinary state. The moment this takes place, the diluted acid, in the first case seizes upon it; or, in the second, the copper salt is reduced.

Sponge Fishing.

From the account given by Vice Consul Green, of the Tunisian sponge fishery in his report to the Foreign Office, which has lately been issued, it would seem that to fish for sponges requires as much if not more skill than to fish for salmon. The sponge fishery, is most actively carried on during the three months of December, January, and February, for at other seasons the places where the sponges exist are overgrown with seaweeds. The storms during November and December destroy and sweep away the thick marine vegetation and leave the sponges exposed to view. The fishery is divided into two seasons, namely, summer and winter; the former commencing in March and ending in November, and the latter as noted above. But the collection of sponges is not very productive in summer, as it is confined to the operations carried on with diving apparatus, which can only be used on rocky and firm bottomed places, or to the success of native fishermen, who wade along the shores and feel for sponges with their feet among the masses of seaweed. The sponges thus collected by the Arabs are also of an inferior quality, owing to the small depth of water in which they have grown. As nevertheless, calm weather and a smooth sea are essential for the success of the fishermen, the winter season, although lasting three months, does not generally afford more than forty-five working days. The Arab inhabitants of the coast, Greeks, principally from Kranidi, near Nauplia, (Napoli de Roumania), and Sicilians, are chiefly employed in the sponge fishery, the Greeks, however, being the most expert fishermen, while the Arabs are the least skillful. Sponges, says the *Pall Mall Gazette*, are obtained by spearing with a trident, by diving with or without the assistance of an apparatus, or by dredging with a machine somewhat similar to an oyster dredge. The Arab fishermen, principally natives of Markenah and Jerbah, employ boats called sandals, manned by from four to seven persons, one of whom is the harpooner, while the others manage the sails, etc. The spearman watches for the sponges from the bows of the sandal, and the boat is luffed round on his perceiving one, so as to enable him to strike it. The depth of the sea in which the Arabs fish is from fifteen feet to thirty-five feet. Although the Greeks are most expert divers, the majority of them use the spear. They employ small and light boats, just sufficient to carry a spearman and an oarsman. The boat is rowed gently along, while the spearman searches the bottom of the sea by means of a tin tube of fourteen inches in diameter by nineteen inches in length, at one end of which is placed a thick sheet of glass. This tube is slightly immersed in the water, and enables the fisherman to view the bottom undisturbed by the oscillations of the surface. The spears used by the Greeks are shorter than those employed by the natives and Sicilians, but with wonderful adroitness they are enabled to reach sponges covered by sixty feet of water. They hold in their hands from three to four spears, and dart them so quickly and with such precision, one after the other, that before the first has time to disappear under the surface the second strikes its upper extremity, and thus gives it additional impetus to reach the sponge aimed at. The Sicilians, also, fish with a spear and in small rowing boats, but do not understand the employment of the tube, and have not acquired the knack of the Greeks in using three or four spears; they consequently seldom secure an equal quantity of sponges, although they are always more successful than the Arabs. The produce of the fishery is, it is stated, susceptible of considerable augmentation by an increase in the number of fishermen, and a new sponge is reproduced within a year wherever one has been removed.

Reducing Powers of Hydrogen and Phosphorus.

When a jet of cold hydrogen gas is directed against a paper that is impregnated with any of the salts of the oxide of silver—such as the phosphate, nitrate, arsenite, sulphate, sulphite, carbonate, acetate, oxalate, etc.—the silver is reduced to the metallic state and blackens instantly. Invisible characters traced upon the paper with any of the above salts are immediately rendered visible under the action of the gas.

The same, however, is not true of the chloride, bromide, iodide, cyanide, or sulphocyanide of silver, provided these be pure. Iodide of silver prepared with commercial iodide of potassium in general blackens because the salt is not pure. Thus we have a test for the purity of our chemicals. Do we desire to know whether an emulsion film of collodio-bromide contains free nitrate or not, submit it to a jet of hydrogen and the question will be answered at once, the amount of darkening showing the quantity of free nitrate present.

If we make a drawing upon a paper which has been impregnated with nitrate of silver, by means of a pen or brush dipped in a solution of chloride or bromide of ammonium, and then submit it to a jet of hydrogen, we shall obtain a white drawing upon a black ground.

For hydrogen may be advantageously substituted nitrogen or carbonic acid, which have been passed through a tube containing fragments of phosphorus. This gas, then, blackens not only salts of the oxide of silver, but also those of mercury and of copper. Proofs may thus be obtained upon paper impregnated with carbonate of copper. Hydrogen thus charged with phosphorus is more energetic upon the salts of silver than either of the other gases.

A COMMITTEE of the American Railway Master Mechanics' Association are of the opinion that back flue sheets of locomotives should be of $\frac{1}{2}$ inch iron or $\frac{7}{16}$ steel, and front flue sheets of $\frac{7}{16}$ iron or $\frac{3}{8}$ steel.

THE PROGRESS OF FISH CULTURE IN NEW YORK.

From carefully conducted experiments, made during the past few years, it has been determined that fish may be transported, acclimatized and bred, and thus supplied in increased numbers for the use of mankind with as much facility as animals existing on the land. With a view toward popular benefit from these discoveries, the Commissioner of Fisheries of New York State were authorized by the Legislature some two years ago to build a hatching establishment for the purpose of breeding the better kinds of fish for distribution throughout the public waters of the State. This building, which was erected in the summer of 1870, is practically the most efficient and the most productive of results of any in the world. The water is introduced in the ordinary way through a number of flannel sieves, and is led into 24 troughs, which are sixteen feet in length by fifteen inches in the clear in width. These troughs are raised about two feet from the ground, so that a person sitting on a stool alongside can readily examine the condition of the ova during the period when they are hatching. The lower ends of the troughs is an inch lower than the upper ends, so as to give a gentle motion to the water that is introduced into them. The water flows from a spigot about an inch in diameter and through another flannel screen, which is an additional protection against the accumulation of sediment.

The troughs stand in pairs, so that the workman can easily overlook them by passing on each side through a passage way left for that purpose. They are divided into compartments at every two feet, and at first, when the eggs are being hatched, the water running through them is only about half an inch deep. The moment however, the fish are out of the egg, screens are introduced at each compartment and, a piece of board being put across the lower end of the trough the water is raised to about three inches in depth. The hatching house is located at Caledonia, N. Y., and is situated on a brook the water of which is very peculiar, remaining at substantially the same temperature throughout the year, never growing warmer in summer or colder in winter. Every stick and stone that is covered or washed by the water is alive with caddises, and every bunch of moss or piece of wood is filled with fresh water shrimps or other minute insects. The stream even in its natural condition, without the assistance of any artificial propagation, has produced enormous numbers of trout; and at the present moment, although it has been greatly fished, it is fairly alive with them.

The fourth Annual Report of Commissioners of Fisheries for this State furnishes us with much valuable information relative to the general progress that has been made in fish culture during the year 1871. On the Hudson River, the operations for augmenting the supply of shad have been more successful than heretofore. Owing to the large increase of that fish in the Connecticut river, in which some millions of young fry had been placed three years before, the market in New York and other adjacent cities was supplied so abundantly as to seriously reduce the profits of the fishermen on the Hudson; so that it became a necessity to take measures to restore the fisheries in this state and to protect the persons, deriving their livings therefrom from ruin, and 8,295,000 eggs were placed in the Hudson during the year. These, it is believed, will greatly increase the yearly yield which at present does not exceed one million mature shad, and it is estimated that in a few years the fisheries will be so improved that 500,000,000 fry will be artificially hatched.

Another experiment was made, at the expense of the State of California, to introduce shad into the Pacific Ocean, where they had hitherto been utterly unknown. Mr. Seth Green, a gentleman already celebrated for his discoveries in the art of fish culture, was employed for carrying out the purpose, and the fry were taken out of his establishment on the Hudson. The undertaking was generally pronounced to be hopeless. Three thousand miles of land had to be crossed, mostly over a section of country nearly destitute of water. It was a trip by railroad with little opportunity to stop for a resting spell if that were necessary; and all this with a fish so exceedingly delicate that it can hardly be kept in confinement. Mr. Green's report states that he started on his journey with 12,000 young shad, placed in four eight gallon milk cans. He deposited about six hundred fish in different bodies of water along the route, and finally, after surmounting apparently overwhelming difficulties in the shape of impure water and dearth of any water at all, he placed 10,000 living shad in the Sacramento river. The attempt, as he states, seemed desperate, but contrary to all expectations, it resulted in triumphant success.

During the year, the State hatching house, before alluded to, has been greatly enlarged, and operations for the winter hatching of fish commenced on an unprecedented scale. Millions of the spawn of salmon trout were taken there from the great lakes to be distributed through the States, or to be developed and then distributed. It is much less expensive and easier to distribute the ova than the young fishes. The ova may be transported anywhere during the month of December, but no later.

Notices have from time to time been published in the papers authorizing parties to send for as many eggs or fry as they needed for stocking public waters, and all who have applied have been accommodated.

The Report before us contains detailed accounts of various other operations which have been performed. The Commissioners pride themselves upon not only building the cheapest and largest fish breeding establishment in this country or in the world, but also in building one that has in every way proved an entire success, and which is capable of supplying all the public waters in this State with all the salmon tribes of fish.

The Action of Quinine on the Blood.

The nature of the influence exerted upon blood by quinine has recently been the subject of a fresh investigation by Schulte. Its extraordinary power of stopping fermentation and putrefaction by destroying low organisms, such as bacteria and fungi, has been before pointed out. It is supposed to diminish the formation of pus in inflammation, by arresting the motions and preventing the exit from the blood vessels of the white blood corpuscles, the accumulation of which, according to Conheim, constitutes pus. By depriving the red blood corpuscles of the power to produce ozone, it diminishes the change of tissue in the body, and therefore lessens the production of heat Ranke and Kerner have shown that the waste of tissue is reduced when large doses of quinine are administered, as indicated in the smaller proportion of uric acid and urea excreted.

With the object of ascertaining whether this effect is referable to the direct influence of quinine on oxidation in the blood or to its indirect influence through the nervous system, Schulte employed a method based upon the changes occurring in the alkalinity of the blood observed by Zuntz, who had noticed that a considerable formation of acid takes place in freshly drawn blood, and continues in a less degree till putrefaction commences. The amount of acid formed was estimated from the diminished alkalinity of the blood, as comparatively shown by the quantity of dilute phosphoric acid required for exact saturation. A sufficient quantity of chloride of sodium was added to the phosphoric acid to prevent the blood corpuscles from being dissolved and interfering with the reaction by their coloring matter. The point of saturation was fixed at the transient reddening of carefully prepared test paper by carbonic acid. Schulte has thus been enabled to confirm the experiments of Kuntz and Scharrenbroich, showing that quinine and berberine lessen the production of acid, and that quinine can stop it both before and after coagulation; that sodium nitropicrate has an action similar to, and nearly as powerful as, quinine; while the action of cinchonine is much less energetic. Harley has shown that while quinine lessens oxidation in blood, some substances, such as snake poisons, increase it. Binz found that when putrid fluids were injected into the circulation of an animal, the temperature rose, but that this increase of temperature could be more or less prevented by the addition of quinine to the putrid liquid, or the simultaneous injection of the quinine.

With respect to the influence of quinine on the change of tissue, Schulte gives the result of some careful experiments made by Zuntz, who found that, after taking three 0·6 gramme doses of hydrochlorate of quinine for two days, the amount of urine he excreted was increased by one third, and then decreased as much, the specific gravity falling from 1·018 to 1·012; the urea also showed a marked decrease.

The Production of Chlorine and Hypochlorites.

We give the details of the method recently patented by M. Tessié du Motay. According to that distinguished chemist, the processes hitherto employed to produce chlorine continuously, by means of oxygen or of air and hydrochloric acid in the presence of certain metallic peroxides or dehydrating salts, have never given practically valuable results, because the excess of oxygen or air and nitrogen, mixed with the chlorine generated, partly prevents the condensation of this chlorine or its combination with the alkalies and alkaline earthy bodies intended to produce hypochlorites suitable for practical use in bleaching. The object of M. Tessié du Motay's process is, while wholly or partially utilizing the hydrochloric acid employed, to generate pure chlorine in an isolated state which can combine without waste with the alkaline or alkaline-terrous bodies in the form of bleaching chlorides; and to accomplish this, the inventor has discovered two methods:

1. Into a retort heated to a deep red, containing peroxide of manganese or a mixture of peroxide of manganese and lime, a current of hydrochloric acid is caused to pass; chlorine and steam are produced and disengaged, and there remain in the retort non-decomposed peroxide of manganese and chloride of manganese, and chloride of calcium. The chlorine is collected in the water or led away into a chamber for the production of dry hypochlorites. Over the mixture remaining in the retort, a current of air or oxygen of the same temperature is caused to pass, which, in the presence of peroxide of manganese decomposes at once the chloride of manganese alone, or the chlorides of manganese and calcium regenerated from the sesquioxide of manganese alone into sesquioxide of manganese mixed with lime, and sets at liberty the chlorine contained in the chlorides. This chlorine mixed with air and azote or oxygen is led into vats containing a mixture of lime and protoxide of manganese which has been previously produced by the decomposition of chloride of manganese by an excess of lime, the soluble chloride of calcium produced in this reaction having been previously run off. In presence of the oxygen of the air and of the chlorine, it produces immediately sesquioxide of manganese and hypochlorite of lime, which in reacting upon the sesquioxide produces finally the hydrate of peroxide of manganese and chloride of calcium. The excess of lime remaining, having no longer to act upon the sesquioxide, remains in the state of hypochlorite of lime. Upon this mixture, composed of hydrate of peroxide of manganese, chloride of calcium, and hypochlorite of lime, liquid hydrochloric acid is made to react in the ordinary manner. Chlorine is at once disengaged by the reaction of this acid, on the one hand upon the hydrate of peroxide of manganese, and on the other upon the hypochlorite of lime. This chlorine is led into the chamber for the production of hypochlorites. After this reaction, it remains in the vats of the chlorides of manganese and calcium. Upon the chlorides of manganese and calcium, an excess of lime is again caused to act, which reproduces the mixture of protoxide of manganese, chloride of calcium, and lime already referred to. The soluble chloride of calcium is then run off, and there remains in the insoluble state a mixture of protoxide of manganese and lime, which will serve for other similar operations by repassing under the action of chlorine and air to the state of hydrate of peroxide of manganese, chloride of calcium, and hypochlorite of liquid lime.

It therefore follows, first, that by the reaction of gaseous hydrochloric acid upon air and oxygen, in retorts heated to redness containing peroxide of manganese or a mixture of peroxide of manganese and lime, a first quantity of pure chlorine is produced, which is led away into condensing chambers, and for the production of hypochlorites; secondly, that by the decomposition by means of air or oxygen of the chloride of manganese alone, or the chlorides of manganese and lime contained in the said retorts, gaseous compounds are produced containing at once oxygen and chlorine. These compounds in their passage across the vats containing the protoxide of manganese and liquid hypochlorites of lime produce pure chlorine by the action of liquid hydrochloric acid, the chlorine in its turn being led into the chambers for the production of dry hypochlorites. Instead of the mixture of protoxide of manganese and lime in excess, over which the chlorine mixed with air and oxygen is caused to pass just as it comes from the retorts, a milk of lime may be employed, which is transformed into hypochlorite of lime. This hypochlorite, as well as the mixture of hydrate of peroxide of manganese and hypochlorite of lime treated by liquid hydrochloric acid, regenerates pure chlorine suitable to be taken to the chambers for the production of dry hypochlorites.

The chloride of calcium remaining from the operation is collected in vessels wherein carbonate of magnesia, or magnesia and carbonic acid, are caused to react simultaneously, carbonate of lime and chloride of magnesium being produced. This distilled chloride of magnesium regenerates the hydrochloric acid, which is again employed for the production of a fresh quantity of chlorine. The magnesia remaining serves again for another operation. Thus the reactions which constitute the process are shortly as follows; 1. The oxides of manganese serving for the production of chlorine are ceaselessly regenerated; 2. The hydrochloric acid is utilized completely for the production of chlorine; 3. All the chlorine generated is in a pure state, and consequently suitable for the production of dry hypochlorites.

2. The second method only differs from the one just described in the substitution of magnesia for lime, the chlorides of magnesia produced being without transformation, and capable of re-engendering hydrochloric acid by simple distillation.

NEW METHOD OF REPRODUCING DRAWINGS.—According to M. Rénault of Paris, if a drawing be made on strong glazed paper with glutinous ink, and the lines be afterward covered with a metallic powder (the bronze powder of commerce) and if the drawing thus prepared be pressed upon a sheet of sensitized paper, the lines of the original drawings are reproduced in black by the chemical action of the pulverized metal upon the sensitive paper. By softening the ink with the vapor of alcohol and renewing the bronze when it is exhausted, many impressions may be produced.

PAPER AS A MEANS OF DEFENSE.—Colonel Muratori, says *Engineering*, has made a successful application of paper as a defensive material in the construction of a cuirass which, weighing the same as the ordinary service cuirass, is capable of far greater resistance. It will turn a regulation pistol bullet fired from a distance of 3 feet, and is equally capable of resisting a bayonet thrust. The inventor claims that the fabric can be used for armor plating ships of war, and is especially suitable for covering bottoms of vessels to protect them from explosions of torpedoes.

BEER DRINKING IN THE UNITED STATES.—From the report of the proceedings of the Brewers' Congress lately, held in this city, we learn that the amount of fermented liquors brewed during the year ending June 30, 1871 was 7,159,740 barrels, being an average of 82 glasses each to every man, woman and child in the country. Assuming the beer to have been consumed in the State in which it was manufactured, each individual in New Jersey averaged 292 glasses, in New York 261 glasses, in Maine, probably on account of the liquor laws, 7½ glasses, and in Texas but 5 glasses. These data may be of value to our Teutonic fellow citizens in finding their choice as to the States in which they may in future locate their beer manufactories.

DR. ANGUS SMITH gives a good rule for ascertaining the amount of carbonic acid in the air of houses: "Let us keep our rooms so that the air does not give a precipitate when a 10½ ounce bottleful is shaken with half an ounce of clear lime water," a sanitary regulation which can easily be carried out.

IRON ship building is becoming an important industry in Denmark. At present several vessels of 1,000 tuns are being built, and one of these, it is stated, will be employed in laying down the telegraph cable between China and Japan. Two steamers, the *Rolfe* and the *Thorwaldsen*, have lately made the passage to this city, and are the first iron vessels built in Denmark that have ever entered the port.

THERE are about four hundred species of minerals known; but the varieties of these species are almost infinite. For example, carbonate of lime exists as chalk, marble, spar, lithographic stone, etc.

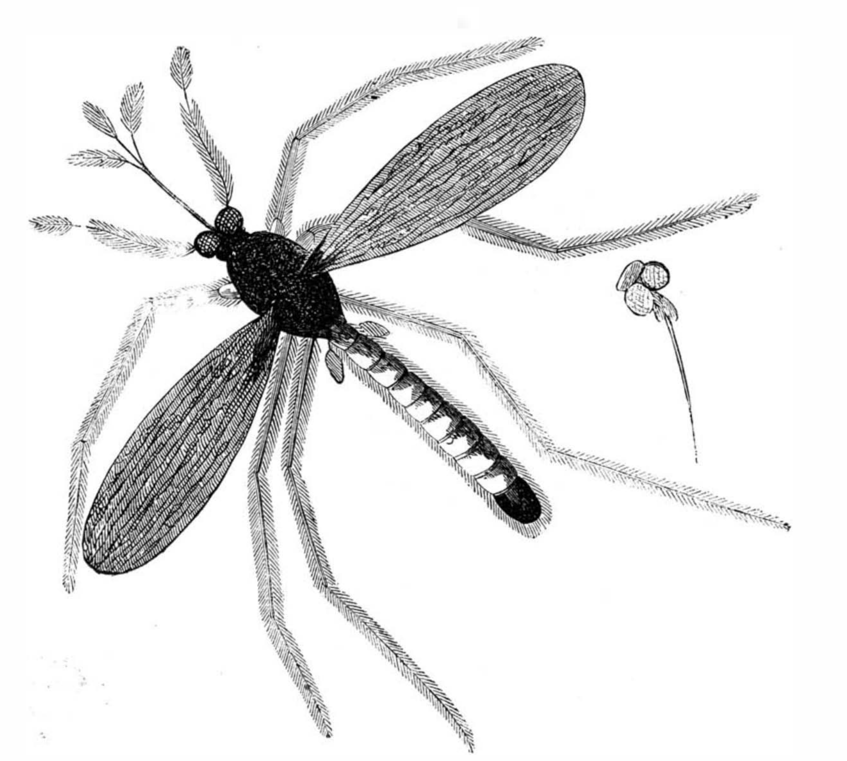


FIG. 1.—THE MALE MOSQUITO.

