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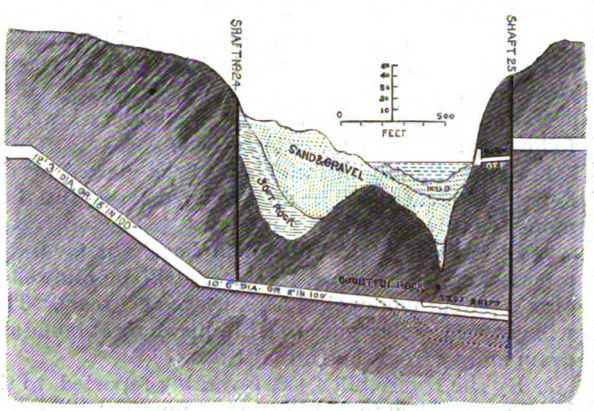
THE AQUEDUCT UNDER THE HARLEM RIVER.

Perhaps the most interesting and novel feature of the great aqueduct now being built by the city of New York to increase its water supply is that portion of the tunnel extending beneath the Harlem River. The contrast between the old and the new methods of crossing this river has been happily brought out by our artist in the frontispiece. High Bridge, over which the present supply comes, shows plainly in the background; the foreground being occupied by the section through the bed and banks of the river, far below the surface of which the new aqueduct is to pass.

We here have, within a half mile, the two most wonderful examples of conducting water across a river—one forming the most conspicuous and attractive object in a naturally beautiful region; the other forming the safer conveyer, far beyond the reach of any efforts that might be made to destroy it, and as durable as the solid rock in which it is buried.

The bed of the river is composed of sand and gravel at the eastern side, and mud at the western side; below these is hard rock, which takes the form, immediately under the mud, of a sort of deep, narrow valley, as shown in the accompanying longitudinal section. To clear this low spot, the aqueduct must be sunk at least 150 feet below the river water level, when the crossing can be made through solid rock. After reaching the bottom of shaft No. 25, during construction, a small test drift will be extended to the doubtful rock; if this shows hard rock, the tunnel will be erected as indicated by the full lines; but if it uncovers loose rock, the shaft will be further extended, and the tunnel built as indicated by the dotted lines.

Section 12 of the aqueduct extends from a point in the vicinity of shaft 24 (shown in a map published, together with a general description of the aqueduct, in the SCIENTIFIC AMERICAN of November 7, 1885) on the



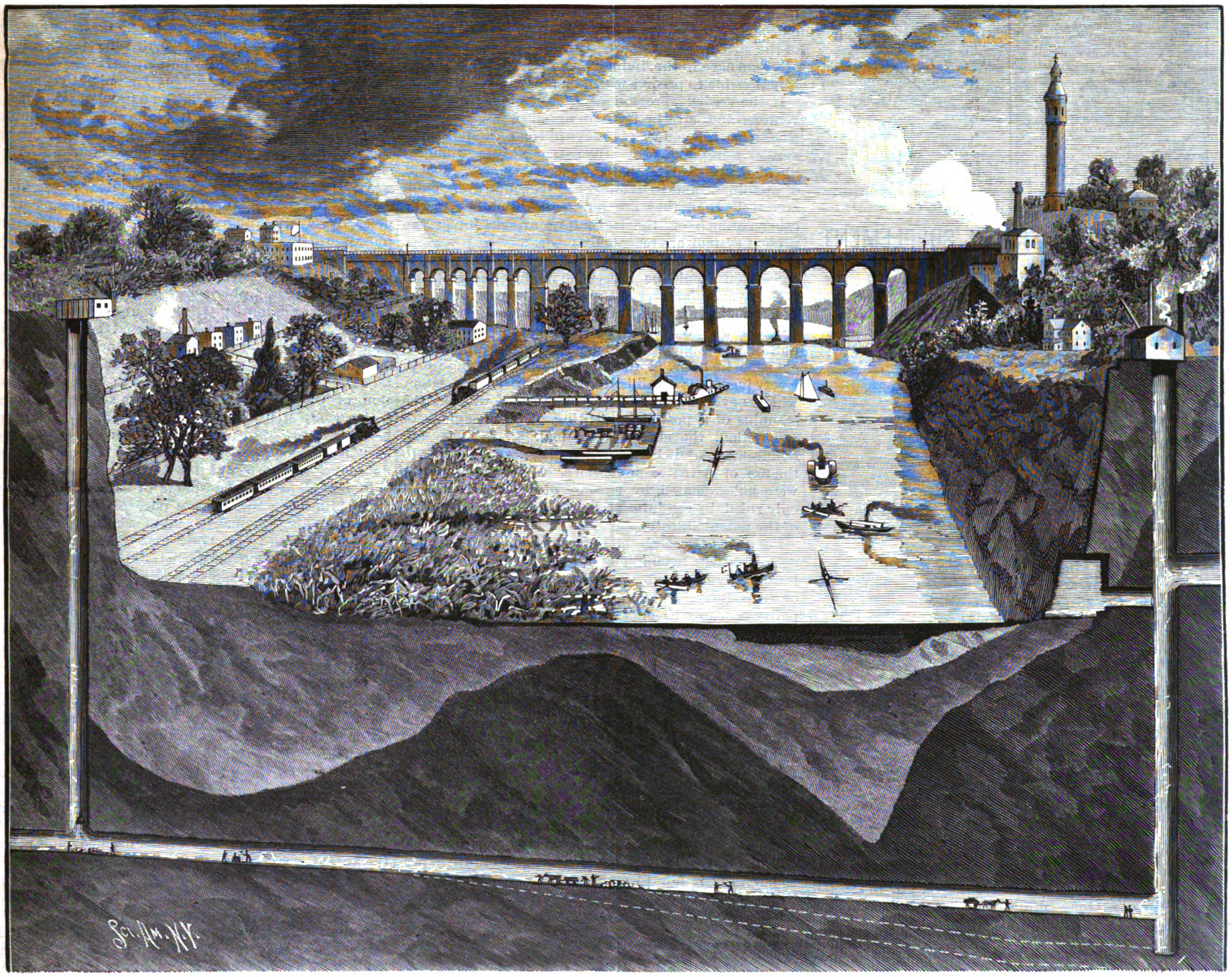
LONGITUDINAL SECTION, AQUEDUCT UNDER HARLEM RIVER.

easterly side of the Harlem River across and under the river to a point near 178th street and Tenth avenue, a total distance of about 1,937 feet. A short distance east of the river the aqueduct is carried downward on a grade of 15 in the 100, the diameter being 12 feet 3 inches to a point just east of shaft 24; from here to shaft 25, on the opposite side of the Harlem, the grade is 2 in the 100, and the diameter 10 feet 6 inches.

The water on its way to the city will then flow up shaft 25 to a point above the surface of the river—at a level about equal to that of the aqueduct at the opposite side before it dips to pass under the bed of the river—and from thence through solid rock to a gate house at 135th street, between Convent and 10th avenues, the diameter of the last mentioned portion being 12 ft. 3 in. This section of the aqueduct is to be lined with masonry throughout, and that portion below the river is to be lined with cast iron to prevent percolation. Where the aqueduct has a diameter of 12 ft. 3 in., the cross section of the excavation is to be a circle 14 ft. 11 in. in diameter; where it is 10 ft. 6 in. in diameter, the circular section of the excavation is to be 13 ft. 10 in. in diameter. The test drift is to have a rectangular section 7 ft. wide by 6 ft. high, and the blow-off tunnel to be excavated between shaft 25 and the river, above high-water mark, for the accommodation of two blow-off pipes, is to be 12 ft. wide by 6 ft. high. The lining is to be of brick, backed up with concrete and rubble stone, and all the masonry is to be laid in hydraulic cement mortar, all of which will be subjected to severe tests before being accepted. All the mortar is to consist of 1 part of cement to 2 parts of clean sharp sand, and the broken stone for the concrete is not to exceed 2 in. in greatest diameter.

