Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, NEW YORK.

O. D. MUNN. A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year postage included **$3 20**
One copy, six months postage included **1 60**

Clubs.—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five subscribers at $3.20 each; additional copies at same proportionate rate. Postage prepaid.

Remit by postal order. Address

MUNN & CO., 361 Broadway, corner of Franklin street, New York.

The Scientific American Supplement

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, $5.00 a year, postage paid, to subscribers. Single copies, 10 cents. Sold by all news dealers throughout the country.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year postage free, on receipt of *seven dollars*. Both papers to one address or different addresses as desired.

The safest way to remit is by draft, postal order, or registered letter.

Address MUNN & CO., 361 Broadway, corner of Franklin street, New York.

Scientific American Export Edition.

The SCIENTIFIC AMERICAN Export Edition is a large and splendid periodical, issued once a month. Each number contains about one hundred large quarto pages, profusely illustrated, embracing: (1.) Most of the plates and pages of the four preceding weekly issues of the SCIENTIFIC AMERICAN, with its splendid engravings and valuable information; (2.) Commercial, trade, and manufacturing announcements of leading houses. Terms for Export Edition, $5.00 a year, sent prepaid to any part of the world. Single copies 50 cents. ☞ Manufacturers and others who desire to secure foreign trade may have large, and handsomely displayed announcements published in this edition at a very moderate cost.

The SCIENTIFIC AMERICAN Export Edition has a large guaranteed circulation in all commercial places throughout the world. Address MUNN & CO., 361 Broadway, corner of Franklin street, New York

NEW YORK, SATURDAY, JUNE 7, 1884.

REMOVAL.

The SCIENTIFIC AMERICAN Office is now located at 361 Broadway, cor. Franklin St.

Contents.

(Illustrated articles are marked with an asterisk.)

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 440,

For the Week ending June 7, 1884.

Price 10 cents. For sale by all newsdealers

THE STATE OF MANUFACTURING.

Visits during the first half of May to the manufacturing towns in four counties of Connecticut show a condition of business activity much more favorable than the general reports in the newspapers, taken from all parts of the country, would seem to justify. Perhaps much of this difference is to be attributed to the varied character of the industries in those portions of the one State visited. Machine tools, guns, sewing machines, machine screws, bicycles, small tools, builders' hardware, bench hardware, nuts and bolts, screw taps and dies, butt hinges, pumps, drop and lever presses, steam, water, and gas fittings, and many other branches of productive work of which the general public are in continual need are in the usual demand. In no one department of productive industry is there evidence of a permanent falling off in demand, although there is a tendency to crowd down the prices. So, on the other hand, there is no unusual demand for the productions of any department. In some instances the hours of labor have been temporarily shortened; in others (two) the number of men has been curtailed. But in the first instance a return to the original full time is shortly expected, and in the other the men were discharged because of a glut in the specialties they produced. One establishment that in early spring shortened its hours of labor is now working overtime in its most important departments.

Some annoyance has been caused by the debates and delays in Congress on the matter of a tariff on foreign productions as affecting home manufactures, and some of the manufacturers attribute the falling off of orders to the uncertainty which this state of Congressional business produced. But there is a better feeling than there was during the pending and threatening of the Morrison bill, and it seems possible that the old notion of a presidential election year proving to be one of general business depression may be shown to be unfounded.

PORCELAIN HEADED NAILS.

One of the familiar illustrations of the benefit of rapid machinery in producing articles of use combined with elegance, is in the manufacture of the ornamentally headed nails used for picture hanging and similar purposes. The heads of these nails are of porcelain or glass, held in a gilt brass setting, and the shanks are of iron wire. The heads are moulded from opaque porcelain or transparent glass, and the settings are made from sheet brass in the dies of a press. A disk of brass is cut from a sheet, and a small hole made in its center. The disk is drawn down through the center of the die, forming a tube-like neck which is afterward tapped in a machine, thus forming a nut for the reception of the threaded head end of the wire shank.

The press forms the setting into a cup shape for the glass or porcelain head, and this, when inserted, is held in position by having its edges turned in over the head by a press. The wire shank is pointed in a rotary press which draws the wire down to a point in dies or scores that form the pointed portion four sided. On two of these sides a film or sprew is left that is removed by a trimming press.

The formation of the screw thread on the other end of the wire shank is somewhat interesting. The thread is not cut with dies—in fact, it is not cut at all. It is rolled up from the material of the shank, and the threaded portion becomes larger than the original wire. There is a fixed die in a press, the die having been milled on a slant to represent the V-threads of a certain pitch. The die is perfectly flat, and these scores are simply cuts of a V-form running diagonally across it. Another die exactly like the fixed one is attached to a reciprocating arm, so as to traverse across the fixed die. Between these dies the shank is passed under pressure, and the result is a perfect thread at the rate of at least one hundred gross per day, the only attendant being a boy.