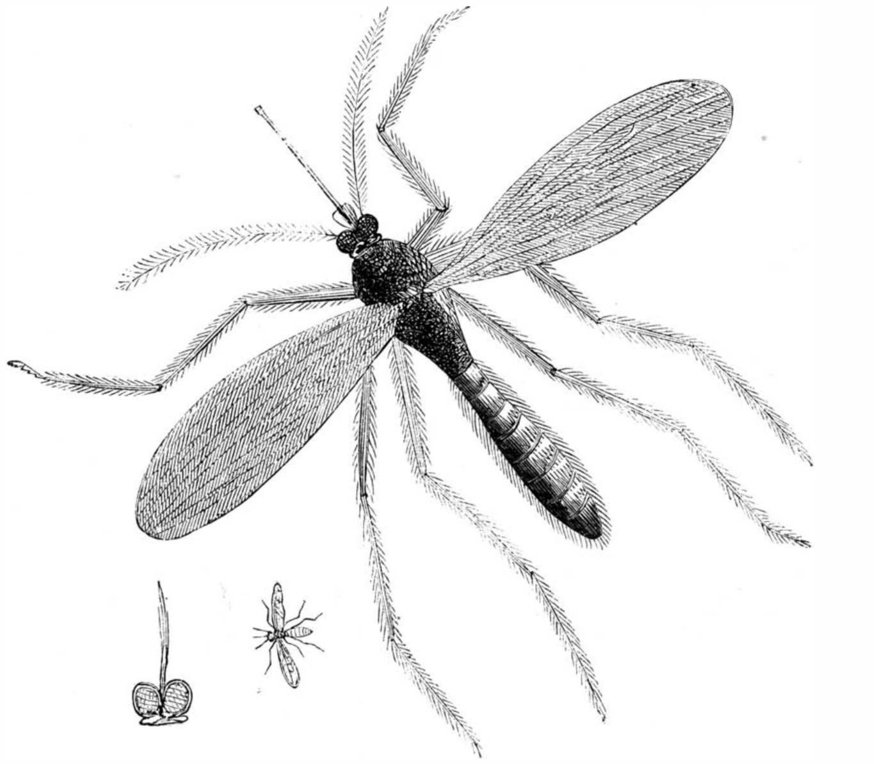
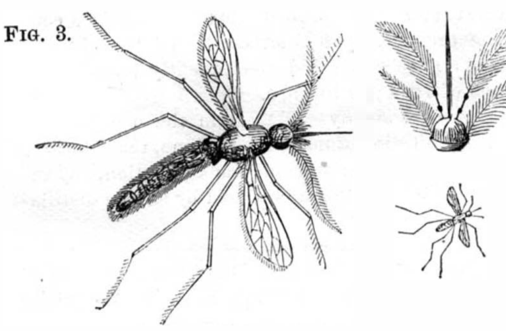


FIG. 2.—THE FEMALE MOSQUITO.

THE MOSQUITO ILLUSTRATED.

"Mosquito" in the United States, "cousin" in France, and "gnat" in Great Britain, are the names commonly given to the family *culicidæ*, of the proboscidean division of the order *diptera*, or two-winged insects. The family is large, and is at present but little understood. Our own mosquitoes

FIG. 3.



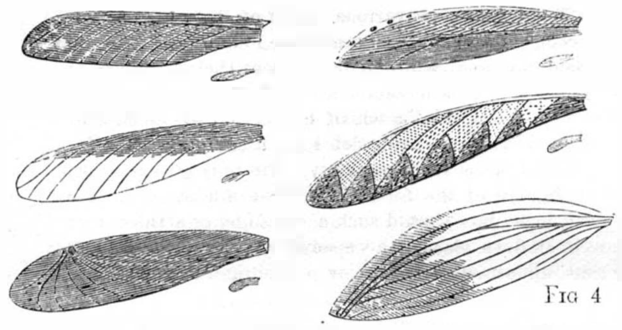
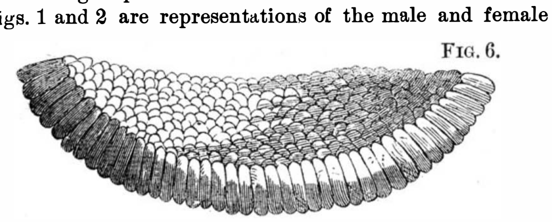


FIG 4

belong to several genera, among which is the *culex pipiens* (humming gnat). This is a native of Great Britain and the north of Europe and Asia, and must be considered the type of the family here. It is common with us only in the extreme Northwestern States and in high situations in the Middle and Southern States; while the genus *megarrhina* (Linn.), with innumerable subgenera, must be held to compose our largest portion of the family.

Figs. 1 and 2 are representations of the male and female

FIG. 6.



of this genus. It will be seen that the male has tufts and plumes not found in the female; his body is not so thick as hers, but longer, and his proboscis is slightly recurved or thrown back, while hers is carried straight forward. The female stings, while the male merely brushes with his plumes as he flies by; the organs of his mouth being too weak and too few in number to do any harm.

FIG. 7.

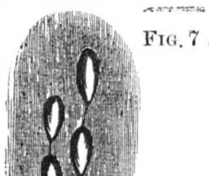


FIG. 8.

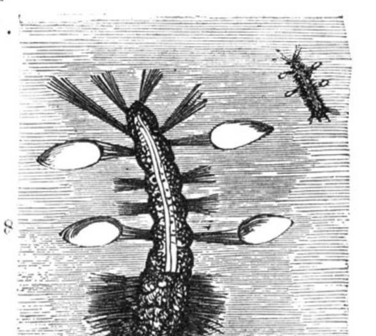
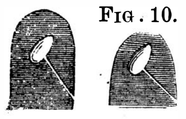


FIG. 9.

Fig. 3 illustrates the other genus named, and the difference in the wings will be apparent on comparison. They distinctly differ in their nervures, and the prismatic colors are deeper on the edges in one specimen than in the other. It would be an easy way to class these insects by the wings, but for the endless variety. No two years bring back the same subgenera; and though

FIG. 10.



they are always alike in general appearance, a close examination of specimens reveals endless novelty in details.

Fig. 4 shows various wings belonging to several specimens collected at one time, and which were very beautiful objects under the microscope, and shone with all the tints of the rainbow. We shall not therefore attempt to make our readers acquainted generally with this multitudinous family, but will at once introduce them to some of its members, who have been studied, and their habits.

The male mosquito, during his short life, subsists on the contents of the flower cups of various plants, preferring that

FIG. 11.

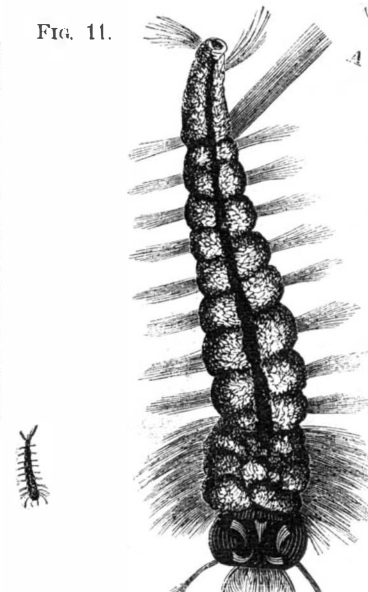
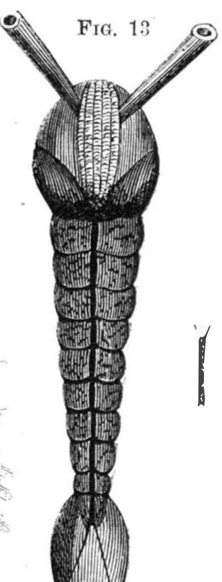


FIG. 13



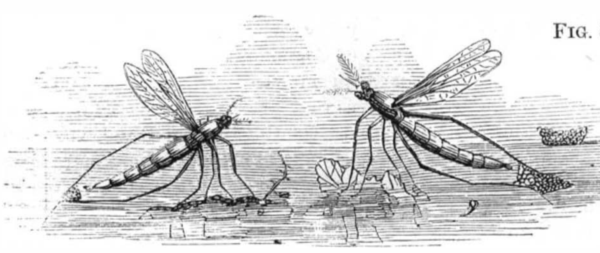
of the tall white lily; and after the performance of his natural functions, his life is brought speedily to a close.

With the female it is otherwise. She has work to do and proceeds about its accomplishment thus: She selects some quiet, cool eddy in a brook, crosses her hind legs (as shown in Fig. 5), and builds a boat of eggs (Fig. 6). When finished, this boat contains sometimes more, sometimes less, than three hundred eggs; but it is always of one form. The eggs near the ends contain males; those in the middle, females. It cannot be upset or filled by any effort, and pouring gallons of water on it will not sink it. Neither can any weather affect it. It may be frozen in solid ice, then thawed out and exposed to a June sun, and in time larvæ will make their appearance.

But they do not all build this boat; the females of several varieties have their eggs strung (see Fig. 7). A spot of the mucus, full of eggs, was transferred from a rain water tank, with some of the water, to a breeding glass. In five days, exposed to the warmth of the sun, the larvæ began to come forth, as shown in Fig. 8. When six days old they could be seen lazily floating about, some with two eggshells, some with three, and one with four attached to the extreme hairs of his body, as at Fig. 9. As their movements were unaccountably slow and lifeless, they were separated from the unhatched eggs and placed in fresh water; when, after sinking to the bottom, they discarded the eggshells and rose rapidly to the surface. The experimenter concluded that the shells had acted as buoys in the stagnant water.

The large mosquito of the Southern swamps sinks a hole in the soft mud with the end of her body, and hangs the eggs upon a foot stalk, as in Fig. 10. When the larva comes out, there is always water at the bottom of the hole, ample

FIG. 5.



for its sustenance until it sinks into the mud to undergo its transformation into the perfect insect.

The large mosquito of the dry, sandy pine barrens of the Carolinas and Georgia selects a spot exposed to the sun, and drops her eggs among the grains of the sand. The proceedings and habits of the larva are unknown; but in twelve or fifteen days the metamorphosis is complete. This variety is exceedingly venomous.

Fig. 11 represents the full grown larva from the egg of the boat; and A will direct attention to the respiratory tube of hairs. The larvæ float with their heads downwards, dive on being disturbed, and carry down enough air in the closed tubes to last them until they come up again. They remain in the larvæ state from five to fifteen days, casting their skins thrice, or oftener, and then enter the pupa state. The position is now altered, and the breathing tubes are kept up in the water. The change can be seen in Figs. 12 and 13. The pupa becomes less active and seems to scull along with the paddles at the end of the tail. Five or ten days more, and it bursts on the back, and the mosquito, as in Fig. 14, rises from the opening. This feat is accomplished with difficulty, and not a thousandth part of all that burst the case escape. Using the empty case as a raft, the insect plants two legs firmly on the water and waits until the wet wings get separated; then another pair of legs are disengaged, the body elongates, and the wings begin to unfold, as presented in Fig. 15: finally, the last pair of legs are drawn forth, the body poised, the wings elevated, and the fly stands on the water (Fig. 16), ready for flight.

FIG. 14. FIG. 12.

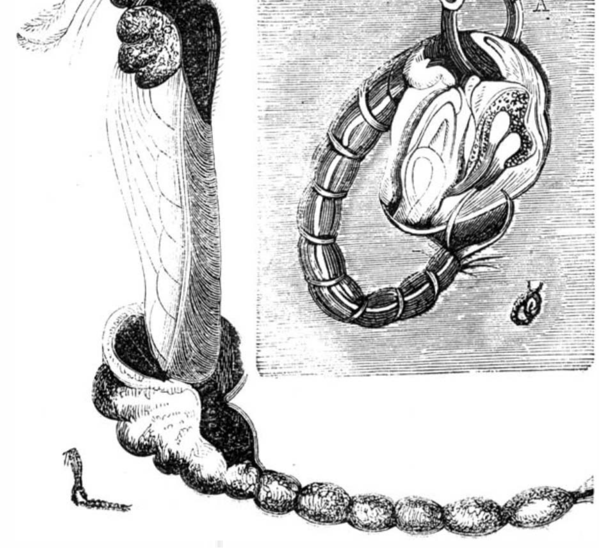


Fig. 17 is the fully developed female of a night mosquito found at the extreme north down to Florida. Her congener of the day resembles her closely, except that her body, when empty, is of an apple green color, and turns to dark amethyst after a meal, which are marks of all the day *culicidæ*.

Fig. 18 shows the dissected body of a mosquito, on which were discovered numerous parasites (*acari*) seen at A.

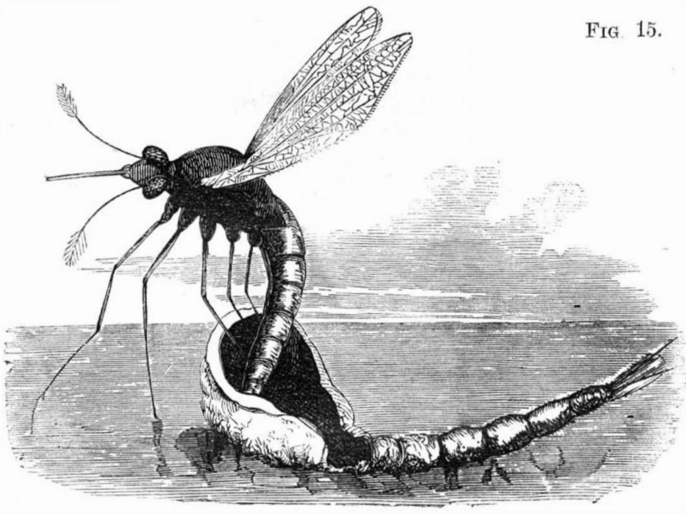


FIG 15.

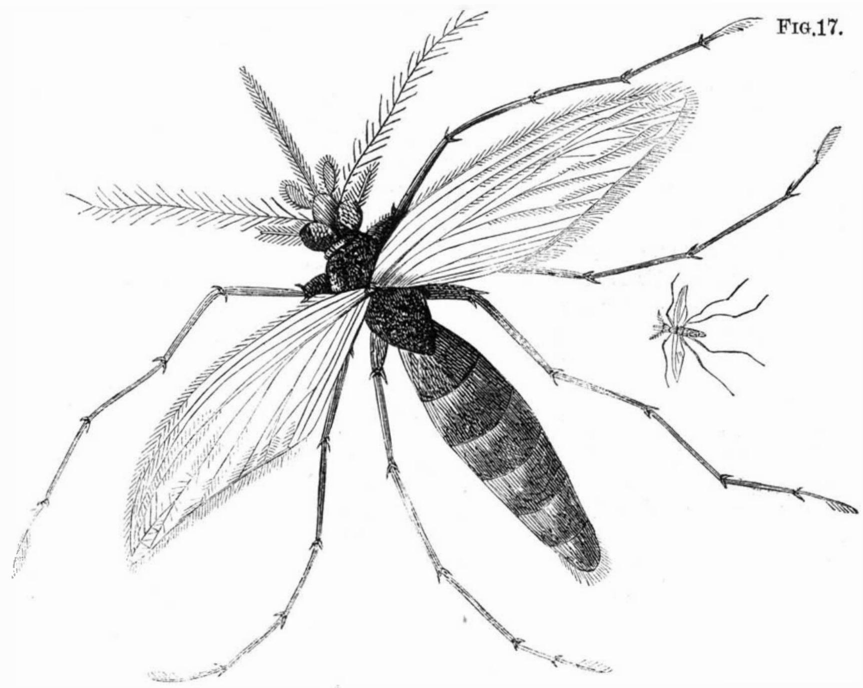


FIG. 17.

Figs. 19, 20, and 21 are stings of several kinds. Authors are not agreed as to the number of parts composing the sting; it appears to vary according to the genus. Several prickers can be felt in the large northern mosquito, and a dozen lancets are found in the southern. After the tubes are separated from the sheath, the lancets can be separated also. The two side tubes serve probably to aid suction, and to support the head, but eventually are employed as an outside protection to the lancet case. There will be noticed quite a hollow in the sheath, into which the blades of the lancets fit; then these join over them, and the sheath is complete. In some the proboscis is not hairy, but smooth and polished. In biting, it seems that the hollow extremity of the sheath is in-

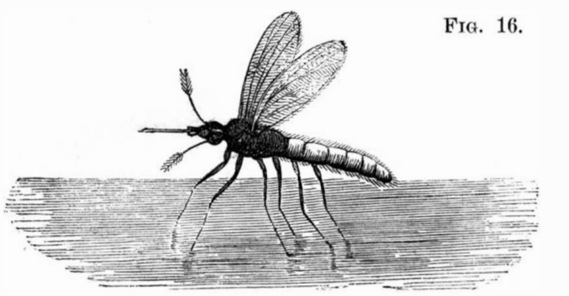


FIG. 16.

troduced into the wound made by the lancets, and by its means the gnat sucks the blood while the lancets keep the wound open. The mosquito has not always a thirst for blood, but often sucks up other liquids, particularly those with spirits in them. In this case the sheath is extended in front of the lancets. The pain of the wound made by the bite is attributed to the irritating action of a fluid retained in the

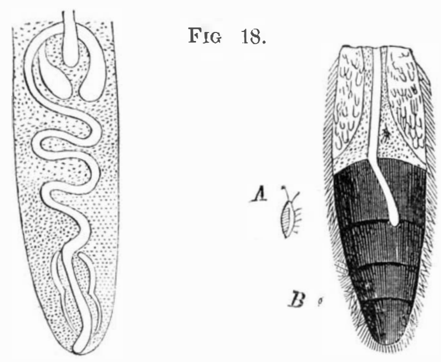


FIG 18.

sheath to keep its parts in working order. It is not poisonous alike to all persons.

Figs. 22 and 23 will show how the sting is applied.

The humming noise of these insects is supposed by some to be made by the rubbing of the wings on the chest; by others, by their beating against the air; and some think it proceeds from the proboscis.

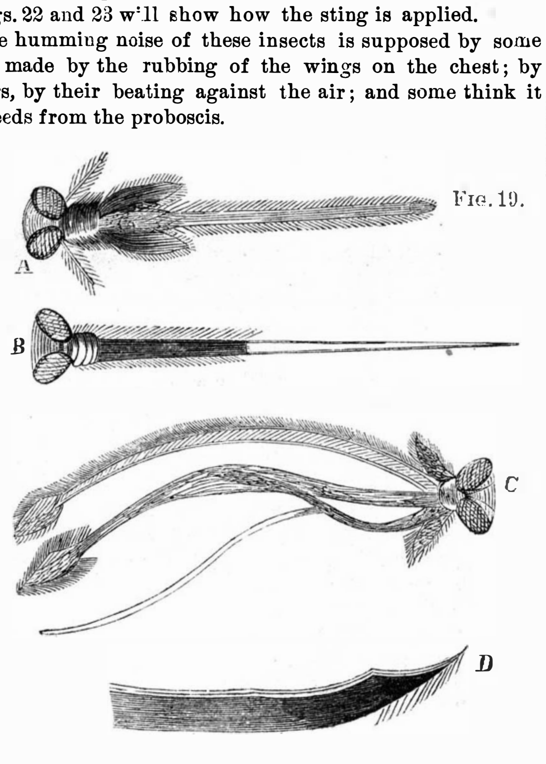


FIG. 19.

The eye of the day mosquito is a most brilliant object. The facets are very thickly placed, and from each one springs a small sharp cornea; these catch the rays of light and cause the eye to scintillate with various shades of color. We give a drawing of the eye at Fig. 24.

The metamorphoses we have described, which are common to all gnats, are rendered the more interesting by means of the ease with which they may be witnessed and studied. There is a fresh progeny of these insects every month, and their total production is so numerous that it has been held by some writers that the very air would be darkened by them were it not for their natural enemies devouring great numbers. (These latter are various kinds of birds and several carnivorous insects). Wet summers are found most favorable for their production, while in dry seasons their numbers are less unlimited. This no doubt arises from the standing waters and marshy spots, in which the insect passes the first stages of its existence, being dried up in many places before the contained larvæ reach maturity. There is not much probability, in view of the foregoing, of the student ever lacking specimens; but should such a contingency arise, the exposure in an open place of a vessel of water will, in the summer time, almost surely result in providing him with a good

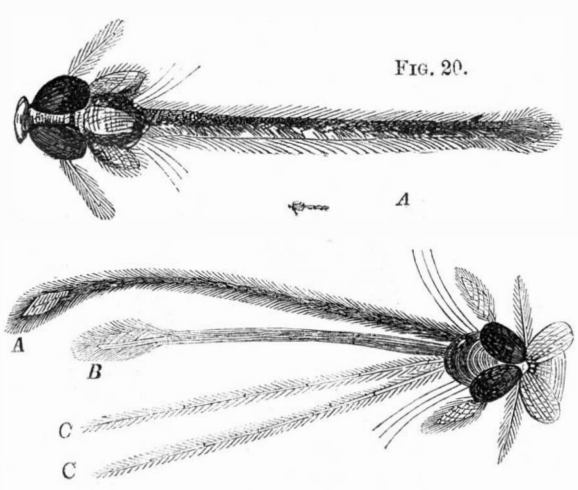


FIG. 20.

supply of wigglers, or gnat worms, as the larvæ are sometimes called. These, from their transparency, require no preparation for examination by the microscope, for which instrument they form excellent objects. The insect and its transformations have always presented a most interesting subject for observation to the naturalist and the ordinary observer, and the interest is by no means diminished by modern investigation.