The excavation for the double shaft 25 is to be 33 ft. wide, across the line of the aqueduct, by 16 ft. 6 in.

(*Continued on page* 372.)



THE NEW AQUEDUCT PASSING UNDER THE HARLEM RIVER, NEW YORK CITY.

Scientific American.

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NEW YORK, SATURDAY, JUNE 12, 1886.

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ANOMALOUS CONGRESSIONAL LEGISLATION.

The U. S. Senate passed upon the first day of the present month the Plumb bill imposing restrictions upon aliens or alien corporations holding land. The bill may be cited as interesting, in offering a contrast to other proposed legislation now before the country. In the Plumb bill, foreign corporations and also individual foreigners who have not declared their intentions of becoming citizens are prevented from holding title to land in the United States or Territories. Foreign capital is excluded by this measure from the development of the resources of the country. The same legislature proposes to grant copyright protection to the work of foreign authors. This is one of the contrasts. The foreign capitalist is to be prevented from spending money on the development of the natural resources of the country. He is not to have the privilege of cultivating and bringing into civilization the old time deserts of the West. But the foreign author, without doing one particle of material good to us, is to have protection accorded him, and the imaginary property rights of an author are cited in defense of the justice of this proceeding. As far as the interests of the country are concerned, the tendency of legislation should be the reverse of this.

By these three bills, if they should become laws, the following results would be achieved:

1. By the Plumb bill, which has been passed by the Senate, foreigners will be debarred from sending their money to this country.

2. By the copyright bill, which has been favorably reported to the Senate, foreigners will be allowed to obtain patent monopolies here, lasting 42 years. This will enable the foreigner to sit in his chair at home and drain money from the United States.

3. By the House bill 4,458, favorably reported to the House (published in full in our last number), American inventors are deprived of protection, and the majority of all patents for new inventions are made free to infringers.

RESISTANCE TO OBNOXIOUS LEGISLATION.

We have repeatedly called the attention of our readers to obnoxious patent laws which we feared the national legislature might pass. Last week we gave the text of one (House bill 4,458) that has actually been recommended for enactment by the Committee on Patents. These proposed laws have occupied much of the attention of Congress for several sessions. All are a menace to the industries of the country, and it is impossible to predict which one may pass.

If the verdict were sought from manufacturers, inventors, and all who have an unselfish interest in the welfare of the country in days to come, and if such verdict were abided by, the patent statutes would be unchanged, save to make them cover a wider field of usefulness, and to render their benefits even more accessible than they are now. But from one or the other branch of the legislature attacks upon the present system are repeatedly made.

The conclusion is an obvious one. Such inimical legislation should be resisted in its first stages.

Every manufacturer of standing is deeply interested in the maintenance in its integrity of our system of patent laws. Whether a maker of patented articles or not, he will find that his whole business rests on patents for its basis. Patented machines do the work. Every ingenious detail is due to the inventor's labor, which never would have been exerted without the stimulus of a possible patenting. The cheapness of production, the cheapness of making business announcement of it by printed notices, are both due to the use of patented inventions. If a manufacturer were not animated by a sense of justice, but were only ruled by self-interest, he should espouse the cause of the patent statutes.

Following the large manufacturers come workmen, agents, dealers in supplies, and the like, whose welfare is as deeply involved. They draw upon the industries of the country, and all that affects manufacturing prosperity concerns them. Those interested in every factory, from head to the lowest employe, should, from simple self-interest, be supporters of the present system of patents.

In their hands is the power of doing much to stop these threatened invasions of the inventor's rights; for in any enlightened view of the case, governmental protection is the least that is his due. A congressional representative or senator is, directly or indirectly, under the influence of his constituency. When bad legislation is imminent, the constituents of each representative should apprise him of their views. Every manufacturer should arrange memorials in protest, to be signed by himself and all his workmen. These should be forwarded to Washington to the representatives personally. It is fair to assume that were this done all over the country, the just and expedient view of the matter would be made so prominent that legislation hostile to patents would never have a chance of passing.

If, on the other hand, the members of Congress do not hear from their constituents, and believe all they are told by some interested member, they will be exceedingly apt to pass some one of these bad bills during the session. They can hardly be blamed for so doing, except upon general principles. Many of them do not give the subject sufficient thought to act intelligently on it, and this involves a dereliction. Their duty is, of course, to become so informed, but the voice of their constituents, expressed as we have suggested, would be effectual in turning the scale.

At the present time, such action is imperatively needed. Our readers know the provisions of the bill that has occasioned these remarks. They have been given *verbatim* by us. What we would now suggest is for the manufacturers of the country to unite in an effectual protest against the ruinous measure.

OZONE AND PNEUMONIA.

Dr. Draper, of the New York Meteorological Observatory at Central Park, has been continuing his researches into the possible connection between climatic conditions and the death rate from pneumonia. Since the beginning of 1885, the disease has assumed the form of an epidemic, and has been particularly fatal in New York. A comparison of the statistics of the malady with many thousand meteorological observations failed to show any continuous connection between the two. But when ozone is taken into consideration, Dr. Draper states that he found a very close connection between its presence and the fatality of pneumonia. He has collected the statistics on both subjects for the past eight years, and in order to present their monthly and annual fluctuations in a graphic manner suitable for comparison, he has constructed diagrammatic tables. He finds that the annual average amount of ozone increased from 1878 to 1882, then decreased through 1883 and 1884, and again increased very decidedly in 1885. Comparing these observations with the fluctuations in the death rate from pneumonia in New York, Dr. Draper states that generally when there was an excess of ozone present in the atmosphere, there was also a high mortality from pneumonia during that month, or in the month following.

Without wishing for a moment to disparage the care with which these observations have doubtless been made, we must take exception to the conclusions deduced from them, for we believe that there is absolutely no support for such a theory.

As the popular conception of ozone does not appear to be very definite, it may be worth while to ask in the first place what it is, and whether, as it occurs in the atmosphere, it is injurious to the animal economy. Ozone is a colorless gas possessing a peculiar odor, from which it derives its name. In composition, it is simply a modified form of oxygen, one-half again as dense as the ordinary gas, and having much more powerful chemical affinities. It may be produced in several ways. In the electrolysis of acidulated water, it is evolved in considerable quantities at the positive pole. It is also produced by the slow oxidation of phosphorus in air. But its largest source of supply is in electrical discharges through air or oxygen gas, and in the evaporation of water. Both of these processes condense the atmospheric oxygen and produce ozone. In a sufficient quantity it is undoubtedly inimical to animal life. Dr. Redfern has asserted that the inhalation of oxygen gas containing only one two-hundred-and-fortieth of its volume of ozone will cause death in all animals. The ozone produces intense congestion of the lungs, and through its strong oxidizing action completely decolorizes the blood, the albumen being entirely destroyed. Such being some of the most important qualities of the gas, the question of its connection with pneumonia turns upon whether it is present in the atmosphere in sufficient quantity to be injurious; whether we possess proper methods for estimating its quantity; and whether, in a comparison between New York and other places, the supposed connection between the disease and the gas can be shown to be independent of the local climatology of the metropolis.