SOFTENING AND HARDENING CAST IRON.

Questions have lately been asked as to the possibility of altering the texture or changing the qualities of cast iron by heating and chilling. In the respect of resistance to the superficial changes which are induced on steel by heating and sudden chillings, cast iron stands alone. It is amenable to the gradual influences of heat, but it will not contract nor harden, like steel or wrought iron, under sudden changes from heat to cold. And yet hard cast iron may be annealed, as it is done daily by tons, the heat being supplemented by the pyrogenous oxide of iron, the hot oxidized scale, such as is seen at the base of the blacksmith's anvil. It can be annealed also, if the articles are small enough, by being heated in a bituminous coal fire, and then buried until cool in a bed of the coal siftings. This sort of annealing is entirely unlike that for hard wrought iron or obdurate steel, as in these cases only clean charcoal is to be used, any taint of sulphur being a source of injury. But in annealing hard cast iron the softening qualities of the sulphur contained in bituminous coal is what is required. Some of the most intractable specimens of cast iron, no larger in diameter than a pipe stem, that refused to yield in a genial charcoal fire when packed with bone, lime, and charcoal, softened to usable condition by one heating in bituminous coal.

As to hardening of cast iron there is no ordinary process that is generally convenient, except that of casehardening. In this the cast iron article should be polished as well as finished—the surface being made as homogeneous as can be—so that the flux of casehardening be given as large a surface for action as possible; for the composition of cast iron is a honeycomb instead of a solid; and it is not even a series of layers of fibers, as is wrought iron, or of a network of fibers, as is cast steel, but it is a mass of material of which pure iron itself is not always the largest part. Recent improvements, however, have given the pure metal a preponderance over the foreign palpable matter and the air spaces. But this constitution is not common.

Even heating is necessary to caseharden cast iron; and yet the heat must be less than that allowed for wrought iron and low steel, for at much less than the white heat for wrought iron or the "high heat" for carbonized steel, the cast iron would disintegrate. The cast iron should be heated to a soft red heat and then sprinkled with powdered prussiate of potash and sal ammoniac in proportions of two of prussiate and one of sal ammoniac, and then immediately plunged into a cold water bath. It will not do, in the matter of casehardening cast iron, to return the iron to the fire, or to use the flux as a paste. Put it on as a powder, and plunge immediately into cold water.

The Petroleum Industry.

From recent statistics it appears that there are 20,000 producing oil wells in Pennsylvania, yielding at present 60,000 barrels of oil a day. It requires 5,000 miles of pipe line and 1,600 iron tanks, of an average capacity of 25,000 barrels each, to transport and store the oil and surplus stocks. There are now nearly 38,000,000 barrels of oil stored in the region in tanks. This oil would make a lake more than one mile square and ten feet deep. The money actually invested in petroleum production since 1860 is estimated to be more than $425,000,000, of which $200,000,000 was capital from New York city. Since 1880 more than $12,000,000 has been used in building iron tanks, and nearly as much in pipe lines, all by one corporation. The tanks cost on an average $8,000 each. A 35,000 barrel tank is 90 feet in diameter and 28 feet high; 100 tons of iron are used in constructing one. The annual loss from lightning by the use of iron tanks is very great, as they form an attractive path to earth for electricity.

The speculative transactions in petroleum represent more than $400,000,000 annually. The lowest price crude petroleum ever brought was 10 cents a barrel, in 1861. In 1859, when there was only one well in existence, Colonel Drake's Pioneer at Titusville, the price was $24 a barrel. Besides the 5,000 miles of pipe line in use in the oil regions, there are in operation 1,200 miles of trunk pipe lines connecting the region with Cleveland, Pittsburg, Buffalo, and New York, and lines building to Philadelphia and Baltimore. In the line between Olean and New York 16,000 barrels of oil are transported daily. These lines are all the property of the Standard Oil Company, except one between Bradford and Williamsport, Pa. The Standard employs 100,000 men. The product of its refineries requires the making of 25,000 oak barrels of 40 gallons each, and 100,000 tin cans holding 5 gallons each, every day The first American petroleum ever exported was in 1862. Charles Lockart, of Pittsburg, sent nearly 600,000 gallons to Europe in that year, and sold it for $2,000 less than the cost of transportation. In 1883 nearly 400,000,000 gallons were exported, for which $60,000,000 were returned to this country.

Simple Intensifier for Gelatine Negatives.

The mercury intensifier for gelatine plates, now largely used by photographers, has been somewhat improved by Mr. H. J. Newton quite recently.