Nearly a hundred years ago, James Barbut, in writing of the mosquito, said with enthusiasm, "it is impossible to behold and not admire the amazing structure of its sting. One undergoes with pleasure a puncture that enables us to observe how this piece of mechanism acts."

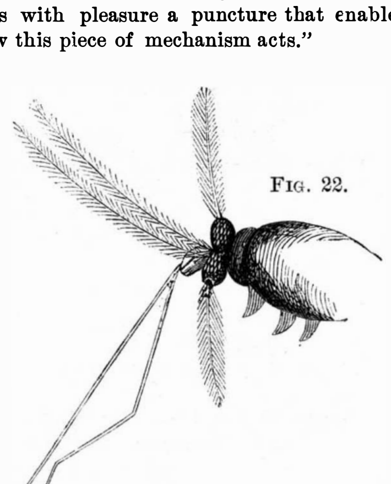


FIG. 22.

Lately, microscopic research informs us that the rapidity with which the gnat vibrates its wings—fifty times in a second—depends on the peculiar form of muscle which produces the movement. This muscle is composed of little disks which are kept apart and are yet connected by fibers in between them; these fibers pull the disks together on one side while they are relaxing their hold on the other, and, by alternating the movement, give rise to the rapid motion in the wings.

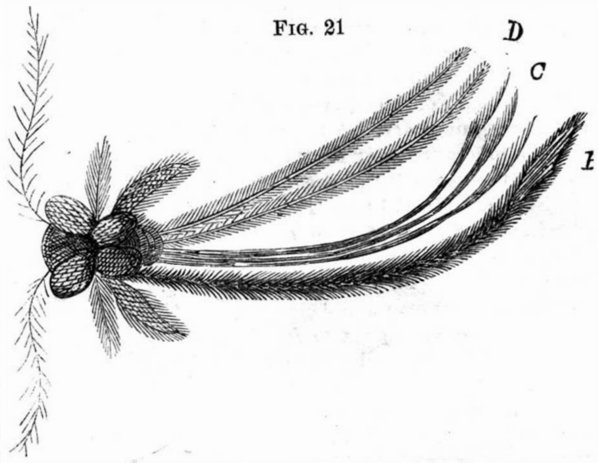


FIG. 21

We doubt if any of our readers would be as willing as the author just quoted to sacrifice themselves in the cause of science, but the question would, no doubt, be speedily decided by the effect of a mosquito bite on the particular individual bitten. In some cases and perhaps also under peculiar circumstances, the bite is attended with but little if any virulence; generally obstinate itching arises from it, and frequently redness and swelling of the adjacent parts; in rare cases, irritable ulcers are the result. The preparations of ammonia will remove the itching, and rubbing at night with fuller's earth and water is recommended by some writers to allay the pain and lessen the inflammation. It is also stated that if the part is scratched and washed with cold water im-

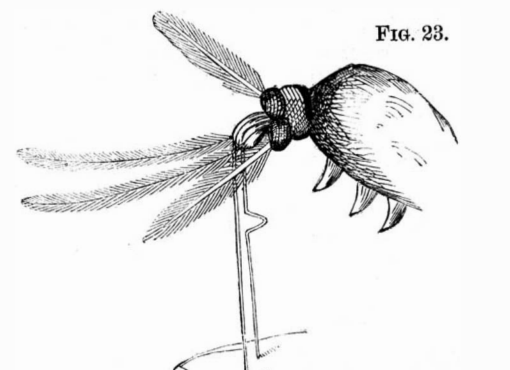


FIG. 23.

mediately after the bite is received, a cure will be effected; but the operation must not be delayed, as a little while later it would only increase the itching and swelling.

Contemptible as these small insects may, at the first glance, seem to be, their greedy attacks upon man and beast and the prodigious swarms in which they sometimes appear have made them formidable enough to cause extraordinary measures of defense to be taken against them. They are nowhere more troublesome than in Lapland, where the natives are compelled to anoint themselves with grease and to drive off with smoke the almost incredible numbers by which they

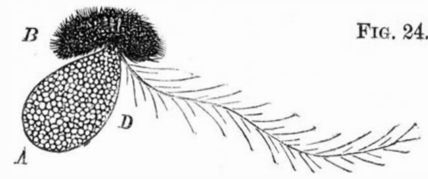


FIG. 24.

are assailed. During the short summer of northern Asia, mosquitoes and other insects so abound in the woody tracts of Siberia, near the Ural Mountains, that the peasants burn fires constantly before their cottages to ward off their attacks. Within the tropics, a bed of sand is resorted to as a means of defense against their assaults, and in more temperate and civilized regions, curtains of gauze and other material are used as barriers against the foe. Essential oils have also been employed to drive them away from particular localities, but with only partial success.

Correspondence.

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

Factories in the Wyoming Valley.

To the Editor of the Scientific American:

I have just returned from a delightful morning ride up the Wyoming valley, a forenoon ramble along the Oatka, and a visit to two somewhat peculiar and interesting manufacturing establishments.

Two miles above the beautiful thriving village of Warsaw is the factory of Martin & Co., devoted exclusively to the manufacture of map rollers and moldings, of which they turn out about 250,000 sets per annum. Much of the machinery used has been invented or improved by Mr. Martin, the senior partner, to whose kindness I am indebted for the privilege of inspecting the machines and operations.

The rollers are turned by a self acting lathe. A square stick of the required size is moved forward and guided by three pairs of feed rollers, or wheels, with grooved edges. In the first pair, the grooves are angular to fit the square stick. By this pair, the stick is driven forward through a hole in the center of a wheel, on the inside of which the knives are set. This wheel is driven by a belt. The stick is turned as it passes through the wheel, being guided and drawn through by two pairs of feed rollers with curved grooves in the edges. The map rollers are next smoothed by being run through emery faced blocks. The painting and varnishing of the rollers and moldings are very rapidly done by a machine which causes them to pass through the can which contains the paint, the holes in the sides being made to fit the stick to be painted. A wire frame receives the painted rollers, on which they are carried aside by dozens and stacked until dry. A simple machine turns the tenons and the rollers are ready for the knobs. The contrivance for turning the knobs is the most interesting feature of the establishment. It will turn from four to five thousand a day. The knobs are turned from cubic blocks which have been soaked two or three days and bored half through. The block is driven upon a mandril at the end of a shaft. This mandril projects over a table. On the table is a block about six inches square and two feet long, one end being made small to serve as a handle, the other turning on a pivot. On one side is a curved knife, which, when the block is drawn up to the knob, gives it its general outline. A second knife, fixed in the end of a smaller block, which slides in a groove in the upper side of the larger one, is then brought up to the knob by means of a short lever, and gives the knob the required shape. No peculiar machinery is employed in the manufacture of moldings, unless a planer, which smooths the four sides of a strip at once, be peculiar. After planing, the strip is split diagonally so as to make two moldings, which are next shaped by a small planer with a knife of the requisite shape. Rollers and moldings are made of bass wood, knobs mostly of soft maple. The establishment has been in operation 19 years, and is thought to be the only one in the country doing a large business solely in this line.

Two miles farther up the stream, in a most romantic glen, is the factory of the Warsaw Furniture Company, their finishing and salesrooms occupying a fine four story block with French roof, in the village. The machinery is driven by a turbine water wheel, which communicates with the main shaft of the factory through an endless wire cable 480 feet in length. The company use no machinery invented here; but I understand that they intend to introduce a machine for fitting joints, the invention of the foreman. For curved sawing, they use an endless belt saw about 20 feet long, which runs over two wheels and through a table on the descending side. The frame which supports it resembles an enlarged Wilcox and Gibbs sewing machine. The company manufacture, for wholesale and retail trade, all kinds of house and office furniture.

The water of the Warsaw village waterworks has just been put to a new use. By means of one of Stannard's cold water hydraulic engines, a half inch stream having 260 feet head is made to print the Wyoming County *Democrat* at the rate of 1,000 impressions per hour. C. H. DANN.

Warsaw, N. Y.

British Patent Reform.

To the Editor of the Scientific American:

I notice in a recent number of the SCIENTIFIC AMERICAN that the patent laws of Great Britain are, in all probability, going to be rearranged, and that it is proposed to add a new clause to the effect that "letters patent, which have been granted for any invention which has not, within a fair and reasonable time (to be arranged), been brought into active use, shall be declared to have expired."

This, in my opinion, is an excellent suggestion, and one which would operate with great fairness to inventors in this country. Here is an instance: A few months ago I applied at Washington for letters patent for an invention, in connection with railroad operation, which was, by many practical men, considered to be of considerable value, both with regard to saving of expense and obviating danger. My application was, however, refused, on the ground that it interfered with an invention of ten years back, which I know has never been brought into active use, and is patented only in England. Again, not long ago, I applied for letters patent for another invention, also in connection with railroads. Result, another refusal, as conflicting with English patents No. —— and No. ——, of, respectively, 1847 and 1861. Neither of these, to the best of my knowledge, have ever been brought into active use, and I know England well, the railroad world not less than any other.

Here, therefore, is a clear instance of the justice with which this new proposed clause in England would operate with us here. If you will be kind enough to publish this letter, it may draw forth some expressions of opinion on the subject, and be of interest to inventors generally.

INVENTOR.

An Optical Experiment.

To the Editor of the Scientific American:

A microscope is any instrument by the aid of which we can subtend the angle of vision. Is there any instrument which will enable us to subtend the angle of vision indefinitely? I think that the ordinary photographic camera is such an instrument. The following experiment would soon demonstrate the correctness of my deduction: Photograph the palm of a human being, say eighteen inches in diameter. Cut a circular inch from the center of that photograph and mount it upon cardboard. Mark it number one. Take an eighteen inch photographic copy of number one. Subject the copy to the cutting process and mark that circular inch number two. Copy number two and cut out number three, and so on until you obtain many circular inch photographs. Spread the last copy taken on the table. Put the original palm under the best microscope you are able to use and compare results. Lunar and solar investigations can be carried further, by the above described method, than by any other with which I am acquainted. Warren De la Rue has published excellent photographs of the moon, which are just the things to cut the second hole into.

New York city. R. B. S.

A Machinist's Query.

To the Editor of the Scientific American:

On page 349 of your volume XXVI, is an article headed "Sorry he didn't learn a trade;" now I have learned a trade, and I am not sorry for it, but it is hard to know that after serving four years apprenticeship to my trade, I can get only $3.50 a day for building and repairing an engine, while a man who has served no apprenticeship, and is ignorant of the working of the engine, gets $4.50 for running it. This I think, is alike an injustice to the machinist and to the public who risk their lives by the incompetence of these men. If an accident occurs, the public clamors to hang the poor ignorant wretch who caused it; but an ounce of prevention is better than a pound of cure. Is there no way to prevent railway officials from filling such important places with ignorant men? Ask the public who have the risk to run, or the Congress which is said to right all wrongs.

Galveston, Texas. A YOUNG MACHINIST.

The Steam Jacket.

There is a practical objection to the use of the jacket to which we have not yet referred. High pressure steam, especially if quite dry, appears to exert a peculiar solvent effect on cast iron. Already we hear rumors in numerous directions of the rapid wear of the high pressure cylinders of compound engines, an evil which grows in proportion with each augmentation of the weight of the casting. It appears to be fortunate that the remedy for this evil affords the best possible method of applying the true theory of the jacket in practice. In certain cases the jacket is made by putting a thin steel tube into a cast iron cylinder bored out to receive it. The Reading Works Company, for example, have brought this system of construction to great perfection, with excellent results. How far the scheme is applicable to marine engines, we are unable to say. We suggest that, especially in marine engines, instead of steel—notably an uncertain material—hard brass, or more strictly speaking gun metal, liners should be used for the high pressure cylinders. Properly made, the material is much harder than cast iron, and will take a beautiful surface; while the material, being an excellent conductor, would comply with one of the fundamental conditions of eminent success in using the jacket. The idea is a mere extension of the system of lining air pumps. We do not claim it as original, but we believe this is the first time the scheme has been mentioned in any journal; and it appears to us to be well worth the consideration of engineers engaged in the construction of large steam engines working with considerable pressure.—*Engineer.*

Locomotive Boiler Incrustations.

At the recent meeting of the American Railway Master Mechanics' Association, they expressed the belief that the boiling of the water previous to its use in locomotives would separate the sediment from the water, and obviate, in a large degree, the trouble now felt from incrustations. On some of the western railroads, the loss by these incrustations was no less than $75,000 per year for each one hundred locomotives. Mr. Coleman Sellers, of Philadelphia, called attention to the fact that the entirely pure water was more injurious to boilers than that which was slightly impregnated with salts or some foreign substances, and stated that on one occasion the boiler of a steamer which used distilled water was nearly ruined in one trip thereby.

"Is there any material or device more economical for packing stuffing boxes than hemp?" Hemp is considered the best, as no danger from fire is felt, this material standing 500 degrees of heat, while ordinarily steam reaches only 343 degrees.

SOMETHING ABOUT PIPES.

It is an interesting fact, particularly at the present time when resolutions, at the Convention of the Young Men's Christian Association at Lowell, Mass., condemning the use of tobacco, have been made the subject of considerable comment, that over *nine millions* of pipes made from different varieties of wood alone are yearly manufactured in this country. The wooden pipe is probably more distinctly national than any which finds its way into the market. Ranging in cost between the aristocratic meerschaum and the plebian clay, it is rarely expensive, while at the same time its manufacture calls into existence an industry which develops a raw material by far the largest part of which is obtained within our own brokers.

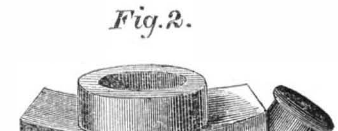
The root of the "Briar Ivy" is the substance most generally used for pipe making, it being selected for the purpose on account of durability, hardness, and the bright polish which it is capable of taking. It is found throughout the Southern States generally—the best qualities growing in Virginia—and is sent to the market in large pieces which vary in size from that of a man's fist to the dimensions of a good sized keg. It costs the manufacturer from thirty to forty dollars per ton, the price depending upon the quality of the wood

The above information was imparted to us by one of the manufactures of pipes in this city, while wending our way from his office to the cellar underneath the factory, where the rough briar root was stored. As we entered the last mentioned apartment, we noticed, heaped against the walls, the odd shaped pieces of the wood. Some had just been received, for a workman was busily engaged in throwing them into an oven which, heated by steam pipes, served to dry out all sap and moisture the wood might contain. In the middle of the cellar, a circular saw was in motion, cutting the dry pieces into slices of about two inches in thickness, which as soon as finished were received by boys and piled in regular heaps. From this underground apartment, the slabs are sent to a drying room on one of the upper floors, where they are kept heated at a moderate temperature for six months, during which time the wood becomes thoroughly seasoned.

Following our guide, we next entered the workshop. Here the clatter of innumerable wheels and the buzzing of saws and lathes rendered speech out of the question. Picking our way over heaps of wood and edging between countless belts, we were at length arrested before a workman who, sitting on a bench in which revolved a circular saw, had at his side a pile of the slabs which we had already seen cut, down in the cellar. Taking one piece at a time, he pressed it against the blade and in a few seconds it was divided into several smaller blocks of the shape of Fig. 1.

Fig. 1.

Fig. 2.



The blocks vary in dimensions according to the size of pipe to be made. Very little of the wood is wasted, the odd pieces being all worked up into stems or small pipes.

The blocks as soon as cut are passed over to the turners. Standing beside one of the workmen, we watched him as he placed the piece in the lathe chuck. A pressure of the boring tool, and the interior of the bowl of the pipe was excavated, then a part of the exterior was turned; and finally the block was reversed and, in a few revolutions, the end for the stem completed. The entire operation did not occupy more than ten seconds, the pipe, when thrown to one side, appearing as in Fig. 2. Still it was far from finished. It had to be carved into shape, and, to witness the process, we were conducted to another part of the room where the filers were at work. Each operative had before him a revolving disk, one side and the edges of which were cut coarse or fine, like files. This instrument removes the wood in either large or small quantities as may be desired. If the pipe is to be ornamented, the finer files are used to cut away minute portions. The workmen are all well skilled, and reproduce apparently intricate designs with wonderful accuracy.

The most delicate work, such as faces, flowers, etc., are cut by hand. We noticed that, in carving heads, it was evidently the intention of the manufacturers to meet the fancy of the German portion of our population, as there appeared to be an unusually large number of profiles of King William, Bismarck and Moltke.

After the carving is completed and a hole drilled for the stem, the pipe is thoroughly sand papered by holding it against a revolving wheel covered with that material. This done, it is passed to the burnisher where a brilliant polish is given to the wood by allowing it to rest against a rotary disk made of layers of chamois leather.

We next passed to the finishing room where, seated at long tables, we found a number of workmen engaged in fastening to the pipes the pewter tops and covers, together with the small bits of chain and bands which hold the stems and mouth pieces in place. The latter are manufactured from the tips of horns which are brought from the comb makers for the purpose. These tips are turned to the shape desired, holes drilled through their length, and then they are bent into shape by the action of heat and finally colored black by a peculiar kind of dye When completed, they are carried to the finishing room and there attached to the pipes. Nothing further remains to be done but to pack the finished pipes in boxes, label and mark them, and they are ready for the market.

The factory which we have described manufactures over one hundred and fifty gross of pipes weekly. Other woods beside briar root are used, none, however, equaling it in durability and beauty. Among these are apple, cherry, mahogany and poplar, which are made into the cheaper pipes, which cost from nine to twelve dollars per gross. The most expensive articles are made from the briar root and carved by hand, costing some twelve dollars per dozen.

THE ENGLISH BUILDING TRADE LOCK-OUT.

As we chronicle the latest phases of the eight hour rising in this city, the cable brings us the news of the great lock-out which has lately taken place in the English metropolis. Twenty thousand workmen, mostly belonging to the building trades, having struck for reduced hours and increased wages, have been thus retaliated upon by their employers, and have consequently been thrown into idleness and forced to rely upon the societies and unions for their daily support.

The agitation for less hours of labor was commenced in London in 1853. The masons were the first to make the demand, though they were almost immediately joined by the carpenters and joiners. Both trades eventually agreed to a proposal made by the masters, by which, although the number of working hours was not diminished, their wages were increased sixpence a day. In 1858, the nine hour question again came up, and in 1859, under the leadership of George Potter, a noted agitator, the bricklayers, masons, and carpenters united in the formation of trades' unions in support of the movement. In July of the last mentioned year, the operatives in one of the largest establishments in London struck, a proceeding which was promptly met by a grand lock out of some 24,000 workmen by 224 of the principal manufacturing firms. After a struggle of nearly eight months in duration, a reconciliation was effected by the masters agreeing to withdraw a certain document, whereby they pledged themselves not to give employment to union or society men.

The nine hour movement was thus virtually abandoned, only, however, to appear again in 1871 when a general uprising of the engineers took place throughout the kingdom. Long and bitter controversy ensued, resulting in the yielding of the masters and a concession of nine hours as a day's work to this branch of trade.

Encouraged and emboldened by this victory, the carpenters and joiners recently revived the question and demanded that a day's work shall consist of nine hours labor, except on Saturdays, when they shall only be required to work six hours and that their wages shall be increased to nine pence, or eighteen cents of our money, per hour—a change amounting to the reduction of the number of hours per week from fifty-six to fifty-one, and an augmentation of their weekly wages of about seven pence or fourteen cents in our currency. The masters refusing to accede to these terms, the workmen of two of the principal firms struck and left work.

The employers then threatened a general lock out, but mindful of the heavy losses which they would necessarily be compelled to undergo, and at the same time not wishing to resort to such an extreme measure without giving their men time to deliberate on the consequences thereof, they proposed an appeal to arbitration, and named the Earl of Derby and the Marquis of Salisbury as their representatives. This overture was rejected by the strikers, and the menaced lock-out was enforced. Not only have the carpenters and joiners—the originators of the movement—been thus served, but the masons, bricklayers, and all others employed in the building business have been summarily ejected from the factories and workshops.