The existence of ozone in the atmosphere, first announced by Schoenbein, though disputed for some time, is now universally admitted. But it is present in such very small quantity that it is very difficult to determine its amount. It varies with the climatic conditions. It has been stated on good authority that the amount of ozone in the air stands in a direct relation to the amount of atmospheric electricity present. The method of estimation is a very rough one. It depends upon the property possessed by ozone of liberating iodine from its combinations. Papers impregnated with a solution of starch and iodide of potassium are exposed to the atmosphere to be tested. As free iodine forms with starch a decided blue color, the appearance of this tint indicates the presence of ozone. The quantity is estimated by comparing the tint produced with that of certain standard tints prepared by exposure to known percentages of ozone. At best the results are only approximate, and when it is remembered that certain other substances, such as oxide of nitrogen, which is frequently present in the air, produce the same coloration, it will be seen that

but very limited confidence can be placed in the quantitative value of this reaction. As the result of passing 100 liters of air through a dilute solution of hydriodic acid, Zenger obtained an amount of iodine corresponding to between 0·001 and 0·002 milligramme of ozone, an amount absolutely inappreciable in its effect upon human life. Taking into consideration, therefore, the minute quantity of gas and the rough method of its estimation, we very much doubt whether it can be shown to have undergone such a variation as indicated by the tables mentioned. But be this as it may, there are other considerations which disprove the proposition.

The presence of ozone in the atmosphere is usually indicative of health. It is found in the greatest amount in the air of the country, in the mountains, and at the seaside, the greatest proportion being found during and after thunder storms. In any thickly inhabited district, and particularly in towns and cities where much coal is burned, the atmosphere is almost free from ozone; and when present, it is quickly reduced to ordinary oxygen by the dust and organic emanations, or the sulphurous acid present in such an atmosphere. It is unquestionable, therefore, that New York city is deficient in ozone, when compared with the surrounding country and smaller towns. Yet it is the favorite haunt of pneumonia, a disease, by the way, which is particularly prevalent during the winter and spring, while the amount of ozone is greatest in summer. The national health statistics, prepared by Dr. Billings, show that in proportion to the population there are more deaths from pneumonia in New York than in any other part of the country.

It seems to us, therefore, an incontrovertible argument against Dr. Draper's theory that the greatest number of deaths from the disease should occur in a city, the atmosphere of which is deficient in the hypothetically exciting cause.

On the other hand, the beneficial action of ozone in purifying the air and freeing it from organic contaminations has been so well recognized that there are now manufactured special ozone-producing machines for use in ventilating churches, theaters, and other buildings where large numbers of people are congregated. A modified form of Holtz auto-exciter has recently been devised by Mr. H. D. Hall, for the production of ozone for this very purpose.

The stronger probability is that the high death rate from pneumonia in New York is due to the presence of large amounts of organic contaminations in the atmosphere. The immense number of vehicles and horses employed in the city, and the impossibility of cleaning the streets except at stated intervals, result in the production of a local atmosphere of peculiar nature. About 160,000 tons of organic matter are dropped in the streets of New York in a year. But in the mean time, before this material can be removed, it is dried and ground up by the constant march of animals and vehicles until the atmosphere on the streets becomes surcharged with fine particles of organic impurities, which our citizens take into their lungs. The breathing of such an atmosphere is sufficient to account not only for pneumonia, but as well for many other diseases. In addition to these contaminations are vast volumes of sewer gas, together with the regular rise of gas from the soil, the result of leakages from the hundreds of miles of pipe which fill the streets. The action of ozone is to purify this vile atmosphere, and its presence in large quantities would, within the limits of its occurrence in nature, tend to a diminution, rather than an increase, in pneumonia.

PHOTOGRAPHIC NOTES.

Novel Camera for Instantaneous Work.—A short time ago, before the Society of Amateur Photographers of this city, Mr. Walter Clark exhibited an improved camera, recently patented by him, which involved two or three novel features. The picture, when the lens tube occupied one position, is thrown upon a horizontal ground glass screen located in the upper part of the box, over which is arranged an automatically extensible hood, through which the operator looks. In this position the lens points downward vertically upon a mirror, placed in the front part of the box at an angle of 45°, and it is the non-reversed reflected image passing through the lens to the ground glass that one sees. The lens tube, being held in a cylinder which rotates at right angles to the longitudinal axis of the tube, is quickly changed from the vertical position to a horizontal position, by a quarter revolution of the cylinder. At the same time the tube can be moved to and fro in the cylinder, for focusing, by a rack and pinion movement, when desired. In front of the lens, on the outer surface of the cylinder, is arranged a shutter, which slides upon the surface of the cylinder.

In making the exposure, when the image is seen to be in the right position on the ground glass, a trigger is touched, which at once permits the lens cylinder to rotate upward a quarter of a revolution. The moment the cylinder stops, the shutter is automatically released, and, passing over the surface of the cylinder, in front of the lens tube, completes the exposure. A double movement is made before the exposure is completed, but as the lens tube and cylinder can be rotated so rapidly, and through such a small space, it practically does not interfere with the successful operation of the apparatus. When the lens tube is thrown up horizontally, the image is projected upon the sensitive plate held in a holder at the back of the box. There is a device for holding the shutter open, so that a time exposure can be made, and a device for increasing or decreasing the speed of the shutter.

The advantage of the camera is that no finder is required, that the operator sees the image he is going to capture up to the second of exposure, and knows exactly what he should take in on the plate. The model exhibited was quite compact and very neatly made. All of the working parts worked freely and rapidly. Specimen photographs taken with it were shown.

The Photographers' Association of America.—The seventh annual convention of this association is to be held at St. Louis, Mo., on June 22, and will close on the 25th. The president, Mr. Wm. H. Potter, is known as an active, progressive Western photographer, and as he will be assisted by Mr. G. Cramer, a resident of St. Louis, and one of the oldest and largest manufacturers of dry plates. It is expected a meeting and an exhibition of photographs of unusual interest will be the result of their enterprise.

There will also be a large display of improved photographic apparatus; prizes are to be awarded for the best photographs and for essays on practical subjects pertaining to photography.

PROFESSOR BROOKS' COMETS.

The new comet just announced by Professor Brooks makes the ninth that he has discovered during the past five years. It is the third comet discovered this year, and, with the last one announced in 1885, makes four comets in succession detected by this one observer. The two most recent discoveries of Professor Brooks were made within four days of each other, and were visible at the same time as the one found earlier in the year. It is the first time, we believe, that one astronomer has had three comets of his own finding visible at the same period.

Master Car Builders' Association.

The Twentieth Annual Convention of the Master Car Builders' Association began at Niagara Falls, June 8. The chief object of the Association, as stated in its constitution, is "to provide an organization through which its members, and the companies they represent, may agree upon such joint action as may be required to bring about uniformity and interchangeability in the parts of railroad cars, to improve their construction, and to adjust the mutual interests growing out of their interchange and repair." The constitution states further that "the action of the Association shall have only a recommendatory character, and shall not be binding upon any of its members or the companies represented in it."