The advantages claimed for it are its simplicity, speed, and in giving to the negative a good color. The intensifier, combining mercury, iodide of potassium, and hyposulphite of sodium, sometimes gives to a negative a yellow color, which makes it a slow printer. The solution will not keep well, but soon precipitates.

Mr. Newton's formula overcomes these objections. He first takes 10 grains of bichloride of mercury, pulverizes it in a mortar, and dissolves in 10 ounces of water. He next dissolves 190 grains of iodide of potassium in 3 ounces of water, and gradually pours the same into the mercury solution. A red precipitate occurs, but will be redissolved when the whole amount of iodide of potassium has been added.

The 13 ounces of concentrated solution thus formed is now diluted by the addition of 24 ounces of water. The intensifier will keep clear for a long time, and so retain its strength.

To intensify, Mr. Newton pours a sufficient quantity of the intensifier into a tray, and immerses in the same the dry or dried negative. The action of the intensifier takes place in a few seconds, and the intensification is completed in two or three minutes.

The plate is then washed and immersed for a few seconds in a very dilute solution of hyposulphite of sodium, again washed, and dried. Negatives in which there was very little detail in the shadows have been very easily brought up to good printing density with this intensifier. It is essential that the hyposulphite of soda shall be eliminated from the plate before intensification. To avoid an extended washing for that purpose, Mr. Newton quickly dissolves out the hypo from the film by pouring over the latter, after fixing, a solution of 5 to 10 grains of nitrate of lead to the ounce of water.

Its action is easily observed by the formation on the film of a milky precipitate, which may be easily washed off.

AMONG the recent patents is one for the combination of a holy water font and a poor box.

To Cure a Damp Cellar.

A correspondent inquires of the editor of the *American Architect* what remedy he would suggest for curing a damp cellar.

The difficulty to be overcome, presents the questioner, in a new house is the wet cellar. Conditions present, concrete not strong enough to resist the hydraulic pressure through a clay soil. No footings under wall (which are of brick). No cement on outside of wall. The water evidently, however, forces its way through the concrete bottom.

(*a*) Will reconcreting (using Portland cement) resist the pressure of water and keep it out?

(*b*) If not, will a layer of pure bitumen damp-course between the old and new concrete do the work?

(*c*) Will it do any good to carefully cement the walls on the inside with rich Portland cement, say 3 feet high, to exclude damp caused by capillary attraction through the brick wall?

In reply to the above queries the editor gives the following hints, which are equally applicable to builders of new houses as to those occupying old houses with damp cellars:

It is doubtful whether even Portland cement concrete would keep back water under sufficient pressure to force it through concrete made of the ordinary cement. The best material would be rock asphalt, either Seyssel, Neufchatel, Val de Travers, Vorwohle, or Limmer, any of which, melted, either with or without the addition of gravel, according to the character of the asphalt, and spread hot to a depth of three-quarters of an inch over the floor, will make it perfectly water tight. The asphalt coating should be carried without any break 18 or 20 inches up on the walls and piers, to prevent water from getting over the edge; and if the hydrostatic pressure of the water should be sufficient to force the asphalt up, it must be weighted with a pavement of brick or concrete. This is not likely to be necessary, however, unless the cellar is actually below the line of standing water around it.

This, although an excellent method of curing the trouble, the asphalt cutting off ground air from the house, as well as water, will be expensive, the cost of the asphalt coating being from 20 to 22 cents a square foot; and perhaps it may not be necessary to go to so much trouble. It is very unusual to find water making its way through ordinary good concrete, unless high tides or inundations surround the whole cellar with water. If the source of the water seems to be simply the soakage of rain into the loose material filled in about the outside of the new wall, we should advise attacking this point first, and sodding or concreting with coal tar concrete, a space 3 or 4 feet wide around the building. This, if the grade is first made to slope sharply away from the house, will throw the rain which drips from the eaves, or runs down the walls, out upon the firm ground, and in the course of two or three seasons the filling will generally have compacted itself to a consistency as hard or harder than the surrounding soil, so that the tendency of water to accumulate just outside the walls will disappear; while the concrete, as it hardens with age, will present more and more resistance to percolation from below.

For keeping the dampness absorbed by the walls from affecting the air of the house, a Portland cement coating may be perhaps the best means now available. It would have been much better, when the walls were first built, to brush the outside of them with melted coal tar; but that is probably impracticable now. If the earth stands against the walls, however, the cement coating should cover the whole inside of the wall. The situation of the building may perhaps admit of draining away the water which accumulates about it, by means of stone drains or lines of drain tile, laid up to the cellar walls, at a point below the basement floor, and carried to a convenient outfall. This would be the most desirable of all methods for drying the cellar, and should be first tried.

Sulphuric Acid Tests.