The general tone of the London masters is that they consider this action of their men as capricious, "and that the time has not yet arrived when they can reasonably or fairly be expected to yield the nine hours demand with increased pay." The employers also assert that though the general effect of the strikes during the past twenty years has been to raise wages some fifteen per cent, yet this increase has been more than balanced by the large numbers of men thrown out of employment and the suffering and privations which their families have been forced to endure. Lock outs as a means of retaliation or coercion are not approved except as a last resort, but the present one is deemed justifiable in order to support the firm and unwavering resistance with which the masters declare they will oppose this outbreak.

The workmen, on their part, say that the cost of living in London is greatly increased, and they complain that they are obliged to waste much valuable time, for which they receive no remuneration, in traveling to and from their places of labor. The masons, especially, are dissatisfied with their wages, which are now eight pence (sixteen cents) per hour, making their compensation for nine hours work amount to $1.44 in our money.

In reference to this uprising, the London *Building News* is of the opinion that the workmen are much stronger than they were in 1859, that they have more money and a more perfect organization at their command, and that "if defeated now, the ultimate victory of the men is next to certain." The same journal further says that, as the prices of the necessaries of life have greatly increased, "it is not unnatural that the men employed in the building trades in London should either demand increased pay or diminished hours of labor; and so far as we can learn from personal intercourse with them, they are much less interested in increased pay than they are in shorter hours. They are determined to have shorter hours, whether they have decreased or increased pay. They say that one man out of ten is out of work, and they prefer to divide the work now done by nine men among ten men."

The London *Times* editorially considers that a vast loss will result to Great Britain from these strikes, owing to the great enhancement which will take place in the price of the products with which England supplies the world. Coal and iron will be much dearer, and as a consequence England will lose her present advantages in her resources for industrial production.

Uses of Blast Furnace Slags.

Professor Egleston says that Mr. Sepulcre, a Belgian engineer, was one of the first who successfully transformed the slag into a stone which could be generally used. This he effected by causing the slag channels to terminate in an excavation whose sides had an inclination of about 30°, and whose capacity varied from a half to ten cubic meters. The very steep inclination of the sides causes the section of the pits to increase very rapidly, and this allows the solid crust, which forms on the surface of the liquid slag, to rise with it without becoming attached. The slag must flow continuously into the excavation, and if, for any cause, there is an interruption, the crust must be raised to allow of the liquid material flowing underneath. In this manner, the whole mass of slag in the pit is sure to be all liquid, and will solidify from above and under pressure. After the excavation is full, it is left for 5 to 10 days to cool, the only precaution required being to cover the top with ashes or sand to a sufficient depth to prevent the mass from cooling too rapidly. The stone so produced grows hard on exposure to the air. When first made, it can be easily broken into any required shape, but after exposure for a period more or less long, it becomes so much harder as to require double the number of tools to work it.

All kinds of slags are not suitable for this manufacture; those which contain too much lime fall to pieces on exposure. In general, it may be said that they should contain from 38 to 44 per cent of silica, and that the furnace should be working well.

Mr. Minary, Director of the Franche Comte Iron Company, conceived the idea of using the slags by granulating them as they flow from the furnace. To do this, the trough through which the slags run is made to terminate in a stream of water which has sufficient velocity to carry the grains of slag into a pit prepared for it, from which it is charged into wagons, without further expense, by an endless chain with buckets.

The granulated slag was first used as gravel in the works, and to make the bed of the casting house. It was found that, from such a casting bed, the pigs came out clean and bright, and were preferred by the puddlers even to those cast in iron molds. This method of using the slag is now of almost universal application in the Siegen district, in Prussia, where most of the furnaces run on spiegel.

As these uses consumed but a very small part of the slag, it was offered as ballast to the railroad companies on condition that they should remove it themselves. As the size of the grain can be easily regulated by the velocity and direction of the water, the railroad companies were not slow to avail themselves of these conditions, and soon were glad to pay for it, thus furnishing to the furnace company a revenue from what had previously been a source of expense. The granulated slag weighs 1,200 kilogrammes the cubic meter. Its cost in France, where it is used, is less than half the price of sand. It is exceedingly porous, so that it retains very little moisture, and yet packs sufficiently; the result is that it will bear transporting for long distances, as it is much cheaper than ordinary gravel and better adapted to the purpose of ballast.

The manufacture of bricks from this material immediately suggested itself. It is simply mixed with lime, pressed, and sun dried. It is very extensively used on the Rhine and in its vicinity. These bricks give a light cheerful air to the buildings, and make a warm and exceedingly comfortable house at a very small cost. It is remarkable what can be done when the necessity exists. I saw, at Kreuznach on the Rhine and in the Siegen district, bricks made from ordinary coal ashes mixed with lime and sun dried, which had stood, during several years of exposure, with no sign of deterioration. The manufacturer assured me that there were seven or eight large establishments for the manufacture of this coal ash brick in Germany.

By coating the surface of the unburned brick with granulated slag and then burning it, out of the direct contact of the coal, it was found to produce an enamel of different colors, varying with the composition of the slag. In making fire bricks, calcined sand is replaced by granulated slag. It is proposed to use this material in the manufacture of bricks for the puddling furnace.

Another application of the granulated slag is its use for agricultural purposes. The important part which carbonic acid plays in rendering soluble the different mineral substances which plants require for their growth is well known. The very fine state of division to which it may be reduced at a very small cost is favorable to its decomposition in the soil.

Blast furnace slags gelatinize in acids, and they are, therefore, very suitable for the manufacture of cement. Pélouse and Frémy, in the last edition of their work on general chemistry, cite them as being eminently fit for this purpose. In certain parts of Germany an artificial cement, equal in every respect to the best Portland cement, is manufactured from them at a price so low as to yield a large profit, and yet very much undersell the Portland. Very large works or the manufacture of this artificial cement are, during this year, to be constructed.

Considerable attention has been paid in Belgium and Germany to the use of the slags for the manufacture of chemical products. These were first salts of alumina, then salts of lime as an incidental product, and lately the use of the silica extracted for the manufacture of soluble glass.

In certain conditions of the furnace, the slag is spun by the blast into fine fibers, and makes a substance which is sometimes called "furnace wool." This material is a very bad conductor of heat, and it has recently been proposed to use it as packing, to prevent loss of heat about boilers, etc.

[We have in our possession samples of this wool. It resembles ordinary white cotton in appearance.—EDS.

Chromic Acid.

Chromic acid occurs in brilliant crimson needles, which deliquesce by exposure to the air. When pure, it is almost odorless. Its aqueous solution has a sour metallic taste, and a rich amber or reddish brown color. It is very soluble in water, sparingly soluble in chloroform, insoluble in the fixed oils and fats. As an antiseptic, disinfectant, and preventive of germ growth, chromic acid stands "second to none." So says Professor Dougall, in the London *Lancet.*

The coagulating power of chromic acid in albuminous solutions has been compared with that of most metallic salts, various acids, etc., and found to exceed them all; for example, it has about ten times the coagulating power of carbolic acid, fifteen times that of nitric acid, twenty times that of bichloride of mercury, and a hundred and fifty times that of chloralum, etc.

Chromic acid coagulates, hardens, and oxidizes decomposing organic matter. It combines simultaneously with ammoniacal products and with nascent sulphuretted hydrogen, reducing the latter to water and free sulphur. Added to putrid blood, flesh, pus, urine, or fæcal matter, the offensive odor is soon absolutely removed, the mixture remaining fresh for an indefinite time. Dr. R. A. Smith found that bichromate of potassium surpassed thirteen other of the most energetic antiseptics, including carbolic acid, in preventing the evolution of sulphuretted hydrogen in a mixture of equal parts of blood and water. This salt has a coagulating power near that of nitric acid, that is, fifteen times weaker than that of chromic acid.

As a preventive of germ life, chromic acid surpasses sixty-six other chemical bodies consisting of irritant, narcotic, and narcotico-irritant poisons, including all the known antiseptics and disinfectants, except two or three substances, with which it has not yet been compared. In this respect it greatly excels carbolic acid, the average preventive strength of which, in three aqueous solutions of hay, urine, beef juice, and eggalbumen, is only 1 to 400, while that of chromic acid is 1 to 3,300.

Earth Poultices.

In further illustration of the value of earth for external application, mentioned on page 9 of our last number, a correspondent, Mr. H. Gallup, of Norwalk, Ohio, sends us the following:

"As the season of bites of reptiles is near, I send you a simple and easily obtained remedy for stings or bites. It is a plaster of clay, or, instead of clay, common swamp or gutter mud, applied as soon as possible to the wound. I have tried it on myself. In one case, I was stung, by a numerous swarm of the yellow hornets, in many places in my neck and arms. I went to a swamp near, the poison being so severe that my sight was much affected. I immediately applied the mud, and, in half an hour, I went to mowing again, with only a small sore lump round each sting. I knew a neighbor who was bitten by a rattlesnake some miles from home; his companion left him and went for help as fast as possible, it being just night. He was not able to return until morning. When going, he met the man returning, with the poison conquered. He had got to a swamp, dug a hole with his tomahawk, inserted and buried the bitten place in the mud. That was all."

Increase of Tea Drinking.

A late member of the London *Grocer* publishes the tea statistics of the United Kingdom for the past seventy-one years. In 1801, the quantity of tea consumed was 23,730,150 pounds, the average price of which was four shillings two pence half penny per pound. The population then numbered 15,828,000 souls, making the yearly amount of the beverage drunk by each person average one pound eight ounces.

In 1871, the consumption had risen to 123,401,889 pounds, but the price had fallen to one shilling, ten and a half pence per pound. The total population had grown in numbers to 31,513,000, and we judge that the taste for tea must have increased in the same ratio as its cost decreased, as in the last mentioned year the average of each individual was three pounds fifteen ounces.

WATER LEVEL INDICATOR.—M. Plaudié, an engineer in Imphy, has designed a new water lever indicator for vertical boilers, in which the water stands from 20 ft. to 25 ft. above the ground, and which is consequently difficult to observe directly. He obtains the indications of the level at a convenient hight by the difference in pressure of two liquid columns, the one having a fixed hight, and the other being variable according to the change of level in the boiler. These differences in the pressure are indicated by the movement of a mercurial column inclosed in a U tube, which communicates at each end with one of the tubes just mentioned. This apparatus works very well in the shops at Seraing and other establishments.

IMPROVED ELLIPSOGRAPH.

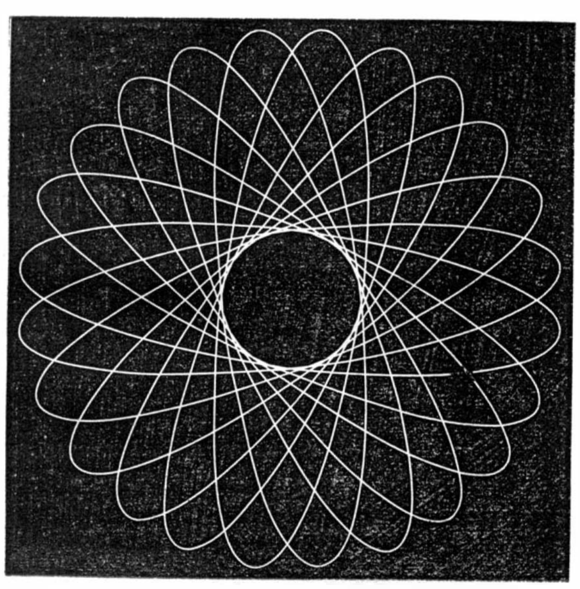
We have pleasure in laying before our readers the accompanying engraving and description of a very beautiful instrument for describing ellipses, invented by Mr. Arthur W. Browne, of Bloomfield, N. J. It is correct in principle and perfect in operation.

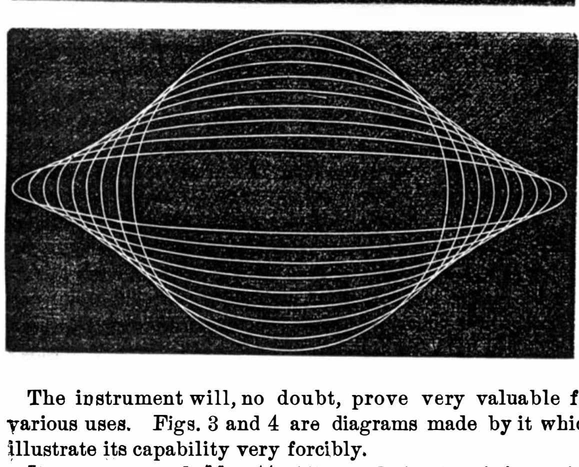
Fig. 1 represents the instrument standing in position to describe the eliptic outline partly shown; and from this figure, a general idea of the operation may be at once conveyed.

A is the fixed center upon which the instrument is worked; B is a revolving center which has a planetary motion round A, and C is the pencil point which moves, like a satellite, round the center, B. It will require no explanation to show how these compound motions compel the pencil point to travel in an elliotic path. We will proceed to explain how they are produced. D is a geared wheel attached to the central upright standard. E is a sleeve from which projects an arm carrying the axis, F, on which the loose intermediate gear, G, runs. To the lower part of this axis is adjustably attached the arm and sleeve, H. Within the sleeve, H, is placed the shaft which carries the revolving center, B, to which the adjustable arm carrying the pencil is attached. This shaft is rotated by the small gear, I. The operation is as follows: The central standard is held firmly in position while the sleeve, E, is revolved by means of the thumb wheel shown in Fig. 1. Motion is thus communicated through the arms to the center, B, which is carried round A in a circle. Motion is also caused in the intermediate gear, G, by which it is conveyed to the small gear, I, and the pencil is consequently carried round the center, B, while B is being carried round A.

In Fig. 2 are shown a pen, which may be used in lieu of the pencil seen in Fig. 1, and arms of varied length on which either may be carried; also a gage, J, the use of which will be explained hereafter.

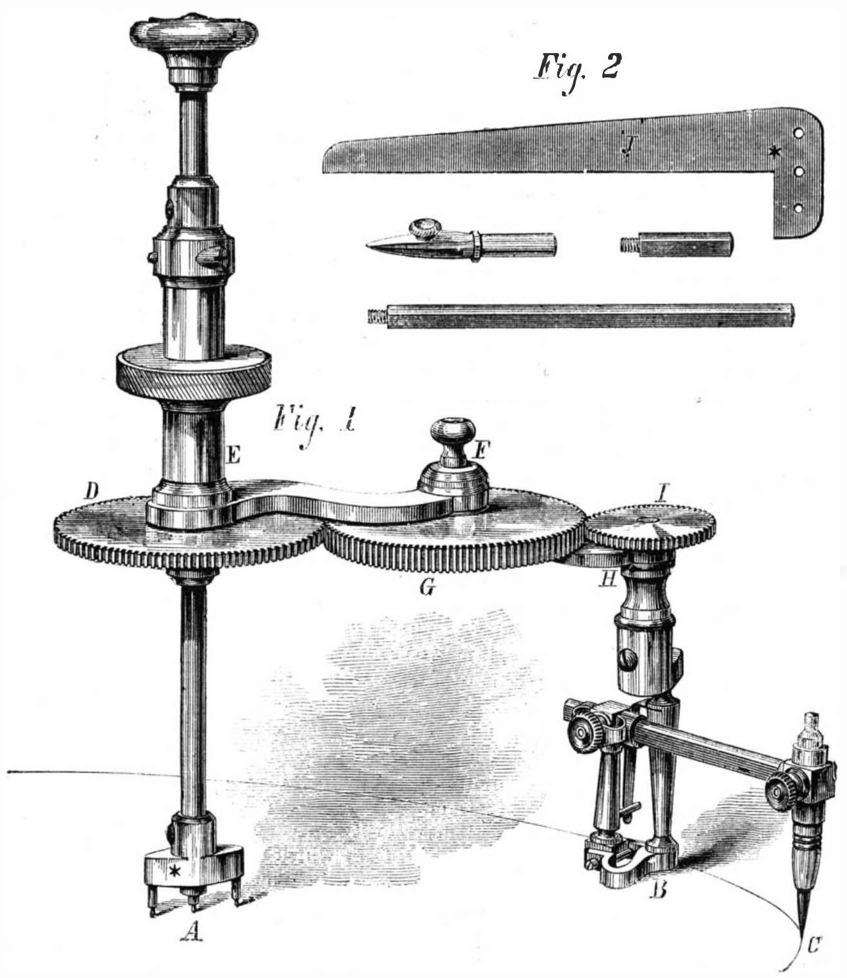
The instrument can be made to describe ellipses of any given diameters (within, of course, its compass) with either of their axes on any given line. To adjust it for size and form, the long and short diameters of the required ellipse are added together and divided by four, which gives the distance at which the centers, A and B, should be set; the short diameter is then subtracted from the long and the remainder divided by four, which gives the distance at which the pencil point should be set from the center, B. To describe the proposed ellipse with its long diameter on a given line, the gage, J, is placed on the three points of the instrument shown at A, so that the star marked on each may coincide. The center, B, and the pencil point are both brought to its edge, and the three points at A are pricked upon the given line, while the edge of the gage is perpendicular to it. The gage is then removed and the ellipse described.





The instrument will, no doubt, prove very valuable for various uses. Figs. 3 and 4 are diagrams made by it which illustrate its capability very forcibly.

It was patented May 14, 1872, and further information respecting it can be obtained of Mr. C. P. Ladd of the Ridgewood Works, Bloomfield, N. J.



BROWNE'S ELLIPSOGRAPH.

Increase of Invention in Belgium and Italy.

We have noticed of late a large increase in the number of new inventions both domestic and foreign patented in Belgium and Italy. The *"Bulletin du Musée de l'Industrie,"* an excellent scientific monthly published in Brussels, Belgium, contains a list of over 160 patents issued in that country for the latter half of the month of April, and also presents illustrations and a translation of the description of Jewell and Steele's high pressure boiler alarm, obtained from the columns of the SCIENTIFIC AMERICAN

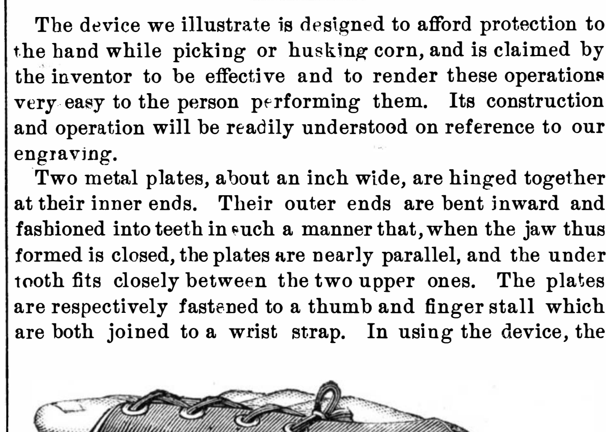
From Italy a new periodical comes to us entitled *"Le Industrie e le Privative Industriale"* in which we find a full description, accompanied by engravings, of Massey's rotary engine, for which due credit is given to our journal. For the month of May, 50 patents were issued by the Italian Government.

This increase of inventions argues well for the future progress of both countries, and the promptness with which their industrial journals republish novel and valuable American labor saving devices proves that the latter are as gladly welcomed and the genius of their inventors as fully appreciated by the people of Europe as by the public of the United States.

CORN HUSKER AND PICKER.

The device we illustrate is designed to afford protection to the hand while picking or husking corn, and is claimed by the inventor to be effective and to render these operations very easy to the person performing them. Its construction and operation will be readily understood on reference to our engraving.

Two metal plates, about an inch wide, are hinged together at their inner ends. Their outer ends are bent inward and fashioned into teeth in such a manner that, when the jaw thus formed is closed, the plates are nearly parallel, and the under tooth fits closely between the two upper ones. The plates are respectively fastened to a thumb and finger stall which are both joined to a wrist strap. In using the device, the



forefinger and thumb are inserted in the stalls, the hinged joint is drawn back so as to fit into the angle formed by them, and the wrist strap is fastened by a buckle. Thus armored, the ear of corn can be broken off from the stalk and afterwards husked without any chance of injury to the hand, for it is grasped by the metallic plates instead of the fingers, and that portion of the hand which would otherwise be most exposed is protected by them and by the finger stalls. The form of the teeth insures a very firm hold on that part of the husk seized by them and, altogether, hand husking is made so easy by the aid of this appliance that the inventor thinks the use of machinery for this purpose, with its attendant waste of fodder, may well be dispensed with.

A patent was granted May 7, 1872, to the inventor, Mr Samuel H. Mitchell, of Lacon, Ill. Further information may be obtained by addressing the Mitchell Manufacturing Company, as above.

Tea Drunkards.