The following is a list of the companies which were represented in the Association last year, with the number of cars owned by each:

Railroad Co.	*Cars owned.*	*Railroad Co.*	*Cars owned.*
Atlantic Ave., of B'k'lyn..	96	Intercolonial.....	3,745
Atlantic & Pacific.....	1,240	Kansas City, Ft. S. & G...	4,424
Boston & Albany.....	6,478	Lake Shore & Mich. So....	16,000
Boston & Maine.....	1,854	Lehigh Valley....	24,247
Boston, H. Tunnel & W..	1,088	Louisville & Nashville....	10,911
Buffalo, N. Y. & Phila...	5,680	Louisville, Ev. & St. L...	1,050
Burlington & Mo. River in Neb., St. Louis, Keokuk & N. Western, Chicago, Bur. & Kan. City, Han. & St. Joseph, Kan. City, St. Joseph & Council Bluffs, and Chicago & Iowa R.R...	7,849	Louisville, New A. & C...	2,286
		Maine Central.....	2,282
		Marquette, H. & Ont.....	1,352
		Michigan Central.	12,110
		Minneapolis & St. Louis..	2,008
		Mobile & Ohio..	1,553
		New York & New Eng....	3,952
		New York Cent. & H. R..	81,117
Bur., Cedar R. & No.....	4,307	New York, Chic. & St. L.	7,245
Central Vermont R.R.....	3,256	New York, L. E. & W.....	31,000
Chesapeake & Ohio.....	5,953	New York, New H. & H..	3,425
Chicago & Alton.....	6,666	New York, Penn. & Ohio.	7,882
Chicago & Eastern Ill ...	3,800	N. Y., West Shore & B...	7,721
Chicago & Grand T. and Det., Grand H. & Mil..	3,711	Norfolk & Western... ..	3,818
		Northern Pacific.....	9,697
Chicago, Bur. & Quincy..	17,940	Ohio & Mississippi.....	3,134
Chicago, Mil. & St. Paul..	20,498	Old Colony.....	2,647
Chicago, Rock I. & Pac..	8,081	Peoria, Decatur & Ev.....	1,705
Chicago, St. Louis & W...	2,000	Penn. & New York.....	384
Chicago, St. P., M. & O..	5,459	Pennsylvania Co.....	23,606
Cleve., Col., Cin. & Ind...	8,386	Pennsylvania, Northern Central, West Jersey, Phila., Wil. & Balt., Alex. & Fredericksburg, and Balt. & Pot.	47,013
Cleveland, Mt. V. & Del..	776		
Connecticut River.....	529		
Cumberland Valley.....	575		
Del. & Hud. Canal Co....	11,392		
Delaware, Lack. & West.	24,000	Petersburg	144
Des Moines & Ft. D.....	290	Pittsburg & Lake Erie....	1,801
Det., Grand H. & Mil.....	700	Pitts., Cin. & St. Louis...	10,820
Det., Lansing & North....	2,681	Richmond & Danville....	2,596
Det., Mackinac & Mar...	850	Rich., Fred. & Potomac..	141
E. Tenn., Va. & Ga. R.R.	3,297	Rome, Water. & Og.	1,769
Fitchburg.....	3,371	Shenango & Alleghany....	248
Flint & Pere Marquette...	2,500	Southern Central.....	375
Grand Trunk (G. W. Div.)	5,351	St. L., Keokuk & N. W. and C., Bur. & Kan. C.	496
Grand Trunk	10,375		
Houston & Tex. Central..	2,070	St. Paul & Duluth.....	720
Illinois Central.....	9,075	Western Car Co.....	1,200
Ind., Bloom. & Western..	4,607	Wilmington & Northern..	155
		Total number of cars represented..	486,882

A Revolution in Magnesium.

For many years past photographers have been promised magnesium at an almost nominal price; times out of number has it been announced that some one or other has discovered a method by which the metal could be produced for a few shillings per pound. Whenever we have given publicity to any of these statements, it has been followed by numbers of letters inquiring where the article could be procured at the price, clearly indicating that there has always been a demand for the metal among photographers.

The price of magnesium, in the form of wire or ribbon, which for many years past has remained at from twelve and sixpence to fifteen shillings an ounce ($3 to $4), is now being advertised at two shillings and sixpence (62 cents), and, apparently, it is exciting but little attention. This may possibly be accounted for by the fact that daylight is now very plentiful. At its present price, however, during the winter months, it is more than probable that magnesium will be more extensively employed than hitherto as a source of artificial illumination, both in the studio as well as for enlarging. If this should be the case, it is quite possible that the increased demand for the metal, coupled with a little competition, will still further reduce its price. However, at the present figure its cost is far from being prohibitive, considering that the metal is so exceedingly light.

There are no means extant by which a most powerful, richly actinic light can be improvised, on the spur of the moment if necessary, for photographing either a single figure or a group long after the sun has set, as that afforded by magnesium. A match is applied to the end of a bit of magnesium ribbon, and, presto! the room is flooded with light so bright and intense as to render the photographing of even a group a matter of such ease and expedition that a brilliant negative can be secured by an exposure of a few seconds, and at a cost of less than a halfpenny. Magnesium forms, in effect, a portable and even a pocketable electric light, the powers of which are evoked into action by the striking of a match.

The most primitive way by which to burn the magnesium is to break a few inches from off the large roll in which each ounce is put up for sale, and hold the end by a pair of pincers. But this is a somewhat clumsy way of doing that which can be done so much better by the employment of a properly constructed lamp, such as that of Mr. Hart, of Kingsland Green, which consists of a perforated wooden handle, through which passes a small tube, of dimensions capable of allowing one or two strands of the ribbon being passed through to the orifice at the outer end, a tiny pair of rubber-covered rollers grasping the metallic ribbon under such circumstances as to enable it to be "paid out," by the agency of a winch handle, just as fast or slow as to suit the necessities of each case. Owing to the exposure required by gelatine plates being so very brief, this can be done with perfect exactitude.

As an agent in the production of enlargements on bromide paper, magnesium is quite invaluable. Assuming a lantern to be employed for this purpose, all that is necessary is to remove the oil lamp and arrange for the orifice of the magnesium burner taking the place of the flame, or for a small spirit lamp being placed there, through the flame of which the strip of magnesium may be pushed during the few seconds which experience dictates as being necessary to print the enlargement. Owing to the smallness of the magnesium flame when obtained in this way, a much sharper enlargement may be produced than when a three or four wick petroleum lamp is used for the same purpose, while, owing to the greater intensity of the magnesium, the time is greatly reduced. A refinement in this method of making enlargements consists in inserting an opaque partition in the lantern, having a hole of about half an inch diameter in it, placed so as to be central with the condenser and in its focus. If the magnesium is burned behind this partition or diaphragm, the centralization of the light is insured.

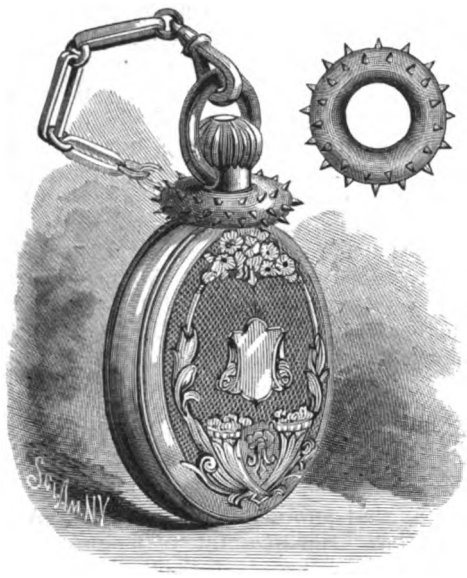
We hail with great pleasure this great downfall in the price of magnesium, as it places a new power in the hands of all practical photographers, both amateurs and professionals. While writing this we have before us a group of fourteen gentlemen, photographed at a supper table three hours after sunset, every individual in the group being sharp and good.—*British Jour. of Photography.*

Imaginary Ills.

A Philadelphia physician says that a great deal of what passes for heart disease is only mild dyspepsia, that nervousness commonly is bad temper, and that two-thirds of the so-called malaria is nothing but laziness. Imagination, he says, is responsible for a multitude of ills, and he gives as an instance the case of a clergyman who after preaching a sermon would take a teaspoonful of sweetened water, and doze off like a babe, under the impression that it was a *bona fide* sedative.