As we all know, this acid is one of the most commonly used for technical purposes; it also forms an important part in the manufacture of carbonic acid gas. The large and constantly increasing consumption renders it necessary that it should be of a pure nature. Ingredients which happen to be found in sulphuric acid during the process of manufacturing may not be of any consequence for some purposes, but will for others. It should not contain any arsenic, subnitric or sulphurous acid, nor any chlorine; which ingredients act more or less injuriously.

For carbonic acid gas we require, without doubt, a product which should be entirely free from the above ingredients; and although manufacturers may wish to deal fairly with the consumer in every way, it may sometimes happen that one or more of the above impurities are found in it. Without special test they cannot be detected. It is, therefore, advisable to always test purchases of sulphuric acid for their purity, and get convinced that it is in such a condition that it will not injure the product to be made. A simple test is for this purpose of great advantage, and the following method will be of some use in places where no chemist is employed:

A small portion of the sulphuric acid is evaporated on a platinum sheet, which is subsequently brought to a red heat. Good sulphuric acid should not leave any residue; if there is any, it is generally sulphate of potash, or soda, or even lead. These are derived from the manufacture, and cannot be classed among adulterations. We may say here that on account of the cheapness of the sulphuric acid it never is willfully adulterated, but *may* contain many foreign ingredients.

A little sulphuric acid is diluted with water, and a few drops of concentrated muriatic acid added; if the solution, which was clear before, becomes milky, it indicates the presence of lead, which can be more safely identified by letting a current of sulphureted hydrogen gas pass through the liquor.

Another ingredient which is often found in sulphuric acid, particularly such products as are made from pyrites, is arsenic. For the manufacture of carbonic acid gas, it is especially required that the acid be entirely free from arsenic, and also nitrous acid and subnitric acid. Arsenic is detected by the so-called Marsh test. If mixed with water and granulated zinc, hydrogen gas is liberated, which should not contain any trace of arsenic. The hydrogen gas is ignited, and the flame allowed to strike a cool porcelain plate, on which, if arsenic is present, metallic arsenic is deposited.

Subnitric or nitric acid may be detected by throwing a small piece of copperas in the questionable acid; if it shows a brown coloration where it touches the liquid, the presence of the above impurities is indicated.

Chlorine or muriatic acid, also injurious for many purposes, is detected by adding a few drops of nitrate of silver into the diluted sulphuric acid; a precipitate or a milky appearance of the mixture shows the presence of chlorine or muriatic acid.

Subnitric acid, derived from the manufacture, is shown by adding iodide of potash and starch mixture to the sulphuric acid; a blue coloration shows subnitric acid.—*Nat. Press and B. A.*

An Optical Test for Iron and Steel.

The question of distinguishing between iron and steel still engages considerable attention on the Continent, where a Committee of Arts and Manufactures, specially appointed by the French Government to examine the subject, has caused much astonishment and dissatisfaction, by maintaining the faculty of tempering as the sole distinctive characteristic of steel. The committee are believed to be reconsidering this judgment; and, meanwhile, the *Revue Industrielle* observes that researches are being prosecuted with a view to discover some simple method of examination which will serve for the recognition of cast metal. The importance of this question, both from the trading and technical standpoints, is universally recognized wherever people who pay for steel wish to see that they get it; but it is peculiarly pressing in all protectionist countries, where differential duties are imposed on various brands of iron and its varieties.

M. Alfred Evrard, Director of the Firminy Steel Works, has carefully studied the matter, and has presented the results of his observations to the French Society of Mineral Industry. The French Ironmasters' Association admit that "the word 'steel' is to be attributed not only to products, not cast, which take a temper, but also to all cast malleable products, whether they are susceptible of tempering or not." According to this definition, there is no such thing as cast malleable iron. The question resolves itself, therefore, into one of detecting, by some reliable process, the traces of welding in welded products. A series of striking experiments was conducted with this object at Firminy. A number of lengths of iron and steel wire of different qualities were cut into pieces, reunited, heated together in a forge to a yellow oxidizing temperature, and tempered in cold water. After this operation the wire was heated again to a cherry red, then well hammered, and finally beaten into a flat band of from 0·4 to 0·8 millimeter thick. If during its handling the wire cooled, it was reheated. The drawing out accomplished, the portion drawn was again returned to the fire, heated to an oxidizing yellow, at which temperature it was kept for a minute, and then very slowly cooled in the fire. When it became reduced to dark red, the metal was plunged into cold water. The sheets were afterward polished on both sides, a bright finish not being desired, but only so much of the metal removed to obliterate all trace of the oxidation produced by the intense heat. This operation suffices to show the lines of severance of iron in welded samples; but it is insufficient to absolutely distinguish the metal, if produced from blooms.