Dr. Arlidge, one of the pottery inspectors in Staffordshire, has put forth a very sensible protest, says the *Lancet*, against a very pernicious custom which rarely receives sufficient attention, either from the medical profession or the public. He says that the women of the working classes make tea a principal article of diet instead of an occasional beverage; they drink it several times a day, and the result is a lamentable amount of sickness. This is no doubt the case, and, as Dr. Arlidge remarks, a portion of the reforming zeal which keeps up such a fierce and bitter agitation against intoxicating drinks might advantageously be diverted to the repression of this very serious evil of tea tippling among the poorer classes. Tea, in anything beyond moderate quantities, is as distinctly a narcotic poison as is opium or alcohol. It is capable of ruining the digestion, of enfeebling and disordering the heart's action, and of generally shattering the nerves. And it must be remembered that not merely is it a question of narcotic excess, but the enormous quantity of hot water which tea bibbers necessarily take is exceedingly prejudicial both to digestion and nutrition.

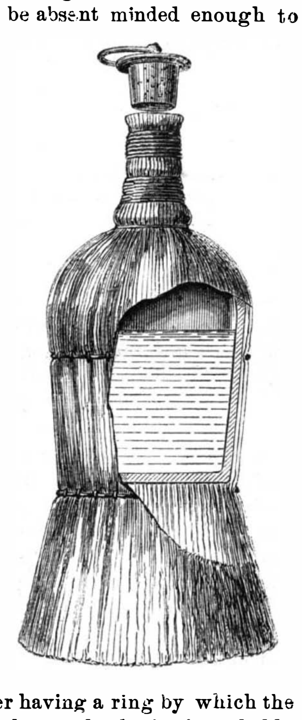
The Development of the Lobster.

According to Mr. S. J. Smith, in the *American Journal of Science*, the first stage of larval life finds the little animal a free swimming schizopod, about a third of an inch long, without any abdominal appendages and with six pairs of legs, to which are attached powerful swimming organs. The eyes are bright blue, and the body is orange to reddish orange in color. The second stage show an increase in the size of the little animal, and a development of a portion of the abdominal legs, with other and less important changes. In the third stage observed, the animal has become half an inch long, the anterior legs have largely increased in size, the second and third pairs are furnished with claws, the abdominal appendages have become conspicuous, and the "pockets" have appeared, though they yet differ from those observed in the adult. The fourth stage finds the young lobster three fifths of an inch long. It has lost its schizopodal features and has become to all intents and purposes, an actual lobster.

It is still, however, a free swimming animal, moving through the water very rapidly by means of the abdominal appendages, and darting backward when disturbed, with the tail, frequently jumping out of the water like a shrimp. It is probable that there is yet another stage of development before the complete lobster is reached. From the data obtained, it is also probable that these changes all take place in the course of a single season.

COMBINED FLASK AND WHISK.

If, in his travels at night, the reader's coat and throat gets dusty, he now has the means supplied whereby the dust may be removed from both in the morning, and his wife be none the wiser, if he can manage to be absent minded enough to forget the customary kiss when he starts out to business after breakfast. While he is brushing his clothes, he may take a pull at the concealed flask in the handle of the whisk, thereby recovering his damaged appetite, without fear of a reproachful look from his better half. Porters in hotels and professedly temperate gentlemen, who wish a sly nip on their travels, will also see their opportunity in the present invention, but, it is to be hoped that Bridget, who presides in the kitchen, will not be equally perceptive.



The flask is made of tin, glass, or other material, of ordinary or special shape, and is concealed by wrapping to it the brown straw in ordinary manner, an elastic wrapping being interposed between the straw and the flask. The flask is provided with a stopper having a ring by which the whole may be hung up, in which case the device is probably the most innocent looking of any yet invented by bibulous mortals for the surreptitious concealment of fluids. This invention was patented Nov. 21, 1871, by Louis T. Pyatt, of Philadelphia, Pa., who, had he brought out his invention when the Maine liquor law was enforced in most of the States might have made his fortune.

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NEW YORK, SATURDAY, JULY 13, 1872.

Contents:

(Illustrated articles are marked with an asterisk.)

A PLEA FOR COMMON SENSE.

In our number of June 22, there is a communication entitled "A Plea for the Classics," in which the writer quotes the following sentence from our article of May 25: "Not only are physics and mechanics more pleasant studies than Latin, and chemistry more interesting than Greek grammar, but we assert that a man can make more money by applying a more superficial knowledge of that science than by a much mere profound knowledge of the dead languages." On this our correspondent replies; "From the above, one would draw the conclusion that money making was the chief end of man. If that be so, the writer is correct. But man was born for a higher purpose than the simple attainment of wealth. I maintain that every man who comes into the world was put here to make humanity better," etc. This seems to be unfair dealing, as the paragraph preceding that about money making, which our correspondent does not quote, runs thus: "Scientific knowledge has its claims on us to be cultivated for its own sake, as well as literature, poetry, or music; we must not solely pursue it for the sake of money making, but first for its beauty and beneficial influence on our minds, and consider the profit, often the consequence of scientific investigation, as a secondary matter, but an important one at the same time, in which science has a decided advantage over literary and poetical pursuits." And further: "All the great agents which have reformed the modern relations of man are due, not to literary and poetical, but to practical scientific pursuits," etc. Our correspondent does not answer this, but comes only with the argument that, in scientific names, many words are derived from the dead languages; well, what of it? Science does not consist in words to be remembered, as our correspondent appears to suppose when he says that "the dead languages compel the mind to think correctly, to rely on judgment, not on memory, whereas mathematics and natural sciences give exercise only to the latter."

Every one who has studied mathematics and natural sciences as well as languages, knows that the reverse is exactly the case; there is no study in existence in which there is such a complete series of logical reasoning as in mathematics, and where memory alone without reasoning is totally inadequate; there is no science in which the practical judgment of men is more exercised than in the study of the natural sciences, that is, the study of Nature which surrounds us and of which we are ourselves a part. It is the study of God's handiwork, while the study of languages is that of mere human invention, the memorizing of mere words; as every language contains a few thousand of them, which have to be remembered before the grammar is of any use whatsoever, who can deny that it is exactly in the study of languages that the memory receives the most active training?

It is the misfortune of those who, like this correspondent, have received a one sided mere classical education that they foster the delusion that language and the study of grammar are the chief end of man, while in fact languages are only the vehicles by which knowledge of facts can come into our minds. We are much in favor of the study of languages, and it must not be confined to Latin and Greek, but include a few of the living languages of the nations foremost in civilization, not for the trifling and selfish satisfaction that we can enjoy the originals better than a translation, as this correspondent states in regard to Homer, but for the more rational reason that we will not be confined to those works which translators choose to publish in the English tongue, but be able to go to the original source, and get our treasures of information at first hand.

The statement of our correspondent that a man of the "most profound knowledge" on any science could not deliver a lecture on that subject without making some stupendous grammatical mistakes, if he is ignorant of the classics, is too strong an assertion. And if it were wholly true, his "profound knowledge" of his subject would be such a redeeming quality that a mere grammatical mistake would by no means make him "a laughing stock of the community." We suspect that those, if any, are becoming the laughing stock of the community whose training has been so one sided and neglected in the most essential branches that they have no knowledge of anything else but the classics and who suppose that this knowledge is everything in this nineteenth century, who are ignorant of the agencies which govern the world in which they live, or of the properties of the materials of which their own bodies are made, and who know nothing which can be of practical benefit to mankind.

Surely the chief end of man is not money making, but the first thing he must know is how to make a living for himself; if he cannot do that, how can he fulfil his purpose, which our correspondent states to be "to make humanity better for being in this world?" It is not the question: What may be good to know? but first: What is absolutely needful? And in order to fulfil what "society demands" so that man may be "prepared for the battle of life" in this nineteenth century, mathematics and natural sciences must be studied more, if possible, in combination with the classics, but if need be, at the expense of the classics. Have we not scores of eminent and highly successful men who never studied the classics, and do the latter in general make a man's life useful to his fellow men in the same degree as is the case when his study runs more on practical subjects?

The custom of a so called classical training is simply a relic from the middle ages, when there did not exist anything worth studying but the writings of the classical authors, when the languages spoken had no literature, and when no branch of knowledge was properly systematized except that of the dead languages. Cicero's expression, quoted by our correspondent, applies as well to a system of education based on scientific as to one based on literary training; and no doubt if Cicero, who possessed an eminently progressive spirit, could see the present condition of the branches of human knowledge, he would be foremost in recommending a thorough reform in our collegiate courses.

Many of our most eminent men, who surely cannot be suspected of underrating classical training, as they themselves received it most thoroughly, are of the same opinion, because by also studying sciences they became able to estimate all knowledge at its comparative value. We will only name one of those: President Barnard, of Columbia College, is also insisting on such a reform, and his influence on the venerable institution of learning under his charge will undoubtedly have the most benignant result on the future of its graduates.

LETTERS FROM PROFESSOR THURSTON.

Professor R. H. Thurston, of the Stevens Institute, Hoboken, N. J., has gone on a professional tour of observation among the iron and mining regions of the country. During his travels, he will make notes for the SCIENTIFIC AMERICAN, and the information thus placed before our readers will be found fresh, interesting and valuable. Professor Thurston is a clear and ready writer. The first of this series of letters will be found on another page of the present paper.

PROGRESS OF THE EIGHT HOUR STRIKE IN NEW YORK.

The excitement is dying out. The movement is a failure. Eight weeks of idleness are producing their effects, and the disheartened workmen, unable to make further sacrifices or to support their families on the pittances allowed them by the Unions, are slowly abandoning the movement and are returning to their labor at old hours and old wages.

The principal event of the past week has been the rapid growth, both in numbers and influence, of the iron and metal workers supporting the strike. During the fifth week of the movement, when its utter defeat seemed most imminent, one John Roach, a workman in Roach's Iron Works, gathered together half a dozen men and went around among his trade singing comic songs of his own composition containing humerous hits against the employers. As he travelled from one body of men to another, he organized meetings and finally succeeded in founding the present league of iron and metal workers, which now numbers several thousand men, has more money than any other union, and may be considered as leading the movement.

Numerous meetings of the different unions and societies have been held during the week, but nothing of importance has resulted from their deliberations. On the evening of the 21st ult, an indignation meeting was held at the Cooper Institute, during the progress of which several highly inflammatory speeches were made. One Mackey threatened revolution, and warned the employers to remember Paris in '93. "When the aristocracy of Paris refused bread to the working men, there followed a scene in which those same laborers revelled in the finest halls and palaces of the city." A set of resolutions of similar tenor was adopted, in which it was stated that such action as might be necessary would be taken to protect the workmen against the police, and to "resist any further acts of violence and brutality, on the part of them or any other tools of the enemies of the industrial masses."

A fiery individual by the name of Blessart who "had been ruled by British bayonets," remarked that he had never seen "such tyranny exercised over any people as that which seeks to crush down the New York working men at the hands of roughs clothed by a government of thieves." He concluded his bloodthirsty harangue by observing that he did not know much about this country, and that he did not wish to augment his stock of knowledge in relation thereto until it changed from a country of "thieves, murderers, and policemen."

The work of this meeting, however, was promptly disclaimed and repudiated by the large majority of the strikers, the President of the Metal Workers' League saying that he was sure that the working men would frown down any attempt to draw them into scenes of outrage and riot. If they could not, by stout hearts and clear heads, gain the terms they demanded, they would bare their strong arms for work and not for war, and prove that they could manfully and hopefully bide their time."

On the 25th ult, the sugar refiners returned to their labor under the old terms. These men had more right on their side than any other trade on strike, and, next to the German and metal workers' leagues, they were the largest organized body of workmen in the city. The withdrawal of their support has been the most powerful blow the movement has yet received. The piano makers have also all succumbed, each man, it is estimated, having lost over a hundred and fifty dollars by the strike. In the shops of the New York Central and Hudson River Railroad, the movement is at an end, all the hands, with the exception of the ringleaders who were refused re-engagement, being at work under the old system. The men of the Delamater iron works and those of a large number of other factories throughout the city have recently surrendered, while those from similar establishments that still hold out are making overtures of compromise.

The New York *Tribune*, in a carefully prepared article, points out the cost of the movement, so far as could be learned from estimates gathered mainly from employers. The number of workmen employed when the shops are full is 82,938, of whom 61,050 have struck. 36,050 men are working under the eight hour system. Of this large number 3,500 are bricklayers, 10,000 are day laborers, 3,000 are carpenters, all of whom gained their demands at the beginning of the movement, and the balance is made up principally of workmen connected with the building business. The pianoforte makers, sewing machine makers, and brass founders have completely failed. 23,424 hands are working ten hours a day without advance of wages. 4,800 house painters also labor ten hours, but receive extra pay. 11,498 men are estimated to be still on strike, but this number has been largely reduced since the article was published. The loss to the employers is fixed at $2,043,550, and to the workmen in wages $1,674,950. These statistics cover about forty trades, there being of course others regarding which accurate information could not be obtained. It is believed that the figures here given as the amount of the losses incurred would extend over a period of one month, so that for a year the total direct loss to both employers and workmen would reach the sum of $41,814,000. Leading members of different trades state that if eight hours should be conceded as a day's labor, the effect would be as follows: Piano makers would raise their prices one third: carriage makers, 25 per cent; marble workers would be unable to continue business in the city; the furniture trade would increase their prices 25 per cent for fine furniture, 15 per cent for medium, and from 7½ to 10 per cent for cheaper goods. The cost of production to brass founders would be augmented 25 per cent. Clothing would advance 30 per cent. The great majority, representing all trades, unite in belief that, in case of their acquiescence to the demands of the strikers, outside competition would force them to abandon work in New York, an opinion the correctness of which is admitted by the workmen themselves.

As regards the indignation meeting above referred to, which had a fit sequel in the repudiation of its resolutions and the unhesitating acquittal of the policemen against whom charges had been brought, we can only express our surprise that American workmen should allow themselves to be influenced by such firebrands as Blessart and Mackey. The remarks of the former person on bayonets, standing armies, thieves, and murderers were out of place and absurd. These men are not Americans, nor do they know anything of our institutions. They merely rant communism and wild socialistic ideas here, as they would in any other country, simply to foment disorders and defy the authority of the law. The language of condemnation uttered by the metal workers is manly and sensible, and will win for them the respect and even sympathy of many who do not approve of the cause they support.

Our workmen lose sight of the fact that they are in every respect better off than their European brothers. Let them read the account of the great lock-out now taking place in England, and picture to themselves the misery that must ensue therefrom. While they are striking here for eight hours' labor and 25 per cent advance on wages that are already large, the English artisan is locked out because he ventures to demand nine hours as a day's work, with an increase of but fourteen cents a week—a mere pittance that an ordinary laborer would spend for beer in a single day. The American mechanic, if sober, honest and industrious, is the equal of the best in the land—the highest positions in the nation are open to him, and he is and should consider himself infinitely above the level of the degraded communists of France, or the uneducated hopeless drudges of other European countries.

There is a fair prospect, we are gratified to learn, of this dispute being settled by amicable arbitration, and it is reported that the Citizens' Association and the Commissioners of Emigration of this city have proffered their good offices in the matter. We thrust that this plan will be carried out, and that no obstructions will be opposed to it either by employers or workmen. It has been fully demonstrated that the eight hour system cannot be adopted at present, as its only effect would be to increase the cost of every product of our industries to such a degree as to render our competition with foreign labor impossible. Let the workmen, then, submit their views to arbitration peacefully and with moderation; and if the employers meet them, as we think they will, in a spirit of forbearance and reason, we have no doubt but that a compromise will be effected, satisfactory and honorable to both parties.

THE EAST RIVER BRIDGE.

The third Annual Report of the New York Bridge Company has recently been published and contains much interesting information relative to the progress in the construction of the great suspension bridge between New York and Brooklyn.

The tower on the Brooklyn side has been carried up to an elevation of 100 feet above high water and within 20 feet of the roadway. During the winter months, the old boom derricks have been removed and a new set of hoisting machinery placed in position.

On the New York side, the past eight months have been entirely occupied in sinking the caisson for the New York tower, an operation rendered especially disagreeable from he fact that the site selected had been, for some years past, a dumping ground for garbage and refuse, so that the mud was filled with decayed animal and vegetable matter. The total weight of the caisson is 7,000 tuns, and it is considered twice as strong as its counterpart on the Brooklyn side. At a depth of 18 feet and under a load of 53,000 tuns, not the slightest weakness or deflection of the roof could be observed even when the main frames and edges below were entirely dug out and not resting on the ground. Outside of the masonry, a coffer dam has been carried up to a hight of 25 feet. The chief benefit derived from this structure was that the masonry could be laid below the water level during most of the winter, and the work of sinking the caisson could therefore proceed without interruption. At present, the coffer dam has been designedly filled up with sand and forms part of the timber dock extending to the tower masonry.

Twenty-five courses of stone (granite and lime stone) have been laid on top of the timber reaching to a hight of 50 feet and amounting to 11,700 cubic yards of masonry. Sand was removed from the caisson by means of the air system, being discharged at a depth of 60 feet through a 3 1-2 inch pipe continuously, for half an hour at a time, at the rate of one yard in two minutes This represents the labor of fourteen men standing in a circle around the pipe and shoveling as fast as their strength would permit. The material passes from the pipe with tremendous velocity, stones and gravel often being projected to a hight of 400 feet. In order to deflect the sand at the top of the pipe at right angles, both wrought and cast iron elbows were used, but as it was found that these were rapidly cut through by the blast, solid blocks of granite were substituted.

The concrete for filling the chamber in the caisson is all mixed above and let down through the supply shafts ready for distribution below. No brick pillars were used as under the Brooklyn caisson, the bearings of the frames being so wide as to be equal to all contingencies when once uniformly packed under with concrete. The stones, earth and sand, left in the caisson during the sinking, were sufficient to fill one third of the space; and since the concrete is going in at the rate of 80 to 100 yards per day, it is probable that the chamber will be filled in the early part of this month. Final exit will be had by the water shafts.

The effects of the compressed air in the caisson, on the workmen, were not so serious as at first anticipated, but two cases of death resulting directly therefrom. As the pressure increased, the working hours below were gradually reduced from four to two per day. An ingenious mechanical telegraph devised by Colonel Paine was used for keeping up communication between the upper and lower portions of the work. For illuminating purposes, ordinary street gas was used, sixty burners giving all the light required. It was noticed that in the compressed atmosphere all the gas lights became sensitive flames, answering to the stroke of a hammer on a piece of iron or even to the tones of the voice.

Chief Engineer Roebling, in concluding his report, recommends the early acquisition of the ground required for at least one anchorage, so as to make a beginning this season and utilize the coming winter by putting in the foundation.

Having proceeded thus far, the bridge company now ask the New York Board of Apportionment for more funds, requesting the sum of $300,000, being a 10 per cent instalment of the subscription of this city toward the expense of the structure. An inspection of the statement of receipts and expenditures in the report before us shows that the receipts of the company, from stock paid in, rent, sale of New York bonds, etc., amount to $2,923,624.26, while the expenditures reach the sum of $2,905,389.49, leaving a balance on hand of but $18,234.77. Consequently, from the original sum subscribed, $5,000,000—$1,500,000 from New York, $3,000,000 from Brooklyn, and the balance from private individuals of both cities—nearly $3,000,000 have been expended, and yet the structure is but little more than barely commenced. At war prices, the estimates of Mr. John Roebling, who planned the bridge, did not exceed $4,000,000 for the entire work.

A system of swindling and corruption has been proved to exist in the management of the affairs of the company which is simply disgraceful. The New York *World*, having made investigations into the matter, states the members of the New York and Brooklyn rings, who formed the majority of the private subscribers, have not paid in a cent of their subscriptions. The latter were shams, employed merely to hide the too palpable intention of defrauding the corporations of New York and Brooklyn. An individual by the name of William C. Kingsley, a corrupt and notorious member of the Brooklyn ring, holds the position of general superintendent. This man has been authorized to receive five per cent on the expenditures incurred in the work, so that for his proportion of the spoils he has secured $125,000 on disbursements of something over $2,000,000. Chief Engineer Roebling is the actual superintendent, and fulfils the requirements of the position; while Kingsley's duties seem to consist in selling material from his own mills to the company at an enormous profit, and then pocketing, in addition, five per cent of the expenditures therefor. So far from the cost of the entire structure being but four or five millions, it is evident that, unless some measures be taken to rid the company of such vampires as the Brooklyn ring, forty millions will not cover the amounts that will be squandered and stolen. The whole course of the management is an outrage upon the tax payers of both cities, and we trust that no further funds will be allowed until reforms are instituted.

We pointed out, when the question of a suspension bridge across the East River was first agitated, that the expense of such a structure in the location selected would be much greater than the estimates published. If such a means of crossing were absolutely necessary, it might as well have been thrown over near Blackwell's Island, where the stream is much narrower. In our opinion, bridges are not the most suitable means of transit that can be devised.