RUBBER WATCH PROTECTOR.

The ring is made of soft rubber, has a circular cross section, and is formed with short radial rubber projections or stubs, some of which project downward, some upward, and some horizontally. The ring is passed over the bow on to the pendant of the watch, where it is held. When the watch is in the pocket, it can only be removed by a strong pull on the chain, as the projections catch on the pocket lining; this strain is so great as to be noticed by the person carrying the watch, and who can easily withdraw it by grasping it at the pendant or part surrounded by the ring. The ring,



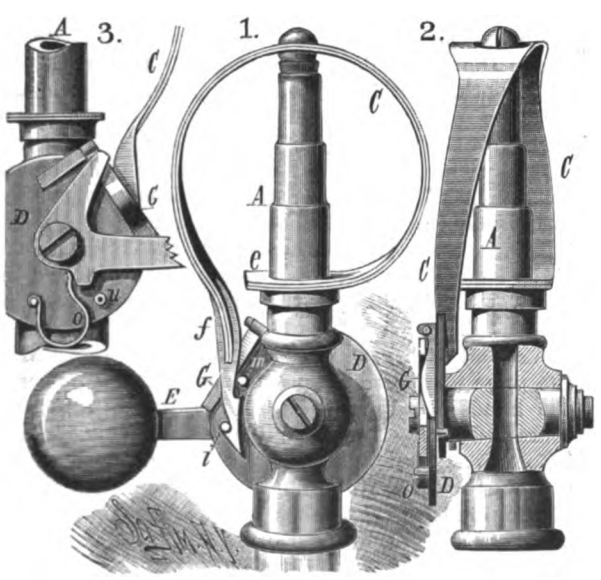
GARDNER'S RUBBER WATCH PROTECTOR.

being small, does not bulge the pocket, and the stubs are not liable to tear the cloth.

This invention has been patented by Mr. George B. Gardner, whose address is P. O. Box 164, Lynn, Mass.

SELF-CLOSING GAS BURNER.

The compensating spring, C, is composed of an outer brass spring and an inner steel spring united, and is bent to pass up over or in proximity to the top of the burner, A, around or outside of the tip. Its lower end is secured to the burner, and its free end is formed with a catch, *f*, having notches upon opposite edges, one above the other, that engage, but not simultaneously, with the pins, *i m*, on the plate, D, secured to one end of the cock. The pins are at a slightly greater distance apart than the notches. Pivoted to the cock is a weighted lever, E, which is held against the outside of the plate by a spring, *o*, a bent arm of the lever resting against a fixed stop or upper end of a cam-shaped lever, G, arranged to come in contact with the free end of the spring. When the cock is closed, the lever, E, occupies a vertical position with its weighted end down. Upon raising this lever to a horizontal position—the plate, D, turning with it—the pin, *i*, is caused to engage with the lower notch, while the pin, *m*, will be out of engagement with its notch. The escaping gas may now be lighted. The heated spring contracts, owing to the different rates of expansion of the two metals composing it, when the outer notch will free itself from the pin, *i*, and



SHERMAN'S SELF-CLOSING GAS BURNER.

the inner notch will engage with the pin, *m*, thereby preventing the cock from closing. Should the gas be extinguished by accident, the spring, upon cooling, will expand, free the notch from the pin, *m*, and allow the lever to drop and shut off the gas by turning the plate attached to the cock. To extinguish the flame by hand, the lever, E, is simply depressed, when its bent arm presses the pivoted cam piece, G, against the spring, C, to force the catch from engagement with the pins and permit the lever to close the cock.

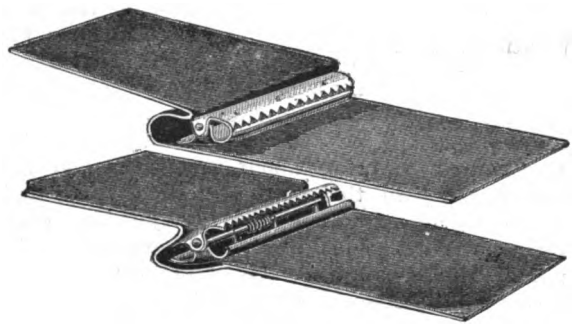
This invention has been patented by Mr. W. W. Sherman, of 316 Fourth Street, San Francisco, Cal.

Burdette on Railway Monopolies.

"Do you know," says Burdette, in the Brooklyn *Eagle*, "I never until recently felt the iron hand of a gigantic monopoly close on my throat, and so realized how slowly it was tightening its constricting folds, like the deadening upas tree, over whose blighted valley there flies no living bird and comparatively few dead ones, as it were, upon the life of the nation? [Applause, and loud cries of "Go on."] Needless is it to say that I refer to the railroad. I live in a small village on the line of the Pennsylvania Railway. We have no competing line. We lie at the feet of the monopoly that hauls us in and out of town; we are passive and helpless. The other day I had two boxes of freight to send West by this monopoly. I went crouching into the office of the freight agent. When I told him I had two boxes of stuff to send to Chicago, a distance of about 800 miles, I saw his eyes light up with the keen glare of savage greed. He said he would ask Harrisburg for rates, which I knew was a mere subterfuge to gain time while he could guess how much money I could raise this side of the grave, and then the grasping tool of a soulless corporation charged me 69 cents for carrying two big boxes 800 miles. What's more, he made me pay it. It's no wonder that shippers kick. I am only surprised that they don't boycott the railroads. Let us return to the days and the quiet ways of our good old fathers, when, by paying only one-half of the price of the boat, I could have sent my boxes to Buffalo by canal and the rest of the way by lake boat, and got them through to Chicago, or the bottom, the same year."

IMPROVED BILL FILE.

The improved bill file herewith illustrated consists of two side pieces connected by a flexible back, the file proper being constructed of two metallic leaves mounted upon a longitudinal rod passing through lugs in their ends. Upon the rod is a coiled wire spring, arranged so as to force the outer edges of the jaws to-



SWEZEY'S IMPROVED BILL FILE.

gether. The lower jaw is formed with upwardly projecting prongs, that pass through perforations in the upper jaw, which is provided at its outer edge with a serrated flange. These clamping jaws are secured in any suitable way to the back of the cover between the sides. The file may be used either with or without the prongs, and if desired the top cover can be removed. It can be made of any size, and can be used as a letter clip, a holder of writing material, a holder for telegraph slips, a holder of postage stamps in book form, either large or small, etc. When used to hold stamps, the sides of the cover are treated with wax or paraffine. The usefulness of the device and its many adaptations are apparent.

This invention has been patented by Mr. Joseph B. Swezey, of East Patchogue, L. I., N. Y.

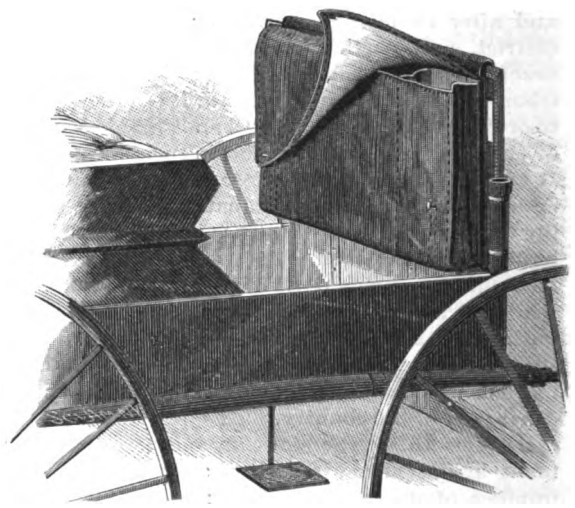
The Regenerative Gas System.