After being polished, the sheets were dipped in nitric acid, in order to show the grain of the metal under this energetic attack. The result showed that steel has a uniform surface, and preserves a gray appearance; the attack of the acid bit into the metal equally all over the surface. Iron, on the contrary, showed a rough surface, the attack of the acid being very irregular. The metal showed brilliant characteristic grains ranged in longitudinal lines beside other portions showing a gray surface like steel. The "bloomed" iron also showed black bands, due to contained impurities. The welds of mixed irons appeared very prominent. The distinctive character which permits of the recognition of a welded from a cast product is the appearance of brilliant, shining spiculæ. In the bloomed metal these are very numerous, and form broken longitudinal lines. In fagoted bars these bands follow the welds all along their length. Another experiment conclusively showed that the presence of bright spiculæ is due to welds. A number of bars of extra soft cast steel were welded like iron, and afterward drawn out into a sheet, as already described, when not a trace of welding appeared until the acid test was applied, which immediately distinguished them by lines of brilliant spiculæ perfectly separable in appearance from the gray metal in which they appeared. Thus the presence of lines of bright grains in metal is due to welding; they enable us to distinguish clearly between a product welded and a product of casting—that is to say, to distinguish between iron and steel.

Any user of metal can employ the proceeding already described—to roughly polish the surface of a suspected metal (a sample flattened under the hammer, if possible), and test it with acid for bright lines. M. Evrard, however, adds a few remarks on the *rationale* of the process, as carried out at Firminy. The first operation—the tempering of the iron at an oxidizing yellow heat—was to open the welds of the metal. The wires of hard steel broke under this treatment. The second operation—the forging of the wires—like the preceding, opened the metal, which, spread into thin sheets, offered a large surface for examination. The third operation—reheating and tempering of the sheets—by keeping the metal at a yellow heat for a certain time, the texture taken by it under the hammer was destroyed, and it was caused to crystallize in large grains. The tempering at dark red rendered the welds visible. For the fourth operation—the acid test—it is necessary that the samples should be polished on the surface, in order that the test should be equal at all points. The test should also be a severe one; and, in order to secure this, the following arrangement might be made: The samples should be placed in a glass jar, partly filled with nitric acid of from 10° to 15° Baume. The attack by the acid is at first very energetic, and after exposure in this way for ten or fifteen minutes, the samples may be withdrawn, washed in water, and immediately wiped dry. The volume of dilute acid should not be too large in comparison with the samples, or it will not rise sufficiently in temperature to act in the strongest possible way upon the metal. These operations require neither laboratory nor skilled operator; they are applicable to all descriptions of iron or steel samples, from the finest wire to pieces cut from structural bars; and they furnish certain and indisputable results.

In order to display in the most striking manner the indications thus obtained, M. Evrard makes use of two Molteni lenses, for projecting an image of the tested surfaces upon a screen, whereby the bright spiculæ and lines of welding are rendered very conspicuous. The practical value of the tests, however, to users of iron and steel does not depend upon refinements of this order.

Artesian Wells in New York.

While the city authorities are debating how to provide a sufficient supply of water for the millions that are and are yet to be inhabitants of New York, private individuals are solving the problem for themselves in a very practical way. Almost all the brewers of the city have artesian wells or are sinking them. Several dry goods and other business firms are also adding to their liquid stores in the same direction. Tracy & Russell are boring on the sidewalk of their big building on Greenwich Avenue, and have gone as deep as 815 feet to find a flow of brackish water averaging about eight gallons a minute. They have been at it about six weeks. They expect to sink a couple of hundred or more feet before they come to a good supply of clear, sweet water. George Ehret, on East Ninety-second Street, is also sinking a well on his premises, and at a depth of 575 feet finds a flow of about 1,000 gallons an hour of brackish water. At a depth of 430 feet Mr. Button, the driller, struck a stream of living water from the East River, the trend of which was from northeast to southwest. He thought it flowed from the vicinity of One Hundred and Sixth Street toward the rocky ridge of Fourth Avenue, and then took a turn, and a few blocks south of Ninety-second Street flowed back to its source. In the well that is being sunk for Mr. Ehret it is found that the rise and fall of the water correspond with the ebb and flow of the tides in the river. That there is an open channel between the well and the river was also proved by the bringing up in pieces of a fish about ten inches long which had been cut by the drill.

At the depth of about 520 feet another stream was struck. The water is brackish, and is evidently from the river. At the depth of 575 feet it was of the same character, but with an increased mixture of sweet water. At the depth of 800 feet Mr. Button expects to strike below the limestone bed of Ward's Island, and to obtain a abundant supply of good drinking water. This will be tapped at its own level for brewing purposes, while the brackish water will be tapped at the higher level for lavatory and other uses.—*The Iron Age.*

Liquid Carbonic Acid.