Tunnels can be bored under the bed of the river with the utmost facility. The present bridge will at a low estimate, even if honestly managed, cost at least twenty million dollars and will require several more years to be brought to completion. On the other hand, the same company that are making the excavations at Hell Gate, we are informed, offer to construct a tunnel under the river for one million dollars, and we have no doubt but that the work could easily be performed, with the aid of the greatly improved machinery now in use, within a year's time. In fact, for the amount which will be expended on this single bridge, at least six tunnels can be opened between different points of the two cities, thus affording much more extensive, effective and less costly means of intercommunication.

[Special Correspondence of the Scientific American.]

LETTER FROM PROFESSOR R. H. THURSTON.

PITTSBURGH, Pa., June 25th, 1872,

A visit to the iron and steel works at Trenton, N. J. Cutting iron beams with toothless saws. The Siemens furnace and the Martin steel. The eight hour strike. Iron ship building in Pennsylvania.

A professional tour of observation among the great iron and the most interesting mining regions of the country can hardly be made as comfortably, at this season, as a trip to the seashore; but, when engagements forbid attempting such an excursion in May or October, it may be still found quite profitable enough to justify an engineer in taking the summer months for it

Leaving New York on such an errand a few days since, we made our first stop at Trenton for the purpose of visiting the works of

THE NEW JERSEY IRON AND STEEL COMPANY, AND THE TRENTON IRON COMPANY.

The first named, unfortunately, were not in operation on that day, and we were compelled to satisfy ourselves with an inspection of cold furnaces and of rolls at rest.

Between 600 and 700 men are usually employed at these works, in the production of 2,0000 tuns of iron and steel annually, of a quality that has made their proprietors deservedly celebrated. Many large iron beams and "channel bars" are rolled here, some of the former being fifteen inches in depth. We had the pleasure of witnessing the interesting and somewhat singular operation of sawing some of these immense beams to length, while cold, with a saw made of soft steel and without teeth. The work was done rapidly and well, and the edge of the saw, when its work was done, was left so cool that the hand could be placed upon it without great inconvenience, although the showers of burning iron torn from the beam during the operation had led us to suppose that the saw itself would become highly heated. The saw, we were told, wears well and saves considerable expense by enabling the beams to be cut to length when cold.

At these works a Siemens gas furnace is used in the manufacture of "Martin Steel" on the open hearth. The process consists simply in the reduction of the proportion of carbon in selected brands of cast iron, by adding to it, when melted, the necessary quantity of wrought iron, and working in spiegeleisen, as in the other methods of steel making, to correct any defects arising from the presence of impurities. It is beautifully simple, and when carried on in the Siemens furnace, where the flame can be made oxidizing, deoxidizing, or neutral, and where the temperature can be kept perfectly under control, it possesses many advantages over older processes, where it is worked with carefully selected stock. As the steel need not be tapped off until it is of the desired quality, the product may be made uniformly right.

We noticed here that all the heavy tools about the mill were driven each by its own engine, making them all independent of the main engine and saving the expense of driving heavy shafting many hours to do a few minutes work.

The Trenton Iron Company employ about 300 men, and produce the finest grades of iron wire in the market—hard and tough and wonderfully uniform in quality. Both of these firms have acquired this very great reputation by a constant and conscientious attention to quality of product even more than by their great enterprise.

A large number of men are employed in the iron works and the potteries of Trenton, but there seemed to be no indications of a desire to "strike." It is hardly probable, however, that it is because they have learned from that experience which has driven work from London within the past few years, and which has just seriously crippled many branches of trade in New York by driving business away to other parts of the country.

THE EIGHT HOUR STRIKE.

It is unfortunate that our people have yet to learn, by bitter experience probably, that if labor is worth fifty cents an hour, the great economical law which controls the relations of supply and demand will defeat the attempt of any combination of capital to get the hour of labor for less money, and that, if labor is worth but thirty cents an hour, no combination of labor and no amount of "striking" will secure more for it except by simultaneously raising the price of the necessaries of life in even higher ratio, thus leaving the working man worse off than before. They have, apparently, also still to learn that a reduction of working hours means a reduction of production and corresponding increase in price of all products of labor in full proportion. So long as these simplest laws of political economy are not taught in our common schools, it remains the duty of the press to teach conscientiously one of the most important lessons which our people have to learn, and to impress upon working men the fact that if capital receives more than its share of profit, a fair distribution can only be secured by the working men becoming capitalists, by combination and coöperation—the true object of "trades' unions," and the only way in which their members have been really and permanently benefitted.

IRON SHIPBUILDING IN PENNSYLVANIA.

From Trenton we went to Philadelphia, where we visited several very extensive ironworks, and where we were particularly interested in the iron shipbuilding yard of Messrs. W. Cramp & Son. This firm are building four large iron steamers for the American "Atlantic S. S. Company," and are employing upon them over 1,000 men.

These vessels are over 350 feet long, more than 40 feet wide, and, when laden ready for sea, will weigh about 5,000 tuns. Their hulls will probably weigh 1 600 tuns.

They will be driven by engines of 2,000 horse power, as measured by the usual engineer's standard, but the real power required to propel such vessels can be best imagined by those unfamiliar with such things when they are told that, to do the work of such steam engines as they do it, day after day and even week after week without stopping, would require a stud of nine thousand good draft horses, and such a number would make three "string teams," to work eight hours per day each, that would be more than four miles in length each, or if all driven together, would extend thirteen miles.

All of the materials entering into the construction of these vessels are American, and the iron of the hulls is of much better quality than that usually put into British built vessels. The workmanship is excellent. I have seen none better in the best shipyards of the Tyne or the Clyde. They have beautifully "fair" and graceful models.

COMPOUND STEAM ENGINES.

The engines are the most effective form of "compound" engine—the form which, it has been recently stated, could not be built in this country because, as alleged, our constructing engineers are unfamiliar with its construction (!)

I was kindly allowed to examine the drawings very minutely, and admired the neatness of their design, their excellent proportions, and the evident familiarity of their designer with the principles involved in this latest form of the marine steam engine.

It is singular that our builders are so slowly taking hold of this style of engine. They have seen it coming forward, steadily gaining ground, for many years past, as steam pressures have gradually risen; and in spite of occasional failures until within a few years, the introduction of surface condensation has removed the great obstacle to the use of high pressures, and has led the way to the adoption of the compound engine by the leading builders of the world.

The cause of our conservatism can hardly be a difficulty in finding engineers capable of designing such engines, for although it is true that it requires a more thorough acquaintance with principles and methods than the old engine, we still have many engineers who can produce quite as good designs as any found abroad.

Messrs. Cramp & Sons are among those who do not propose to be left behind in this matter. R. H. T.

DESIGN PATENTS TO FOREIGNERS.

Strenuous effort was made during the last session of Congress, by some of our large carpet manufacturers, to get the law allowing protection to foreigners for designs repealed.

The bill was not reached, therefore no action was taken before the adjournment; but we learn that it is contemplated, at the next session, to attach a repeal clause to other amendments of the Patent law which the Commissioner will recommend, and so cut all foreigners off from protecting their designs for carpet patterns and other fabrics. This will be a retrograde step, and Congress may as well go a step further and repeal all law for the protection of inventors from abroad.

But there is no knowing what these gigantic carpet corporations may not accomplish; therefore we advise all foreign manufacturers to avail themselves of the present law to protect their designs before the next meeting of Congress.

AMONG the best conductors of sound are iron and glass. Through them sound is transmitted at the rate of 17,500 feet, or over three miles, per second. But in air sound travels only 13 miles per minute, or 1,142 feet per second.

THE NEWARK INDUSTRIAL EXHIBITION.

The Industrial Exposition which is to be inaugurated on the 20th of August next in Newark, N. J., is to be similar in character to those which have proved so successful in Birmingham and Manchester, England. Its especial aim is to demonstrate that the population of Newark, numbering 115,000, bring forth products embracing almost the entire range of man's handicraft.

The example set by Newark in thus encouraging the industries within her limits is an excellent one, and deserves to be followed by all our manufacturing towns and cities. Such exhibitions if properly conducted are of the utmost value not only as a stimulus to the devising of new inventions, but also toward the carrying of those already in the market to a higher degree of excellence. A healthy competition and rivalry between producers is also engendered, and at the same time the business and consequent wealth of the locality is increased from the fact of the manufactures in which it excels being brought directly to the notice of the public at large.

The Time Planets would take to Fall into the Sun.

M. Flammarion makes the following remarks, on this subject, in *Les Mondes*:

Supposing the Earth to be arrested in its course, and the centrifugal force thus destroyed, the Earth, being left to the first force, would fall to the sun with a uniformly accelerated motion. It would take about 64 days in its fall, and would reach the sun with a velocity of 600,000 meters in the last second, or at the rate of about 360 miles for that second.

The following are the figures obtained from a calculation of the time the planets would take to fall to the center of the sun, supposing their motion to be arrested. (The calculations are based on the mean distance of each planet from the sun.)

Mercury	15·55 days.
Venus	39·73 "
Earth	64·57 "
Mars	121·44 "
Jupiter	765·87 "
Saturn	1901·93 "
Uranus	5424·57 "
Neptune	10628·73 "

Superior Safety of Paraffin Oils.

Dr. William Wallace, of Glasgow, communicates to the London *Grocer* the results deduced from a number of experiments made by him with a view of testing the applicability of heavy paraffin oils, better known as mineral lubricating oils, to the process of "batching" or preparing jute for spinning, and also for wool spinning, more especially with reference to the risk from fire supposed to exist in factories where these oils are used. He states that the flash points of paraffin oils vary from 293° to 338°, and as the lowest of the temperatures is far above the boiling point of water and any degree of heat to which any part of a spinning mill could possibly be exposed unless it were actually on fire, they appear to offer perfect safety to spinners of jute or wool. Fatty oils have a higher flash point, but the real danger consists in the generation of heat by the oxidation or insensible combustion to which all these oils are subject, although at different degrees. A rag of cotton waste, saturated partially with linseed oil, kept in an ordinary apartment, will sometimes break out into open combustion in the course of a few hours; and Turkey red dyed calico, prepared with olive oil, cannot be left for more than an hour in a heap without very serious risk of a conflagration occurring. The drying oils, such as linseed, are the most dangerous, and those which have the least tendency to become by exposure thick and rancid are the safest; Dr. Wallace considers that the paraffin oils are safer than any fatty oil because they have no tendency whatever to "heat" when in contact with fibrous materials.

"THE American Vacuum Brake," the invention of Mr. J. Y. Smith, of Pittsburgh, has been applied to cars at Boston, Mass. The time occupied, in bringing the train to a full stop at speeds from 25 to 30 miles per hour, varies from 26 to 30 seconds, and the distance from 672 to 1,152 feet. The general construction of the brake is analagous to that of the Westinghouse; the power employed, however, is the pressure of the atmosphere produced by creating a vacuum instead of that due to compressed air.

PUDDLING BY PETROLEUM.—It is asserted by the French technical journals that the experiment of using petroleum as fuel in the puddling furnace, which has been in progress at a large iron producing establishment during three months, has proved itself to be very successful. In point of convenience, efficiency and in the superior quality of the iron produced, it is asserted that petroleum affords the best fuel that has yet been employed.

IN the onion, there is found a peculiar oil containing sulphur, called the sulphuret of allyle. The odor of the breath after eating onions is caused by the presence of a small quantity of this oil, which is exhaled in breathing.

MERCURY is sometimes found in a pure state; but it generally occurs in the form of cinnabar, which is a red colored mineral composed of mercury and sulphur. In its pure state mercury is volatile, vaporizes at 662° Fah. and solidifies at 39° below zero.

Facts for the Ladies.—Mrs. S. D. Joyce, Kingston, Mass., has used her Wheeler & Wilson Lock-Stitch Sewing Machine since 1867, in general sewing, sometimes changing her silk or thread twenty or thirty times a day, working as easily as with hand needle. See the new improvements and Woods' Lock-Stitch Ripper.

Brilliancy of Complexion.—For its preservation Burnett's Kalliston is guaranteed.

"Our Favorite Sewing Machine.—The cheapest and best Sewing Machine now manufactured for family use is probably the New Wilson. We certainly would use no other. It works with equal facility on muslin, woolen, cloth, cambric, tarletan, flannel and leather. It does not paralyze the spine, or wear out the operator in any way, neither does it demand an incessant stoppage to find out where the difficulty is. There is no difficulty. It runs smoothly and evenly, hems, fells, tucks, gathers and binds. It does the finest and most beautiful work on cambric and linen. It also has the merit of being cheaper than any other first-class machine, as it can be purchased for $50. The feeding device is an improvement on all other machines, and a special patent of the Wilson. It does not get out of order, nor break needles, nor slip, nor pucker the cloth. So complete has the Wilson Sewing Machine been made, by a skillful combination of brain and muscle, that it has left nothing to be desired." Salesroom, 707 Broadway, New York; also for sale in all other cities in the United States.

Business and Personal.

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

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

For Sale—To R. R. Contractors: Two second hand direct-acting Locomotives, 12 tons and 20 tons weight—in good running order. Address Grice & Long Loco. Works, 1340 Beach St., Philadelphia, Pa.

R. R.—The improved "Broughton" Lubricators, Oil Cups, and Oilers, manufactured by H. Moore, 41 Center St., New York, are decidedly the best.

For Silver plated Show Window Bars, write to John D. Moran, 205 Hudson St., New York.

Walrus Leather for Polishing Steel, Brass, and Plated Ware. Greene, Tweed & Co., 18 Park Place, New York.

Extra Heavy Oak tanned Belting—Rubber Belting, Packing, Hose, &c. Greene, Tweed & Co., 18 Park Place, New York.

Situation Wanted—To take charge of a Boiler Shop or turn Flanges. Is used to Marine and Locomotive Work. Address James T. Connelly, 443 N. 6th St., Philadelphia, Pa.

G.W. Babcock, Providence, R.I., wants a Watchmaker, of good habits, honest, and faithful, competent to a nice job, without mutilation.

For Hydraulic Jacks and Presses, New or Second Hand, send for circular to E. Lyon, 470 Grand Street, New York.

For Marble Floor Tile, address G. Barney, Swanton, Vt.

Wanted—A 2d Hand Boiler of about 3 horse power. Whitney Arms Company, New Haven, Conn.

For Vertical Portable Engines and Saw Mills, apply to Griffith & Wedge, Zanesville, Ohio.

For the latest improvement in Stationary Engines and Saw Mills, write to Griffith & Wedge, Zanesville, Ohio.

Wanted—A situation under instructions in draughting room by a young man who is a machinist. Address J. S. C., care of B. F. C., Princeton, New Jersey.

Pattern Letters and Figures, to put on patterns, for molding names, places and dates on castings, etc. H. W. Knight, Seneca Falls, N. Y

For the simplest, cheapest, and best Rotary Pump in use for thick or thin liquids, send for circulars to Hersey Brothers, So. Boston, Mass.

Wanted, Patent Glove Clasps made. J. L. Weir, Dresden, Ont.

Wanted—Iron Planer, of 5 to 6 ft. square by 12 to 16 ft. long, capacity. Must be new, or as good. Will exchange for some choice selected lands situated within 5 to 10 miles of Rail Roads in Northern Iowa. John Cooper & Co., Mount Vernon, Ohio.

The best Bolt Forging Machines are those that work vertical, and forge Bolts any length horizontally. For such, address John R. Abbe, 39 Charles Street, Providence, R. I.

To Capitalists—Two valuable Patent Rights for Sale or exchange for other property. For particulars, address John J. Baringer, Germantown, Columbia Co., N. Y.

Persons in want of Portable or Stationary Steam Engines, or Circular Saw Mills combining the latest improvements, should correspond with Sinker Davis & Co., of Indianapolis, Ind.

Upright Drills—The best in the world. Built by Hawes Machine Co., Fall River, Mass. Send for Circular.

The "Bellis Patent Governor," made by Sinker Davis & Co., of Indianapolis, Ind., is acknowledged to be the most perfect engine regulator now in use.

For the most beautiful Site, Building, and Water Power for manufacturing purposes, address Harris Brothers, Newport, N. Y.

For Machinists' Tools and Supplies of every description, address Kelly, Howell & Ludwig, 917 Market Street, Philadelphia Pa.

Three fourths saving of fuel, by the Ellis Vapor Engine (Bisulphide of Carbon) in running the Haskins Machine Co's Works, Fitchburg, Mass. To whom apply.

Old Furniture Factory for Sale. A. B., care Jones Scale Works, Binghamton, N. Y.

Peck's Patent Drop Press. Milo Peck & Co., New Haven, Ct.

Write for Chemicals, Crude Materials, and Drugs for Manufacturers' use, to L. & J. W. Feuchtwanger, 55 Cedar Street, New York.

Steel Castings to pattern, strong and tough. Can be forged and tempered. Address Collins & Co., 212 Water Street, New York.

The Waters Perfect Steam Engine Governor is manufactured by the Haskins Machine Co., Fitchburg, Mass.

Galvanized Slating Nails, Stove Reservoirs, and Hollow Ware. Address Cleveland Galvanizing Works, Cleveland, Ohio.

Portable Baths. Address Portable Bath Co., Sag Harbor, N.Y.

An inducement.—Free Rent for three months to tenants with good business, in commodious factory just built for encouragement manufacturing. Very light rooms, with steam, gas, and water pipes, power elevator, &c. &c. Manufacturers' Corporate Association, Westfield, Mass. Plans of Building, Room 22, Twenty One Park Row, N. Y.

Standard Twist Drills, every size, in lots from one drill to 10,000, at ¾ manufacturer's price. Sample and circular mailed for 25c. Hamilton E. Towle, 30 Cortlandt st., New York.

For hand fire engines, address Rumsey & Co., Seneca Falls, N.Y.

To Ascertain where there will be a demand for new Machinery, mechanics, or manufacturers' supplies, see Manufacturing News of United States in Boston Commercial Bulletin. Terms $4.00 a year.

If you want a perfect motor, buy the Baxter Steam Engine.

Brown's Coalyard Quarry & Contractors' Apparatus for hoisting and conveying material by iron cable. W. D. Andrews & Bro, 414 Water st., N.Y.

Mining, Wrecking, Pumping, Drainage, or Irrigating Machinery, for sale or rent. See advertisement, Andrew's Patent, inside page.

For Tri-nitroglycerin, insulated wire, exploders, with pamphlet, as used in the Hoosac Tunnel, send to Geo. M. Mowbray, North Adams, Mass.

Kelley's Chemical Metallic Paints, $1, $1·50, $2 per gallon, mixed ready for use. Send for cards of colors, &c., 116 Maiden Lane, N.Y.

Kelley's Pat. Petroleum Linseed Oil, 50c. gal., 116 Maiden Lane.

All kinds of Presses and Dies. Bliss & Williams, successors to Mays & Bliss, 118 to 122 Plymouth St., Brooklyn. Send for Catalogue.

Diamonds and Carbon turned and shaped for Philosophical and Mechanical purposes, also Glazier's Diamonds, manufactured and reset by J. Dickinson, 64 Nassau st., New York.

For Steam Fire Engines, address R. J. Gould, Newark, N. J.

In the Wakefield Earth Closet are combined Health, Cleanliness and Comfort. Send to 36 Dey St., New York, for descriptive pamphlet.

If you want to know all about the Baxter Engine, address Wm. D. Russell, office of the Baxter Steam Engine Co., 18 Park Place, N.Y.

Presses, Dies & all can tools. Ferracute Mch Wks, Bridgeton, N. J. Also 2-Spindle axial Drills, for Castors, Screw and Trunk Pulleys, &c.

For 2, 4, 6 & 8 H.P. Engines, address Twiss Bro., New Haven, Ct.

The Patna Brand of Page's Patent Lacing is the best. Orders promptly filled by the Page Belting Co., No. 1 Federal St., Boston.

Absolutely the best protection against Fire—Babcock Extinguisher. F. W. Farwell, Secretary, 407 Broadway, New York.

Williamson's Road Steamer and Steam Plow, with Rubber Tires. Address D. D. Williamson, 32 Broadway, N. Y., or Box 1809.

Tested Machinery Oils—Kelley's Patent Sperm Oil, $1 gallon; Engine Oil, 75 cts.; Filtered Rock Lubricating Oil, 75 cts. Send for certificates. 116 Maiden Lane, New York.

For Solid Wrought-iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Belting as is Belting—Best Philadelphia Oak Tanned. C. W. Arny, 301 and 303 Cherry Street, Philadelphia, Pa.

Boynton's Lightning Saws. The genuine $500 challenge. Will cut five times as fast as an ax. A 6 foot cross cut and buck saw, $6. E. M. Boynton, 80 Beekman Street, New York, Sole Proprietor.

The Baxter Steam Engine is safe, and pays no extra Insurance.

Better than the Best—Davis' Patent Recording Steam Gauge. Simple and Cheap. New York Steam Gauge Co., 46 Cortlandt St., N. Y.

"What I know about Machinery," especially Engines, Pumps, and Machinists' Tools, which I sell at 93 Liberty Street, New York. S. N. Hartwell, late agent for L. W. Pond.