The Philadelphia Gas Trust has adopted the regenerative system. It is claimed that the new system will, in the increased amount of gas produced per ton of coal and in the economy of fuel and labor, save fully 33 per cent.

The system of producing illuminating gas from regenerative furnaces was first used in Europe, and is in extensive operation on the Continent. It is also in use in Syracuse, Newark, Newport, Chicago, and Minneapolis. Stripped of technical terms involved in a scientific description, its advantages over the present system employed in Philadelphia consist in a more perfect combustion by means of the appliance of the fire and the procurement of a more powerful and general heat. Under the present system, each pound of coal is estimated to yield 4¾ feet of gas. Into each retort, as now operated, 1,200 pounds of coal are put, being always weighed. The station meter records, after the coal has been burned for a period of four hours, an average production of about 5,700 feet. The new system, burning the same quantity of coal for the same time, would produce 6,300 feet of gas, a difference of 600 feet.

RECEPTACLE ATTACHMENT FOR DASHBOARDS.

This bag or receptacle can be readily and securely attached to or detached from the dashboards of vehicles, and may be used for carrying parcels, letters, etc. It is made of any suitable material, preferably in harmony with the vehicle upon which it is to be used, and is secured in place by a spring clamp on its back, fitting over the top of the dashboard. The front and back are made of a yielding or flexible material, and the ends and partitions forming the compartments are made of an elastic material, such as rubber, so that they may the more easily allow the bag to collapse and may also receive parcels slightly longer than the compartments. The bag is stiffened by spring bars let into the material and



FAHEY'S RECEPTACLE ATTACHMENT FOR DASHBOARDS.

passing under the bottom, up the back, and into the clamp flap, where they unite with a crossbar, thereby forming a spring frame for the clamp flexible enough to allow it to fit over the dashboard and still keep it sufficiently stiff for a good appearance. The cover is fastened by swiveled thumbpieces passing through slots in its lower edge. While the lower portion of the bag is comparatively stiff, the upper part may be collapsed or narrowed to occupy a very small space, and be entirely out of the way.

This invention has been patented by Mr. Michael Fahey, whose address is P. O. Box 353, Oakland, Cal.

Comparative Cost of Electrical Bleaching.

The production of electricity to bleach one ton of calico is calculated by Watson, at the lowest possible rate, at 7s. 8d., but would probably cost double that, while the bleaching with 25 lb. of bleaching powder required for that purpose, at the price of £6 10s. per ton, would cost only 1s. 5½d. per ton of calico. Besides, the platina electrodes for a daily turnout of 10 tons bleached goods would cost over £12,000, at the price of 25s. per ounce of platina. Bleaching by electricity, therefore, would be an interesting laboratory plaything, but in practice it would make the yardstick longer than the cloth.

SHAVING MUG.

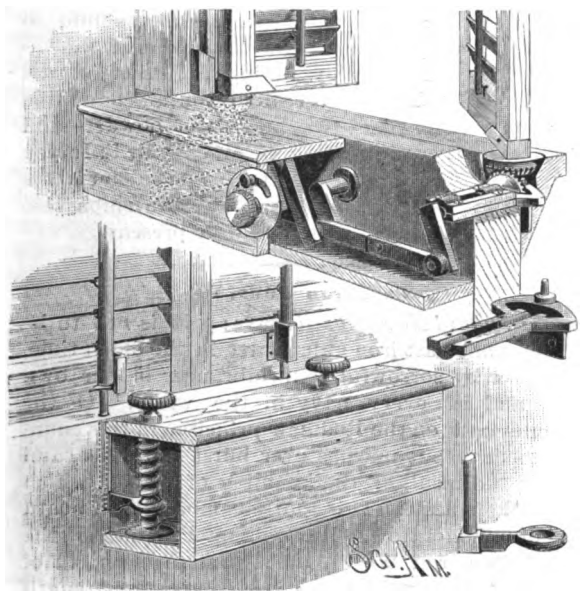
Held on the spirit lamp by spring catches is a cylinder slightly contracted at the middle, and provided with a handle, and a horizontal partition forming a

MAYLOR'S SHAVING MUG.

water cup in the upper part. The lower part of the cylinder is formed with a series of holes. The lather cup has a projecting lug pivoted on top of the handle, to permit of its being swung from the top of the water cup. A spring catch locks the lather cup in position. This convenient shaving mug, the invention of Mr. Thomas Maylor, of Oak Harbor, W. T., may be made of sheet metal or other suitable material. The parts are shown separated in Fig. 2.

DEVICES FOR ADJUSTING SHUTTERS AND BLIND SLATS.

Extremely simple mechanical means for readily setting window shutters at any desired position, between being fully open and entirely closed, as well as for adjusting the blind slats as much or as little open as wished for, are shown in the accompanying illustration. The blinds are supported by a bracket, an arm from which passes through the wall of the building, and is grooved to receive a crank shaft, which is connected by gearing with the blinds and also connected with a double crank shaft, whereby both blinds can be readily opened or closed by one knob or operating device, the thumb nut above the knob affording means of locking the blinds at any angle. To adjust the slats as desired, screws are journaled in worm shafts in the inside of the window sill, one for each blind, with a knob in the window sill to turn the screws, and on each worm a lifting device or arm extending beneath the slat rods, to which the slats of the blinds are attached.



NAYLOR'S SHUTTER WORKER AND BLIND SLAT ADJUSTER.

These inventions are the subject of two patents, which have been issued to Mr. James Naylor, of No. 322 Charles St., Providence, R. I.

SUBMARINE EXCAVATION.

We have described a number of times during the past few years the methods employed at Hell Gate for the removal of the obstruction of Hallett's Point and Flood Rock. This consisted in sinking a central shaft and excavating galleries radially from this point. In the mines thus formed were deposited immense charges of explosives, consisting, in the explosion of October 10, 1885, of 40,000 cartridges, containing 150 tons of explosives, blasting by one discharge over nine acres of surface. The method described below was that employed in 1862 in removing the rocks in the harbor of Brest, France. We are indebted to *La Nature* for the cut and the description, which informs us that this is the work of the distinguished engineer, Mr. Hersent, President of the Society of Civil Engineers. Although the means employed, says our interesting contemporary, are less striking to the imagination than those employed by General Newton, the probability is that they are more economical. This method was first used in removing the rock La Rose and others in the Harbor of Brest. It consists in lowering a diving bell filled with compressed air, much on the same principle as the caisson. This apparatus consists in five different parts: 1. The working room. 2. Float, located above the work room. 3. A central shaft, affording access below, and provided at the bottom with three air locks. 4. Two shafts for extracting rubbish. 5. A floating platform, which connects the central and the two smaller shafts. The work room is 10 meters long, 8 wide, and 2 high, and 20 or 25 men can work there at a time. The float is 10 meters long, 8 wide, and 8 high, and it may be compared to the floating bladder of fishes, and the bell will sink or float according as this is filled with water or air. The space between the girders is filled with beton, which serves as ballast.

The central shaft is 3 meters in diameter, and is provided with a circular iron staircase, and has at the lower end independent air channels. As is well known, the air chamber is a room which communicates with the outer air on the one side and with the working room on the other, to enable the workmen to reach this latter section without opening it to the outer air and to accustom the workmen gradually to the high pressure.