It appears, as a result of the labors of Dr. Raydt, of Hanover, that liquid carbonic acid is speedily destined to take its place as an article of commerce, susceptible of important chemical and mechanical applications. The liquid is contained in wrought iron or steel cylinders, holding 10 liters, in which this quantity of liquid, under a pressure of 36 atmospheres represents 450 times its bulk of gas. Dr. Raydt's improvements comprise not merely the commercial production of liquid carbonic acid, but also relate to the arrangements for disengaging it at a regulated pressure. When the price of this liquid is sufficiently low, it will find many uses wherein great pressure is required to be applied within a small or confined space. At Krupp's Steel Works liquid carbonic acid is used to compress cast steel while cooling in moulds. For this purpose, by heating the reservoir of liquid to 200° C., a pressure of 1,200 atmospheres has been obtained. In this form also pure carbonic acid in considerable quantity, for chemical purposes, may be easily stored and transported.

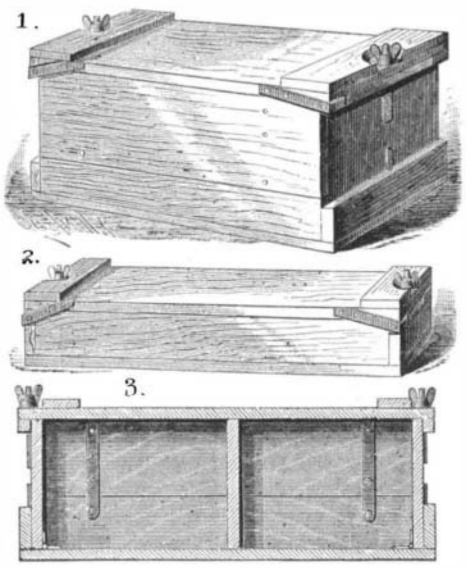
Alcohol in Glutinous Liquids.

The author puts 100 to 200 grammes of the substance into a roomy flask, fitted with a cork having two perforations. In the one is a bent tube which merely passes through the cork and is connected at the other end with a condenser and a receiver. Through the other passes a tube bent at right angles, its longer end passing down nearly to the bottom of the flask, while the other is connected with any convenient steam generator. The flask is fixed in a water bath, and by means of the current of steam all the alcohol is quickly driven out of the glutinous mass and into the receiver.—*E. Borgmann.*

FOLDING EGG CASE.

The egg case herewith illustrated is the invention of Mr. W. G. Ruge, of Washington, Mo., and can be folded very compactly so as to occupy little space while being returned to the shipper. Two side boards and two end boards are fastened to the bottom, the side boards being a little higher than the others. Ends are hinged to the bottom in such a manner that they can be folded down, and when raised their outer surfaces will rest against the inner surfaces of the end boards. Upon the upper edges of the side boards are placed sides of such a height that their upper edges will be flush with the edges of the ends. The sides are held in place by bars having hooks on their lower ends to catch on studs on the side boards. At each end of the cover is an under cleat so arranged as to project beyond the ends when the latter are raised. Secured to the ends are screw pins, which pass through the cover and receive winged nuts. Lateral displacement of the box is prevented by braces secured to the side edges of the cover, as shown in Fig. 1, which is a perspective view of the case. Fig. 3 is a longitudinal sectional elevation through the same.

When the box is to be filled the ends are swung up, the sides are held on the side boards by the bars, the cover is



RUGE'S FOLDING EGG CASE.

placed on, and the nuts screwed down. When the box is to be folded, the cover is removed, the ends are swung down, the sides are removed and placed on the folded ends, the cover is placed on the side and end boards, and the nuts turned on the screw pins projecting from the end boards. The side boards are made higher than the end boards on account of the cleats projecting below the surface of the cover. Fig. 2 shows the case folded.

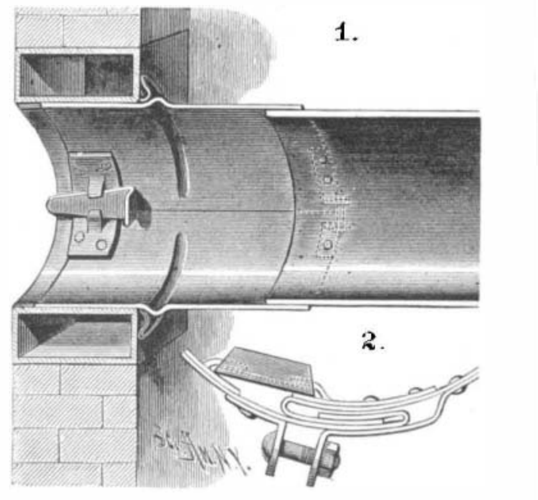
Remarkable Surgery.