The most economical Engine, from 2 to 10 H.P., is the Baxter.

Over 800 different style Pumps for Tanners, Paper Makers, Fire Purposes, etc. Send for Catalogue. Rumsey & Co., Seneca Falls, N. Y.

Inventions Patented in England by Americans.

[Compiled from the Commissioners of Patents' Journal.]

From June 7 to June 12, 1872, inclusive.

DIFFERENTIAL PULLEY.—T. A. Weston, Ridgewood, N. J.
FASTENING FOR RETORT LID.—G. Stancliff, J. R. Floyd, New York city.
INK FOUNTAIN.—Hopson and Allen, New York city.
LOCOMOTIVE ENGINE, ETC.—J. Harrison, Jr., Philadelphia, Pa.
LUBRICATOR.—J. S. Eggleston, Auburn, N. Y.
PERFORATOR.—G. Harrington, New York city.
SELF CANCELLING STAMPS, ETC.—C. G. Johnsen, New Orleans, La.
STAIR RODS, ETC.—E. J. Smith, Washington, D. C.
STEAM PUMP.—A. J. Reynolds, New York city.
STUFFING BOX GLAND.—J. N. Colby, of Mystic, Conn., Glasgow, Scotland.

FOREIGN PATENTS---A HINT TO PATENTEES.

It is generally much better to apply for foreign patents simultaneously with the application in the United States. If this cannot be conveniently done, as little time as possible should be lost after the patent is issued, as the laws in some foreign countries allow patents to any who first make the application, and in this way many inventors are deprived of valid patents for their own inventions. It should also be borne in mind that a patent is issued in England to the first *introducer*, without regard to the rights of the *real* inventor; therefore, it is important that all applications should be entrusted to responsible agents in this country, who can assure parties that their valuable inventions will not be misappropriated. The population of Great Britain is 31,000,000; of France, 37,000,000; Belgium, 5,000,000; Austria 36,000,000; Prussia, 40,000,000; and Russia, 70,000,000. Patents may be secured by American citizens in all of these countries. Mechanical improvements of all kinds are always in demand in Europe. There will never be a better time than the present to take patents abroad. We have reliable business connections with the principal capitals of Europe. A large share of all the patents secured in foreign countries by Americans are obtained through our Agency. Address

MUNN & CO.,
37 Park Row, N. Y.

☞ Circulars, with full information on foreign patents, furnished free.

NEW PATENT LAW IN CANADA.

By the terms of the new patent law of Canada (taking effect September 1st, 1872) patents are to be granted in Canada to American citizens on the most favorable terms.

The patent may be taken out either for five years (government fee $20), or for ten years (government fee $40) or for fifteen years (government fee $60). The five and ten year patents may be extended to the term of fifteen years. The formalities for extension are simple and not expensive.

In order to apply for a patent in Canada, the applicant must furnish a model, specification and duplicate drawings, substantially the same as in applying for an American patent.

American inventions, even if already patented in this country, can be patented in Canada provided the American patent is not more than one year old.

All persons who desire to take out patents in Canada are requested to communicate with Munn & Co., 37 Park Row, N. Y., who will give prompt attention to the business and furnish pamphlets of instruction free.

Messrs. Munn & Co., have had twenty-five years experience in the business of obtaining American and Foreign Patents for inventors; they have special agencies in nearly all countries where patents are granted. Moderate charges and prompt attention may always be expected.

MUNN & CO., 37 Park Row, N. Y.

Notes & Queries.

[We present herewith a series of inquiries embracing a variety of topics of greater or less general interest. The questions are simple, it is true, but we prefer to elicit practical answers from our readers.]

1.—Smelting Iron with Petroleum.—Has petroleum ever been used as fuel in an iron smelting furnace, and can it be done with good economical results?—J. S.

2.—Cardboard Spools for Ribbons, etc.—What varnish should be used in the making of cardboard winders for ribbons and aces? Shellac dissolved in alcohol is good, but it is too expensive.—A. R.

3.—Coloring Ivory.—I should like to learn, from some of your readers, the method of dyeing ivory billiard balls red.—E. S. H.

4.—Flexible Material to Withstand Heat.—What flexible material will stand the action of fire and heat, the degree of heat not to exceed that of a steam pipe?—L. M. S.

5.—Proportions of Steam Engine.—In a condensing steam engine, what proportion should the condenser bear to the cylinder?—D.

6.—Shoemakers' Ink.—How can I make this preparation? The ink must be of a good black color, and must not thicken or mold. One that can be made easily will be preferred.—L. R.

7.—Soluble Glass and the Teredo.—Will several heavy coats of soluble glass, applied to the bottom of a boat, be a sufficient protection against the worm in salt water that gives so much trouble?—A. L. S.

8.—The Sun and the Zodiac.—Considering the theories prevailing in regard to the earth's orbit, it is perfectly natural to presume that a line drawn from the first point of *Aries* to the first point of *Libra* would cut through the sun's center. Will some one inform me if observations have ever ultimately established the fact? If so, by whom taken, and where may I find an account of the same?—D.

9.—Concrete Building.—Can any one give me information respecting concrete building? What proportion of Roman cement is used to sand, ashes, and stone? What is the average cost of such building per square foot? Would it be practicable for me to carry out such a building with the aid of day laborers only, with carpenters' aid for the woodwork? Are there any persons who make a specialty of such building?—R. W.

Answers to Correspondents.

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

ALL reference to back numbers must be by volume and page.

Nickel Plating.—C. A. S. will find a full description of a process on page 16 of Vol. XXVI. of the Scientific American.

Mending Bellows.—W. S. H. should use the preparation described on page 138, Vol. XXV. of the Scientific American.

Ice Machines.—To W. A. C., of Ga.—We know of no small cheap ice making machines in this country.

Inflammatory Rheumatism.—We could not send A. B. any advice on the subject of this complaint. A properly qualified medical man should be applied to, and nostrums and advertised specifics avoided.

Boiler Scale.—W. M. K., of Ill., does not name the mineral of which the scale consists. Different deposits require different remedies.

Phosphorescent Light.—R. L. Y., of Kansas, will find directions for making a phosphorus light on page 10 of No. 1. Vol. XXVII. of the Scientific American. The cork must be removed occasionally, as the phosphorus will not burn without a supply of oxygen.—D. B., of N. Y.

Ocean Cables.—To H. F. H., query 2, page 416, last volume.—The Atlantic cables lay on the bottom of the ocean, which, along their whole course, is covered with a fine silt well adapted to preserve them from the action of currents which may exist, even at the enormous depth to which they are submerged.—D. B., of N. Y.

Test for Zinc.—To J. B. query 10, page 416, last volume.—The salts of zinc are easily detected with a blowpipe flame. Evaporate some of the water and submit the residue to such heat, using carbonate of soda therewith, and burning them on a piece of charcoal. The metallic zinc will soon appear and will volatilize, becoming reoxidized on contact with the air, and a sublimate will fall on the charcoal. This deposit is yellow when hot, and turns white on cooling. The protonitrate of cobalt, when added, exhibits a fine green color.—D. B., of N. Y.

Electro-silvering German Silver.—Query 5, Vol. XXVI., page 401.—If J. H. will use a small or weak battery, so as to deposit the silver very slowly, it will be very soft and perhaps not need annealing.—S. G. S.

Condenser with Rhumkorff Coil.—To S. G. S., query 18, page 385, Vol. XXVI.—I constructed a Rhumkorff coil with condenser, and had the same difficulty as S. G. S. I think it is caused by the platinum terminals being heated by the spark, and fine particles of platinum are detached and carried from one pole to the other, and the action of the hammer welds the two surfaces together. I would suggest to S. G. S. to make his spring stiffer at the point where the platinum plate is soldered.—F. M., of N. J.

Force of Falling Bodies.—If J. E., query 18, page 385, last volume, will multiply the weight of any falling body, in pounds, by the hight of the fall in feet, he will have the force of the blow in foot pounds. Leaving friction out of the question, the force of the blow of his hammer is precisely equal to the force expended in raising it, namely, 6,000 x 4 = 24,000 foot pounds. Converted into heat, this force would be competent to raise the temperature of one pound of water a little more than 31°, thus: 24,000 divided by 772 equals 31·09 units of heat.—W. H. P., of Iowa.

Recovering Silver.—To C. O., query 1, page 385, Vol. XXVI.—Evaporate the solutions to dryness, burn the paper, and add the ashes; dissolve the lot in dilute nitric acid. Precipitate pure metallic silver by putting a piece of clean copper in the solution. Wash the powdered silver clean with rain water, and redissolve in only enough dilute nitric acid. Put the solution of nitrate to crystallize.—E. H. H., of Mass.

Action of Running Water on Lead Pipe.—To G. G. E., quary 10, page 385, Vol. XXVI.—There is no probability that the water will be at all poisonous from taking up any lead from the pipe, especially if the water is hard.—E. H. H., of Mass.

Phosphorescent Oil.—To H. W. B., query 5, page 385, Vol. XXVI.—Cannot be done. Presence of the air is necessary to phosphorescence.—E. H. H., of Mass.

Eccentric Whiskers.—To A. S. R., query 4, page 385, Vol. XXVI.—These result probably from deficient nutrition, and possibly constitutional ill health. Where the general health is and has been good, the hair in any part does not usually suffer. Clip your whiskers occasionally, and do not use a very alkaline soap. Most, if not all, of the popular hair preparations and hair dyes are most pernicious, and ought to be driven out of the market.—E. H. H., of Mass.

Spectacles.—To J. Y., query 13, page 385, Vol. XXVI.—For short, long, or aged sight, spectacles should be of perfect material, ground to proper focus to suit the peculiar wants of the organ, and thoroughly polished. "Eye sharpeners," as they are called, should never be used without professional advice. The eye is too delicate to tamper with.—E. H. H., of Mass.

Vacuum in Casks.—In reply to X., I cannot see what "the screw motion of the liquor," or "terrestrial gravitation," or the "variation, from the perpendicular, of the plummet suspended from the collar of a deep shaft" have to do with the mere pressure of the atmosphere keeping water in the cask. Molasses having a greater specific gravity than water could not be raised to the same hight as water, nor could the liquid mercury rise so high as molasses. If X. takes a hollow hemisphere and fits (by grinding) to it a hemisphere of iron, and then cleans the surface of each, places them together so as to squeeze out the air, so that it cannot enter between the sides, he will find, on inverting the whole arrangement, that the pressure of the atmosphere will be sufficient to prevent the solid mass of iron from falling out of its cup. The force of gravitation would naturally make the lump fall, but it is overcome by the atmospheric pressure. So in the case of the glass of water with the paper over it; for convenience sake, we may say that the paper contributes to afford to it some of the properties of the solid iron—to wit, impermeability of the air and consequent suspension of the whole. The same principle is applicable to the cask; fill it with water, and have the bung hole accurately covered with thin paper, turn upside down, and the water will not flow out.—E. H. H., of Mass.

Mounting Prints.—To E. D. W., query 11, page 370, Vol. XXVI.—Make a thin size of fish glue or isinglass. Take a good sized flat varnish brush, wet the brush with the size just sufficiently to moisten the surface of the print to the extent of the width of the brush and the whole length of the print. Commence at one side and continue in this way until you have gone over the whole surface. Draw the brush with a light, quick stroke, as closely each time to the part previously wet as possible, without lapping or going twice in a place. When dry, go over it again in the same way, only at right angles to the first stroke. Let this dry, then proceed to mount as follows: Stretch as tightly as it will bear while tacking, to a frame of the required size, a piece of new, smooth fine muslin or factory cloth. Rub over the whole surface of this, with a good paste brush, a sufficient quantity, of well cooked paste made of equal parts of wheat flour and starch, to thoroughly wet the cloth. Lay the print on to it, and, with a piece of clean paper covering it, rub it down, on both back and front side, until smooth and fast. When thoroughly dry, varnish with white copal varnish.—G. W. T., of N. Y.

Recovering Silver from Waste Solutions.—To C. O., query 1, page 385, Vol. XXVI.—Burn the silvered paper in an iron kettle in the open air if no air is stirring, or elsewhere where there can be no danger from fire, putting it on to the flame a little at a time until all is burned. Carefully collect and save all the ashes, as they are precious. Pulverize and mix together 8 parts niter (saltpeter), 4 parts carbonate of soda, 1 part cyanide of potassium; and mix these with 32 parts of the burned paper ashes. Put this last compound, or any part thereof, into a crucible, place this into the fire of a blacksmith's forge, bringing the fire well up around the side of the vessel. Blow the fire carefully until the mass is brought to a boiling, red hot state, shortly after which take it from the fire and quickly invert it that the flux may all flow out before cooling. Pour it anywhere, on or about the forge, where there is dirt, sand, or ashes, so that, for the sake of convenience, the flux will not adhere to the brick or stone work. When cold, which will be in a very few moments, break, with a hammer, the flux away from the center, which you will find to be a button of pure silver. I have never tried the residues from silver washings, but have no doubt they can be reduced in the same way. I have a lot on hand, some precipitated with salt, some with sulphuret of potassium, and some with lime. I shall try these soon and, if desired, will report results. Old chloride of gold solutions, I precipitate with sulphate of iron, managing the residue in this way, often obtaining a button of pure gold as large as a robin's egg. All of these precipitates should be collected by filtration or other convenient method, and dried thoroughly before smelting.—G. W. T., of N. Y.

Recent American and Foreign Patents.

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

Handle Fastening for Traveling Bags.—Morris Schwerin, of Newark, N. J.—This invention is an improvement on his handle fastener, patented July 4, 1871. It consists in forming the fastener of a hollow cylinder which is open at one end and outwardly flanged at both. A corrugated band is passed round the cylinder between the flanges, and its ends are brought together, passed through a slot in a small plate and bent outward. The plate is then riveted to the bag. The end of the handle is then inserted in the cylinder and fastened therein by a screw which is passed through a hole or slot in the band. The two ends of the screw, which goes completely through the cylinder, are allowed room for play either under the corrugation of the hand, or in slots formed therein, as may be most convenient.

Fastening for Jewelry Boxes.—Henry Hoefer, of Brooklyn, N. Y.—This invention consists in improving the cushions or pads of jewelry boxes, and stands so that the wire of the article to be held is secured by a clamp instead of being stuck through the cloth covering. Any approved arrangement of spring jaws may be used for the purpose; that, however, being preferable in which the jaws are opened by pressure on the movable one towards the cushion to which they are attached.

Sled Brake.—Jonathan Moon, of Spring Valley, Minn.—This invention furnishes a simple, convenient, reliable, and automatic sled brake, which is so arranged as to apply the brake whenever the sled tends to move faster than the horses, with a force proportioned to the forward pressure of the sled; it consists mainly in the employment of a roller, which is made square, and to the diagonal corners of which are firmly secured two rods. The lower rod extends through the runners and eccentrically pivots the roller to the runners. The upper rod does not extend to the runners, and to it are pivoted the rear end of the tongue braces. To the upper rod, near its ends, is also pivoted the forward ends of the two connecting rods which operate the dogs or brakes. By this construction, when the sled tends to move faster than the horses, the forward pressure of the sled carries the lower angle of the roller forward, while the tongue presses its upper angle backward, causing the rods to operate the dogs and retard the sled. As soon as the horses again begin to draw, the reverse movements take place, and the dogs are again drawn up into the runners. By another ingenious arrangement, the dogs are held up while backing the sled.

Stove Pipe Shelf.—John Hecker Betts, New Canaan, Conn.—This invention furnishes an improved support for stove pipe shelves, and consists of a base that stands on the top of the stove and supports a vertical bar which is hooped to the stove pipe. From this bar project at intervals short brackets which support pivots on their upper sides, and on these pivots the shelves are mounted.

Door Latch.—William H. Mott, New York city.—This invention furnishes an improved latch, which consists of two overlapping and slotted bolts which are worked by pins and shoulders in connection with a lever of peculiar form so as to be drawn back by the key, and which are kept shut by a double wire spring. It may be placed on either the right or left side of a door which makes it a very convenient lock for cupboards, etc.

Machine for Making Wire Tubes.—William C. Edge, of Newark, N. J.—This invention relates to a new machine for manufacturing, from metal wire or links, continuous fabrics of tubular or other form on a small scale for jeweler purposes, or on larger scales for practical uses of various kinds. The principle of the invention consists in the arrangement of a reciprocating tool which expands the meshes that are put through completed loops of the fabric. By thus being expanded, the meshes become absolute and well connected parts of the entire fabric, and constitute loops for the reception of new meshes, to be expanded in turn. In this manner fabrics of various designs are rapidly and accurately made by automatic process, and cheaply produced. The invention consists, further, in various details such as the mechanism for shaping the wire on its way to the expander, the means of imparting the necessary motions to the several devices of the machine, the arrangement of spring jaws for the reception of the expander and other devices.

Washing Machine.—Anton Hochweber, Troy, Indiana.—This invention furnishes an improved washing machine, which is so constructed that it washes the clothes quickly and thoroughly, and without injuring even the most delicate fabrics; it consists mainly of an oscillating box, to the inner ends of which are attached corrugated blocks. Between these is placed a beater formed of a series of horizontal boards, whose ends fit into the corrugations of the blocks. These boards are fastened to two upright boards, and rollers are attached for the beater to run on. In using the machine, the clothes to be washed are divided into two parcels, which are placed in the box upon the opposite sides of the beater. A sufficient amount of water and soap are then put in, and the box is oscillated upon its pivots, the beater passing from end to end of the box and compressing the clothes between it and the blocks alternately. As the beater moves in either direction, the water rushes through the spaces between the horizontal boards upon the clothes in the rear of the beater, and assists in washing them.

Top for Heating Stove.—Harry Whittingham, New York city.—This invention has for its object to supply cylindrical and other stoves with ornamental sheet metal tops, and thereby reduce their expense and weight without in the least diminishing their usefulness or durability. Heretofore, cylindrical and other stoves with ornamental tops had them made of cast iron. The improvement consists in making such tops of sheet metal, and stamping or spinning the same into the requisite raised or ornamental form.

Car Coupling.—Horace W. Barnum, Omaha, Nebraska.—This invention furnishes an improved car coupling, which will couple itself as the cars are run together, and uncouple itself should one of the cars turn over in either direction; it will couple cars of different hights with the same facility as though they were of the same hight, and admits of their being coupled with the ordinary coupling link and pin when required. The details of the construction would not be understood from a verbal explanation.

Car Coupling.—Charles Layton, Matawan, N. J..—This invention relates to a new and useful improvement in couplings for railroad cars, and consists in the construction following: Under the draw head of the car truck projects a hanger, to which is pivoted at its center a cross bar or lever. To the forward end of the lever is pivoted the coupling pin, and to the rear end the uncoupling box. Both pass upward through the draw head—the pin sufficiently far to engage with the coupling link, and the bar right through so that it may be operated from above. A spiral spring is attached to the lever and draw head in such a manner as to hold the coupling pin in place when in use. The coupling link is simply a bar with holes to receive the coupling pins. When the cars are uncoupled, the bar is held up by means of a notch therein, which hooks on to the top of the draw head. When two cars come together to be coupled, the end of the coupling link strikes the bar and forces it from the top of the draw head, when the coupling pin is thrown up by the recoil of the spring and the cars are coupled automatically.

Eye Glass.—John Cadman, Chatham Village, N. Y.—This invention relates to a new manner of arranging the springs on eye glasses, with the object of introducing a more rational mode of holding them to the nose than is at present in vogue. It consists in setting the glasses at nearly a right angle to the spring, so that the latter clamps the nose directly between the eyes at the thin part, and not at the lower fleshy part, as heretofore, which more or less interferes with the process of breathing.

Shield for Corns.—Benjamin Brandreth, Sing Sing, N. Y.—This invention relates to a new arrangement of a plaster for application to corns or bunions; its object is, by a judicious combination of parts, to obtain the requisite soothing or curative and adhesive properties. It consists in the combination of an annular or other shaped porous or healing plaster with an adhesive plaster, the latter serving to retain the former in place and insure its effectiveness.

Stereotype Block.—William A. Pinnell, New York city.—This invention furnishes an improved block for stereotype plates, which is so constructed as to avoid the loss of time now unavoidable in making up a form of plates on a printing press, on account of the irregularity in the thickness of the plates. The block is so constructed that the plates, of whatever size, can readily be secured to it by means of swiveled screw clamps and catches, or screw hooks which are screwed into holes in the face of the block as may be necessary to conform to the size of the plate. Under the block are placed wedges, which are worked by screws, and by means of which the plates are leveled.

Piston Rod Packing.—John W. Lynch, Richmond, Va.—This invention furnishes an improved packing which is adaptable to new engines or to those now in use. It is formed by two sets of conical sectional rings of metal, hard wood, or any other suitable substance. The sections overlap so as to make steam tight joints, and one of the sets is smaller than the other, in advance of which it is kept by projecting studs. In fitting new engines, the stuffing boxes may be bored conically to receive the packing; and in applying it to those in use, a bush provided with a conical bore is fitted into the stuffing box. The division between the sets of packing forms a steam tight oil space, into which oil may be poured through a hole in the stuffing box.