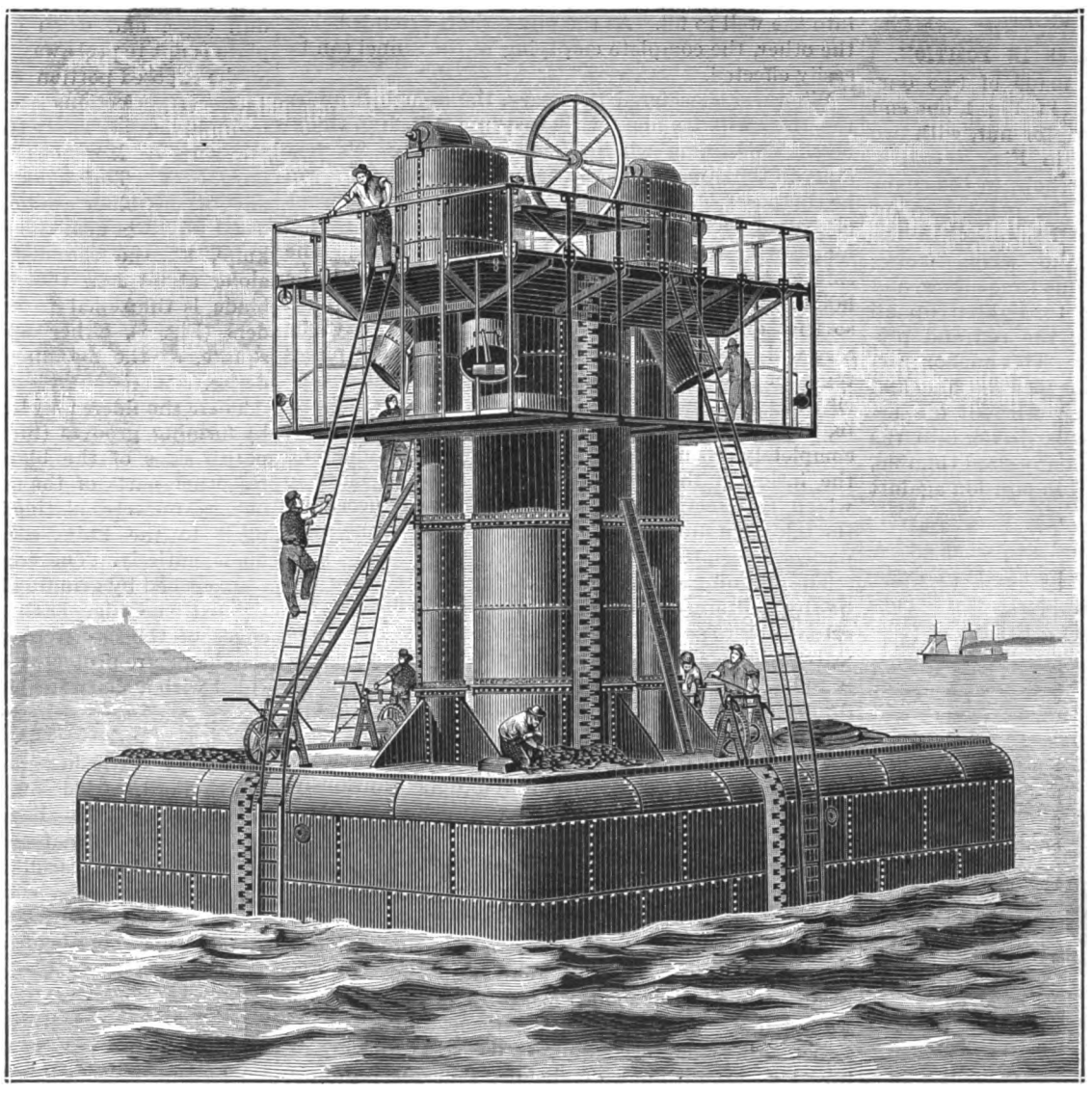
The bell has the following safety appliances: 1. A spring cock at the lower end of the pipe, which carries the compressed air to the working room. 2. Two brass gates for removing the water from the float. 3. A safety cock on the top of the float, which is always open when the apparatus is in operation, for preventing the air which traverses the bottom of the caisson from accumulating in the float.

The method of operation is very simple. The float being full of air, the apparatus is floated by a tug or otherwise to the desired location. When it is desired to sink it, water is admitted into the float and the bell sinks vertically, and it is made to settle on the rock, where a level surface may be secured for facilitating future operations.

When the edge of the working chamber rests on the surface of the rock so the water can be no longer forced out, a low wall should be made of sacks filled with clay and the larger openings closed. As soon as the bell has attained a horizontal position, clay is filled in around it, whereupon the work of excavation may be commenced. The blasting may be readily carried on under the air pressure, and each explosion removes from one meter to twenty meters of rock.

The bell weighs 330,000 kilos., and the displacement of the float and ballast, the work room being filled with water, is 450,000 kilos. The water line of the apparatus when raised is therefore 1½ meters below the platform of the float, because 10 m. × 8 m. × 1·50 m. = 120 tons.

With this apparatus Mr. Hersent contracted for removing the rocks at Brest at 62 francs 50 cents. the cubic meter, while it is probable that the cost per cubic meter by the American system would amount to 80 francs. A similar apparatus was employed at Cherbourg, and another of smaller dimensions is now in operation at Lorient.



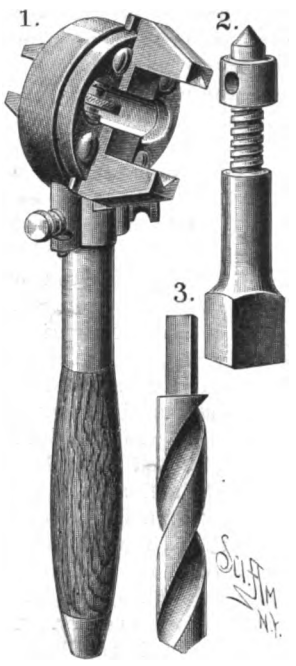
DIVING BELL FOR SUBMARINE EXCAVATION.

Frozen Milk in Fevers.

Dr. E. G. Janeway, acting on a suggestion from a colleague practicing in the country, has given frozen milk to patients whose stomachs did not tolerate ice cream, and speaks highly of its use in fevers.

IMPROVED RATCHET WRENCH AND DRILL.

The two opposite jaws of the tool are moved to and from each other by a right and left screw, which is journaled at opposite ends in a disk provided on its face with ratchet teeth, which fit loosely within an internal groove formed in the outer ring or head piece fixed to the handle. The disk is thus held to the head piece and yet is free to turn with the jaws, and the screw can be turned by its milled wheel within the disk to adjust the jaws. At the opposite ends the jaws are formed with large and small clamp heads, thus providing for grasping larger or smaller objects. The disk is cut away to form finger holes for ready access to the screw for turning it, and next to the disk the jaws have tongues fitting snugly within rabbets formed in guide plates held to the disk by screws, which also hold guide plates to the other side of the disk. These plates overlap the head piece and tend to relieve the adjusting screw and the ratchet teeth of lateral strains caused by the use of the tool. The inner portions of the plates are cut away to furnish finger room. The head piece has the form of a split ring, and at each side of the split has stems which enter the metallic socket, one at each side of a bar having a stem reaching to the back end of the stock, where it receives a nut.



Screws passed through the socket, head piece, stems, and bar bind all the parts securely together. At opposite sides the socket is formed with bored lugs, in which are fitted pawls kept normally engaged with the ratchet teeth by springs. Into each of the pawls is fitted a pin which passes through an L shaped slot in the lug. Either of the pawls can thus be withdrawn from the teeth of the disk, which can be turned in either direction.