A remarkable case of recovery from what was thought to be a fatal gun shot wound brought many eminent physicians to Bellevue Hospital, this city, last week. A young German who shot himself in the head some months ago had been the subject of a number of remarkable surgical operations. The bullet entered the brain immediately above the nose and passed through the head, lodging in the base of the brain, from which it was removed by boring a hole in the skull. A drainage tube was inserted as a drain for the blood and matter from the wound. Subsequently the tube was withdrawn, the wound healed, and insanity did not result.

The operation for a new nose in plastic surgery was not long since performed in Bellevue Hospital, with more than ordinary success. The French and Italian method of building up a nose from the cheeks or the arm has little to recommend it, because, there being neither bone nor cartilage, the flesh sinks into the face, a shapeless mass. In the Bellevue Hospital case, Dr. Sabine used the middle finger of the left hand as bridge and septum, taking off three phalanges. This he covered with pieces of flesh from the cheeks. The patient, a messenger in the hospital known as "Tommy," was suffering from the terrible malady called "lupus." He is now much improved in appearance, and a having example that the bridge of the nose as well as the nostrils can be replaced by a skillful hand.

STOVE PIPE CONNECTION.

In an invention patented by Mr. Godfried Laube, of Huron, Dakota, the accidental withdrawal of the pipe from the chimney or the pushing of it in too far is avoided by the tight joints made between the pipe and the thimble or chimney; the connection being made with an adjustable



LAUBE'S STOVE PIPE CONNECTION.

joint, the diameter may be adapted to pipes and thimbles of different sizes.

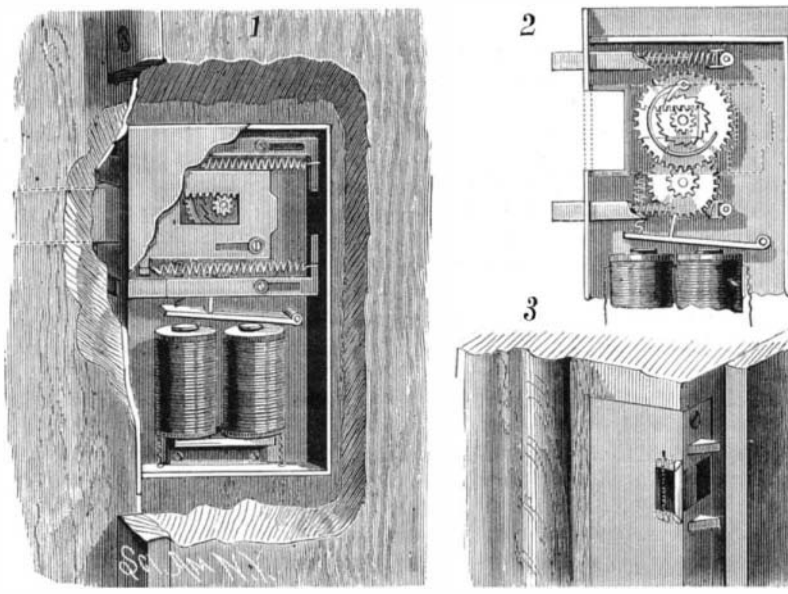
A thimble of the ordinary construction is arranged in the chimney. The joint of the connection is made by folding over two opposite edges of the iron. On the inside of the end of the connection, on each side of the joint, is a lug between which passes a wedge having a lip on the wide end, as shown in Fig. 1. By driving the wedge in tightly the connection is expanded and made to bind within the thimble. Upon the outside of the connection near its other end are two right angled lugs--one on each side of the joint—adapted to receive the bolt and nut as indicated in Fig. 2, which is a sectional view. The end of the stove pipe being placed within the connection, the joint is drawn up by screwing the nut, and the end of the pipe is held firmly. Unscrewing the nut frees the pipe, and taking out the wedge permits the withdrawal of the connection.

ELECTRIC DOOR KEEPERS.

The electric liberating door holder herewith illustrated is designed for the outside doors of buildings generally known as French flats. It has been patented by Mr. A. C. Woehrle, of 2187 Third Avenue, New York city.

The inclosing shell is secured to the door post by screws in the ordinary manner. A sliding keeper, having right angled portions, is held in the shell by a screw passing through a slot. In closing the door the lock bolt rubs against the outer part of the keeper and drops behind the edge, thus keeping the door closed. The inner part of the keeper is furnished with a slot which is formed with a rack which, in connection with the jaws, pinions, cog wheels, and ratchet (shown plainly in Fig. 2), serves to lock the keeper forward, in the position shown in Fig. 3, except when the lower pawl is drawn downward against the tension of the spring by passing a current of electricity through the electro-magnets.