Horse Stall Floor.—George W. Gordon, of Charleston, Mass.—This is an improvement on the stall floor of Z. G. Garlick, which was patented July 21. It consists, mainly, in so arranging the secondary floor as to constitute a close box or framing for the hinged part, thereby facilitating the cleaning of the stall, preventing draft of air upon the animal, and producing other advantages.

Bedstead Fastening.—Leander May, Columbus, Ga.—This invention consists in an improved method of connecting the rails and posts of bedsteads. The end of the rail is provided with one or more hooks of peculiar formation, which are let into mortises in the rail and project about an inch from the end. These mortises are covered by pieces of wood which are glued to the rail. The face of the post has a mortise for each hook of sufficient size to admit the projecting hook of the rail and allow of a downward movement after its insertion. A fastening plate is placed in each mortise of the post. These plates are made of iron, with a mortise or slot of a length equal to or about equal to the mortise in the post, and of a breadth at one end equal to the post mortise, and less at the other end, so that, when it is placed in the mortise, a part projects into the mortise in the post. It is with this part that the hook of the rail engages. The plates are inserted into the posts through slots cut (by a circular saw or otherwise) on the inside at right angles to the mortises. When they are inserted the slots may be filled with strips of wood to exclude vermin.

Sewing Machine Cover.—Dorcas C. Junett, Troy, N. Y., assignor to herself and Henry J. Swart, of same place.—This invention furnishes a new oil protecting cover for the Wheeler & Wilson sewing machine. The improved cover is made S shaped in cross section, and its front edge bears against the back edge of the sewing machine top plate. The back part of the cover is raised and arched so as to fit over the working rock shaft of the machine. At the under side of the cover are projecting legs which support it on the table on which the machine is secured. These legs have inwardly bent lower parts which fit against the lower plate of the machine. A ledge at the side of the arched upper part of the cover supports it on an end pin. By means of these supports the cover is made self sustaining, and, when applied, it at once fits its proper place. A spout or nozzle projects forward from its upper part at the right hand side to guide the thread and prevent it falling against the oiled part of the shaft.

SPOOLING SILK.—Henry L. Brown, of Middletown, Conn.—In spooling sewing silk for market it has been the practice to estimate the weight, of the silk on the spools, by judging the size and by weighing batches of the spools from time to time, and taking the average; but the most skillful persons fell considerably short of that accuracy which ought to be attained in this matter, for it is highly desirable that each spool shall have exactly the quantity, by weight, it is designed to have, and no more. In this invention this object is attained by employing a counterbalance in connection with the spooling apparatus. In one pan are placed the bobbins from which the silk is to be drawn; and in the other a sufficient number of weights, each of which is equal to the weight of silk intended to be wound on each commercial spool, is placed to balance it. One of the weights is now removed and the silk wound off one of the bobbins on to the commercial spool until the remaining weights balance the remaining silk. The spool, which now has its proper weight of silk, is removed, and another weight is withdrawn, when the process is repeated with another spool. This is continued until the silk is all wound off the bobbins.

ELECTRIC CLOCK.—Vitalis Himmer, of New York city, assignor to himself and Gustave Autenrieth, of same place.—This invention relates to several improvements in the mechanism for actuating clockwork by electricity, and is a perfection of the principles developed in the invention patented by him January 4, 1870. It consists, first, in an improvement of the mechanism for regulating and sustaining the pendulum vibration, secondly, in a new means of converting the vibratory motion of the pendulum into rotary motion; thirdly, in a new attachment to the arbor of the second hand of the clock, whereby, once during every revolution of said arbor, or at shorter intervals, metallic connection is established between two conductors of electricity that lead to a second or secondary clockwork, actuating the same when the circuit is established, and finally, in the arrangement of the secondary clock, and in a new pawl mechanism for insuring exactness of motion.

FASTENING FOR RETORT LID.—George Stancliff, of New York city.—This invention provides a means for securely fastening the lids of gas retorts by which the closing can be rapidly effected. At present the lids are usually closed by means of screws. Considerable time is required in opening and closing them, and more or less gas is consequently lost. In this improvement the retort lid is provided with two ears that project from its ends. For the support of one of the ears a fixed hook is secured to the mouth of the retort, while a sliding hook for the support of the other ear is fitted through the flange of the retort, and provided with a cam lever at its inner end. When the lever is swung to bear with its eccentric part against the flange, the hook is drawn back and firmly holds the lid against the retort. When the lever is swung up the lid will be instantaneously loosened, and can be removed.

LATHE FOR TURNING IRREGULAR FORMS.—Eli K. Wisell, of Warren, Ohio.—This invention relates to certain improvements on the spoke machines for which patents were granted to the inventor 3d of March, 1863, and 14th of January, 1868. The object of the present invention is, first, to provide adjustable rests for the spokes or things under operation in such a manner that the same are only supported behind the cutter head in whichever direction they may be moved longitudinally. It consists in providing two vibrating supports—one on each side of the cutter head—and in connecting their ends with a pivoted beam, which is oscillated to raise the supports alternately, and thus insures the aforementioned object. Another object is to provide a balance for the adjustable reciprocating pattern frame, whereby the same is held horizontally to keep the pattern and spokes or things under operation in the right position, and is also eased off the pattern to prevent the rapid wear of the same and of the roller with which the pattern is in contact. This second object is attained by the arrangement of a horizontal rail, which supports the front of the pattern frame, and is secured at the ends to levers that always keep it in a horizontal position, but are weighted to crowd the rail upward whenever there is an opportunity for so doing, by the elevation of the pattern frame.

GRADING PLOW.—Adam P. Hopkins, of Bentleyville, Pa.—This invention consists in a triangular grading or scraping plow with certain attachments, by means of which it is readily shifted to the right or left, or left to turn both ways alike. A long bar is pivoted to the scraper at the apex of the inner angle formed by the two sides, and extends rearward a considerable distance beyond the base, where it is provided with a star or other wheel, with points adapted to roll along the ground. This bar may be shifted from side to side of the scraper, and held at either side by a pin. Each of the rear corners of the scraper has a hook attached, and a draft chain is provided which is attached by one end to the apex of the scraper and by the other to either corner when required. If it is desired to turn the earth to the right, the chain is hooked on to the right side, and the bar adjusted to the left. By reversing the chain and bar, the plow turns the furrow to the left. To have the plow turn both ways, the chain is not engaged with either hook and the bar is allowed to hang by the pivot at the angle of the sides.

WATER WHEEL.—Walter Forward, of Battle Creek, Cal.—This invention furnishes an improved water wheel which is so constructed as to utilize almost the entire power of the water. The wheel is attached to a shaft which passes out through the side plates of the wheel case, and is supported and connected with the machinery to be driven in the ordinary manner. The face of the wheel is channeled or has flanges formed upon its side edges to form a passage way for the water. Buckets, two or more of which may be used, are placed in radial slots in the wheel, which slots extend out through the flanges so as to fully support the ends of the buckets. The escape of water through the slots of the flanges around the ends of the buckets is prevented by the plates, which are attached to the flanges in such a way as not to interfere with the movements of the buckets and not to prevent their ends being fully supported. Upon the rear ends of the end edges of the buckets are formed projections or pins, which project at the sides of the wheel and enter grooves in the inner surfaces of the side plates. The grooves upon the forward side of the wheel, where the buckets are exposed to the full action of the water, are curved upon the arc of a circle. The grooves upon the rear side of the wheel, where the water is received, are curved upon the arc of an ellipse, the entire grooves forming a continuous curve, so that the projections or pins of the buckets move smoothly and easily through them. By this construction of the grooves, as the buckets leave their discharge opening they are drawn inward, so as to pass the projecting bottom of the water box, when they are again projected to receive and be acted upon by the water. The water is confined in the channel of the wheel from its entrance to its discharge points, by a curved plate or casing, so that the buckets are under the full pressure of the water from its entrance to its discharge. The forward edge of the water box bottom is so formed as to fit into the channeled face of the wheel, and the wheel is so arranged in connection with said bottom as to receive the water upon the rear side of the wheel, above its center, so that the wheel is always operated under the full pressure of the head of water.

MACHINE FOR POLISHING THE EYES OF NEEDLES.—Rosewell Thompson, of Waterbury, Ct.—In this improved needle eye polishing machine, a series of threads is drawn from spools on a spool stand through a guide plate, and two clamping bars hold the threads from unwinding further from the spool till required, and also hold them at the proper distances apart. A large quantity of needles are then strung on these threads from which to draw from time to time the batches to be polished, which consist of one on each thread. When one batch is selected and moved forward on the threads to where they are to be worked, a second clamp is applied to the threads, between them and the reserve stock behind, to keep them separate, to keep the threads parallel, and also to hold the threads in case any break while the polishing is going on, and thus prevent the reserve stock from escaping off the threads, as would be the case if the threads were allowed to fall in case of breaking. The ends of the threads extend considerably beyond the clamps and pass through a notched guide, which keeps them parallel, and beyond this they are temporarily secured in a detachable clamp. The row of needles to be polished hang downward from the threads, and are confined at their lower ends in a clamp, which is connected to a reciprocating frame, worked by hand or other power, which moves the eyes back and forth along the threads. The threads are charged with the emery or other polishing medium, and the clamp has a handle by which it is taken in the hand to manipulate it while in motion so as to cause the polishing threads to act on all parts of the oval end walls of the eyes. The work is thus accomplished as well as when all the motions are imparted by the hands.

PLOW.—Henry Gillette, of Millville, N. Y.—In this invention improvements are made in the mode of attaching subsoil plows to the surface plows by which the depth of cut of the lower plow is readily controlled and adjusted. The subsoil plow is arranged at the lower end of a vertical bar which has a series of notches in its upper front side, and an eye on the top. These notches are made of a size to engage with a cross bar, which is made fast to the handles of the surface plow. When the bar is adjusted to the required notch, the two are held together by means of an arm which is linked to the bar below the notches and fastened in the eye on the top by means of a pin.

HARVESTER.—Christopher Lidren, of La Fayette, Ind., assignor to himself and R. Jackson, of same place.—The improvements of the present invention are applicable to the reaper which was patented by the same inventor March 30, 1869, and to the mowing machine which was patented by him September 29, 1868. They can also be applied to reapers and mowers of other construction, and appear to be of a valuable nature. They relate to the balancing of the frame, etc., the adjustment of the cutter bar, the method of working the rake automatically, and various other matters which would require too much space to explain in detail.

STEM-WINDING WATCH.—Jules A. Borel, Paul Courvoisier, and Jean Courvoisier, of Neufchatel, Switzerland, assignors to Florian Quinche and Charles L. Krugler, of New York city.—This invention relates to a new arrangement of stem winding watch, whereby the setting apparatus is automatically thrown out of gear whenever the face of the watch case is closed or the stem pushed inward. It consists in the arrangement of a peculiar slide, which actuates the clutch lever for throwing the winding or setting mechanism into gear and which has a wedge shaped attachment for contact with the fastening catch of the case. When the catch is crowded in, either by the closing of the case or by the pushing in of the stem, the slide is moved and the spring clutch lever liberated to connect with the winding mechanism.

DESK LID PROP.—Henry R. Russell, of Woodbury, N. J., assignor to himself and Isaac S. Russell, of New Market, Md.—This invention furnishes an improved prop for the desk lids of school and other desks. The prop, which is pivoted both to desk and lid, consists of two arms joined by a pivot running in a slot, and is so arranged that when pulled out straight by raising the lid it becomes fixed in that position by the engagement of a notch in one arm with a pin on the other. By the construction, when the lid is raised to its full extent and lowered quickly, the pin drops into the notch and securely supports the lid. If the lid be raised sufficiently to relieve the catch, and lowered slowly, the inclination of the prop will allow the attraction of gravity to act upon the arms and cause them to drop or bend so much that the pin will not set itself in the notch, which allows the lid to be lowered or closed. The prop thus works automatically and enables the lid to be operated with one hand, leaving the other hand free.

SHAFT HANGING.—William J. Kennedy, of Victory Mills, N. Y.—This invention relates to a new self adjusting shaft hanging, which is of such construction that the shaft is held secure and prevented from falling if one of the supporting pivots breaks. It consists, principally, in extending one of the screws that serve as pivots for the bearing through a swivel holder, and through a slot in the hanger, so that it constitutes an additional means of safety for the parts supported by the hanger, and also limits the horizontal vibration of the swivel holder, the slot being of such diameter and form as to allow of the necessary vibratory movement of the screw therein.

WIND WHEEL.—Henry J. Campbell, of Virginia, Ill.—This invention furnishes an improved wind wheel which is designed especially for operating a pump. The arms which carry the wings are attached to a hollow shaft, and the wings are pivoted to them so that they may be turned with their edges more or less to the wind. Their forward ends are connected by ropes to insure their all moving together, and two of them are connected by rods and other appliances with a rod which passes back through the hollow shaft. By means of this rod the wings are adjusted as may be required; and a bucket, which receives the overflow from the pump tank, is so arranged in connection therewith as to stop the wheel by its weight when the tank is full. Other appliances of value are attached to the apparatus.

SIDEWALK.—John Moffet, of New York city.—This invention consists in providing the surfaces of sidewalks, pavements, or stair plates, whether of metal, wood, or stone, with projecting blocks or pads of soft vulcanized rubber, which are fitted into sockets or holes formed in the material. These are so disposed as to receive the pressure of the feet when walking and prevent slipping.

SAW FILING MACHINE.—Thomas M. Chapman, of Oldtown, Maine.—This invention consists in an arrangement of driving mechanism for imparting reciprocating motion to the rod or frame by which the file is actuated, which is calculated to simplify and cheapen the construction, improve the action, and economize space. It is a further improvement in the saw filing machine illustrated on page 182 of our volume XXVI, and consists more particularly in constructing the connecting bar so that it has considerable elasticity in the direction of its vibration, which direction is the same as that of the movement of the file holding frame. In this view, it is made of two bars of tough, straight grained wood, or metal which possesses some degree of spring, and the bars are connected tog ther by bolts, and maintained, by blocks or long washers placed between them, at a distance apart suitable for forming connections with the wrist pin of the crank shaft and the connecting pin of the file frame. Other advantages incident to the present construction were pointed out in the article referred to.

CAR BRAKE.—Stephen E. Harrison, of New Haven, Conn.—This invention relates to a new mechanism for applying the brakes to the wheels of steam or horse cars; and consists principally in connecting the brake beams by a toggle lever, to the middle joint of which are attached chains which extend to the ends of the car, respectively, where they are fastened to shafts. Pinions on the shafts mesh into sliding racks that can be forced down by the driver or attendant so as to turn the shafts and wind the chains upon them. A spring serves to keep the toggle levers distended, and thereby holds the brake shoes away from the wheels. Whenever one of the chains is wound around its shaft by the depression of one of the racks, the toggle joint is raised and the toggle levers somewhat contracted, so as to draw the brake beams toward each other and thereby apply the brakes to the wheels. By this arrangement a very slight motion of the rack suffices to apply the brakes with great power. Immediately on the rack being released, the spring again distends the toggle levers, carries the brakes off the wheels, and unwinds the chain from the shaft.

SUCKER ROD JOINT.—Addison Crosby, of Westfield, N. Y.—This invention relates to a new means of fastening the ends of wooden rods in the metallic sockets by which the same are connected for use on pumps and other machinery; and consists principally in the employment of wooden wedges fitted through the sockets and rods, the apertures in the sockets being made larger than the wedges to permit the requisite spreading of the wood of the latter.

BEE HIVE.—Samuel D. McLean, of Sunny Slope, Tenn.—This invention furnishes an improved bee hive which is very simple in construction. It is strong and durable and enables the hive keeper to inspect and control the bees readily. A prominent feature is a piece hinged to the front of a sliding bottom board, which is so arranged as to form, when open, an alighting place for the bees, and, when shut, to fit flush with the side of the hive and close the entrance.

BUTTER WORKER.—George Ruston, of Freeport, Ill.—This invention furnishes an improved machine for working butter, which is simple in construction, convenient in use, and effective in operation, working the butter in about the same manner as when worked by hand. It consists in the combination of a round roller and a fluted one, geared together, between which the butter is worked, and a scraper by which the butter is kept from sticking to the fluted roller.

SCROLL SAWING MACHINE.—Samuel Ide, of Medina, N. Y.—This invention relates to a new coupling for the pitman and lower cross head of a reciprocating saw, and to a novel connection of the saw and cross head, which facilitate the attachment and removal of the saw blade, and insure a reliable joint for the upper end of the pitman where it is fastened to the cross head. It consists, first, in a peculiar arrangement of the upper part of the cross head for the reception of the saw; and secondly, in the use of a thimble and conical screw connection for the pitman.

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DESIGNS PATENTED.

5,937.—BADGE.—G. F. Crook, Cambridge, Mass.
5,938.—SHUTTER BAR.—W. Gorman, New Britain, Conn.
5,939.—BELL CRANK AND ROSE.—W. Gorman, New Britain, Conn.
5,940.—RECLINING SETTEE.—M. D. Jones, Boston, Mass.
5,941.—PICTURE.—E. Metcalf, Norristown, Pa.
5,942.—CIGAR BOX.—G. Moebs, J. B. Thiesen, Detroit, Mich.
5,943.—SKATING MUFF.—R. M. Seldis, New York city.

TRADE MARKS REGISTERED.

861.—CEMENT.—Black Diamond Cement Company, Louisville, Ky.
862.—CEMENT.—Falls City Cement Company, Louisville, Ky.
863.—VARNISH.—C. F. Hollwede, New York city.
864.—GLOVES.—Kutter Luckemeyer & Company, New York city.
865.—CLEANSING POWDER.—M. H. M. Magan, Plainfield, N. J.
866.—FERTILIZER.—Southern Fertilizing Company, Richmond, Va.
867.—TIN LINED LEAD PIPE.—Colwells, Shaw & Willard Manufacturing Company, New York city.
868.—SCHOOL BOOKS, ETC.—University Publishing Company, New York city.

APPLICATION FOR EXTENSION.

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

21,102.—SEED PLANTER.—J. D. Willoughby. July 17, 1872.

EXTENSIONS GRANTED.

20,411.—MACHINE FOR MAKING HORSESHOES.—C. H. Perkins.
20,519.—TAILOR'S PRESSING MACHINE.—L. B. Storrs.
20,527.—PLANING MACHINE.—J. A. Woodbury.
20,538.—HOUSE BELL.—J. Barton.
8,778.—MACHINE FOR PRINTING FLOOR CLOTH.—S. Savage.

EXTENSIONS REFUSED.

20,539.—CUTTING GLAZIERS' PINS.—J. G. Baker.
20,566.—HANGERS FOR SHAFTING.—W. Johnson.
20,571.—DOOR LOCK.—J. R. Marston.

Value of Extended Patents.

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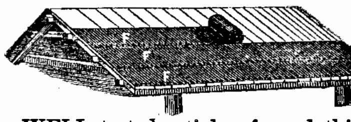

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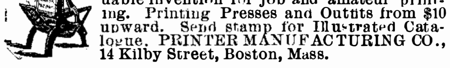

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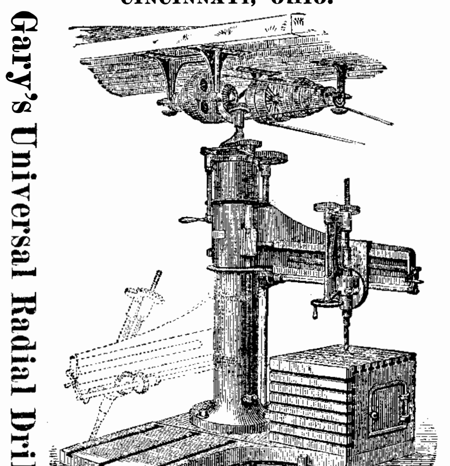

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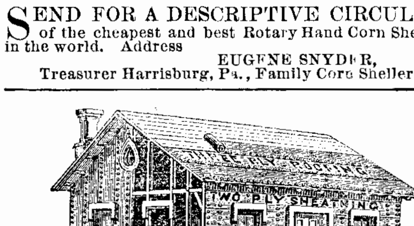

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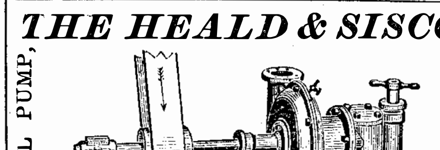

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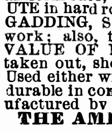

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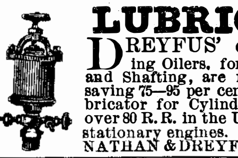

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