Sliding bolts formed with beveled ends are placed in slots in the case, and their inner ends are held by screws passing through slots, Fig. 1. The bolts are held pressed forward by coiled springs, and are connected with the sliding keeper by coiled springs, as clearly indicated in Fig. 1. When the door is open the bolts stand in the position shown in Figs. 2



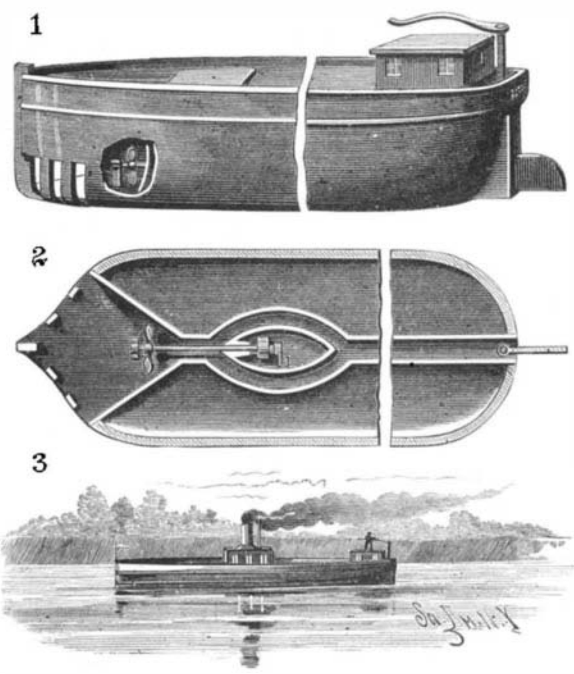
WOEHRLE'S ELECTRIC DOOR KEEPER.

and 3, with the beveled ends protruding from the slots in the shell; but when the door is closed the bolts will be forced inward, thereby compressing the springs shown in Fig. 2, and distending those in Fig. 1, and the latter, when the lower pawl is drawn down by the magnets to free the cog wheel, serve to draw the keeper within the shell and away from the front of the bolt, thus liberating the door so that it may be forced open by the action of the spring attached to it in the ordinary way. The parts then assume their original position. When closed, the door cannot be opened except by operating the bolt directly, by door knob or key, or by passing a current of electricity to the magnets. Circuit wires connect the magnets with the poles of a battery and with buttons situated in the different stories of the building.

CANAL BOAT.

A tunnel is formed in the bottom of the boat from front to rear, the ends being open. At the bow of the boat the tunnel terminates in a lateral enlargement, and a grating or screen is formed to prevent floating objects from entering. Near the front end the tunnel has two curved branches—one on each side—between which a compartment is formed as shown in the plan view, Fig. 2. A shaft is journaled in a standard in the compartment, and a standard in the enlargement. On the front end of the shaft is mounted a propeller wheel, and on the inner end is a crank on which are coupled means for revolving the shaft.

Water, drawn in at the bow by the screw, passes through the tunnel, and being discharged at the stern, assists in propelling the boat. It is claimed that as the water is drawn in at the front of the boat, the bow need not force the water to one side, and thus no billows are formed to wash out the banks of the canal. As the boat advances, the discharged water fills the space just vacated by the boat.



McDONALD'S CANAL BOAT.

This invention has been patented by Mr. Angus McDonald, P. O. Box 17, Au Sable, Mich.

Krakatoa.

The size of Krakatoa was formerly 33½ square kilometers; of that 23 square kilometers have subsided, and 10½ square kilometers remain extant. But on the south and southwest side the island has been increased by a large ring of volcanic products, so that the size of New Krakatoa is now, according to the survey, 15¼ square kilometers. The size of Long Island was formerly 2·9 and is now 3·2 square kilometers. Verlaten Island has become much larger; it was formerly 3·7 and is now 11·8 square kilometers in size. Of the Poolsche Hoedje nothing remains.

In the place where the fallen part of Krakatoa once stood there is now everywhere deep sea, generally 200, in some places even more than 300 meters deep. It is remarkable that in the midst of this deep sea a rock has remained which rises about 5 meters above its surface. Close to this rock, which is certainly not larger than 10 meters square, the sea is more than 200 meters deep. It is like a gigantic club, which Krakatoa lifts defiantly out of the sea.

HOUSEKEEPERS are frequently annoyed by oil marks on papered walls against which thoughtless persons have laid their heads. These unsightly spots may be removed by making a paste of cold water and pipe clay or fuller's earth, and laying it on the surface without rubbing it on, else the pattern of the paper will then likely be injured. Leave the paste on all night. In the morning it can be brushed off and the spot will have disappeared, but a renewal of the operation may be necessary if the oil mark is old. The experiment will be likely to result most satisfactorily on plain papers, or that with the least number of colored figures.