When the tool is to be used for drilling or tapping, an internally threaded stock, Fig. 2, will be clamped in the wide jaws, so that when the threaded thrust-and-feed bar fitted into the stock is turned one way, the drill held in the opposite jaws will be fed forward to the work, while the handle of the wrench is turned forward and back to rotate the drill in either direction, according to the pawl that is in engagement with the teeth.

This invention has been patented by Mr. John W. Miller, of Mount Sterling, Ky.

New Balloon.

A new dirigible balloon of colossal dimensions, says the *Deutsche Heeres-Zeitung*, is now in the course of construction in Berlin. The inventor, Herr Gaswindt, hopes to overcome the grand difficulty in aeronautics—the attainment of a speed greater than the average velocity of the wind—by the enormous size of his balloon. A series of meteorological observations, extending over several years, has shown that near the surface of the earth the velocity of the wind in the temperate zone rarely exceeds twelve meters per second, and Herr Gaswindt expects to attain a speed of not less than fourteen to fifteen meters. A sum of 200,000 marks, it is said, has already been offered for the patent. The balloon is 150 meters in length and 15 meters in diameter, with a capacity of 18,000 cubic meters, about ten times as great as that of the Renard and Krebs balloon. The total weight is about 430 cwt., the envelope and netting alone representing 100 cwt. The propelling machinery consists of two steam engines of 50 horse power each. The cost is estimated at 100,000 marks ($50,000).

George Westinghouse.

George Westinghouse owes his great and rapidly increasing wealth to his inventive genius. Twenty years ago he was a poor young man, but he struck it rich in his air brake for railroads, and money has since flowed into his coffers in a golden stream. He is one of the most prolific inventors of the age, and has enough good mechanical ideas to furnish every manufacturing establishment in Pittsburg with successful specialties. He is not only highly skilled in theoretical and practical mechanics, but is also a thorough electrician. He expends an ordinary fortune every year in experiments necessary to the perfection of his inventions. By warrant of the King of Belgium he is entitled to the title of Sir George Westinghouse, having been knighted by that monarch as a recognition of his services to the world as an inventor.

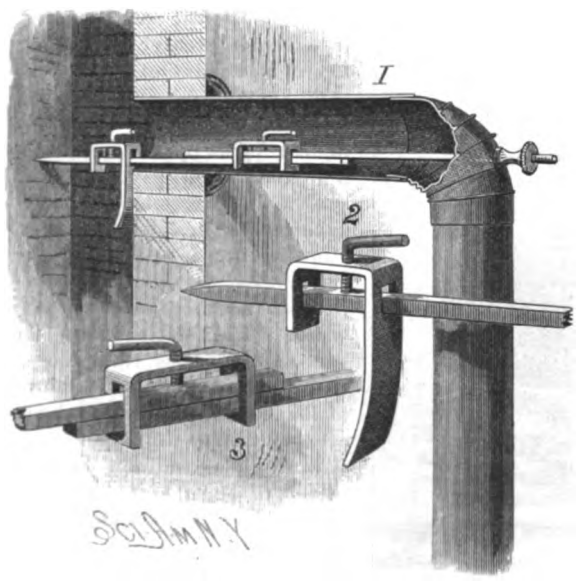
Gas Wells Fired by Lightning.

The burning of natural gas wells in Pennsylvania are sights as thrilling to the beholder as they are dangerous to adjacent property. We have given the particulars of these on various occasions. Recently one of these wells took fire, and a volume of flame shot up into the air for several hundred feet with a velocity that was astounding, showing that the pressure of gas from beneath was something beyond comprehension. This well burned for a long time in spite of all efforts to shut off the flame. It was finally done by means of a huge extinguisher, which was advanced slowly to the mouth of the well and then raised vertically, thus shutting off the air and smothering the flame.

A few days since, one of these wells was set on fire in a very curious manner. The workmen had drilled down until gas in small quantities was found to arise through the boring. A sudden storm came up, the atmosphere became thick and prevented the gas from rising freely. The workmen anticipated trouble, and hastily departed from the well. They had scarcely got to a safe distance when a flash of lightning ignited the gas in the atmosphere over the well; flames instantly communicated to the well itself, the result being that the gas in the lower regions was released, and shot upward with a terrific flame to a height of 200 feet or more. The well burned for several days, the column of flaming gas mounting into the air and lighting up the surrounding country for miles. Another well was struck at the same time in another section of the oil regions, and was burning for a long time, threatening adjacent property. Fires occurring in the products of the oil regions, whether gas or oil, are extremely difficult to extinguish, and the amount of property lost in consequence of them is immense.—*Fireman's Journal.*

AN ANCHOR TO HOLD STOVEPIPES IN POSITION.

The device herewith shown is made of two one-quarter inch square rods, as shown in Fig. 1, one end pointed and another end threaded for nut, with two clamps with set screws, as shown in Figs. 2 and 3. It is applied by making a square hole in the elbow with the pointed end of the rod, the pointed end of the anchor being driven into the back wall of the flue enough to give a hold, the whole being readily adjusted for distance of flue from elbow, and the nut on the outside serving to tighten up all the joints, the square hole fitting the rod and preventing the anchor from turning. This anchor prevents the pipe from going too far into the flue, and also holds it securely from falling, without the necessity of unsightly wires and nails driven into the wall. It will hold any sized pipe in any sized thimble, and the flange plate is firmly held in position against



TUCKFIELD'S STOVEPIPE ANCHOR.

the wall, to prevent air from drawing through and interfering with the draught.

This invention has been patented by Mr. Charles B Tuckfield, of No. 533 First East Street, Salt Lake City, Utah.

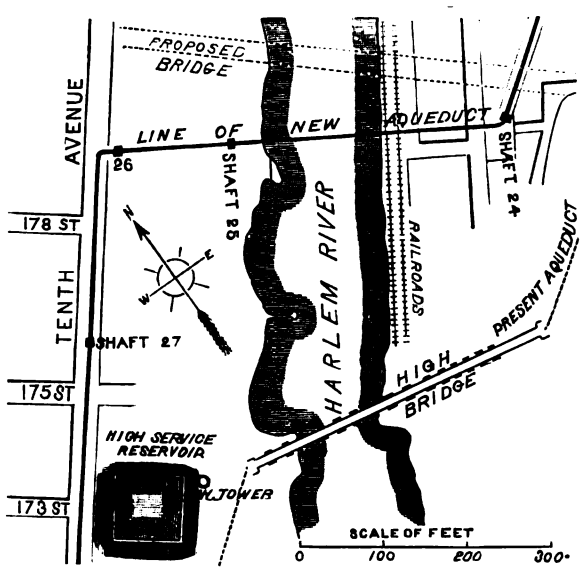
THE NEW AQUEDUCT UNDER THE HARLEM RIVER.

(*Continued from first page.*)

long, and is to contain two masonry wells, each 12 ft. 3 in. in diameter, and a drain pipe 36 in. in diameter. The cast iron lining for the wells is to have a tensile strength of at least 16,000 pounds per square inch, is to be 1¼ in. thick, and each ring, at least 5 ft. high, is to be cast complete or in four or more segmental pieces.

One of these wells will unite the aqueduct under the Harlem with that leading to the city, while the other will extend a short distance below the first to form a sump, and is designed to be used as a pump shaft, a gate forming a passage between the lower ends of the two wells. From the top of each shaft, near the top, a blow-off pipe 4 ft. in diameter will lead to a chamber built in the face of the bluff just above the river level, and each pipe at its end will be provided with a valve.

The pump shaft will only be used when it is necessary to remove the water from the tunnel to make inspections or repairs. The water will then be pumped



MAP OF AQUEDUCT AT HARLEM RIVER.

out by means of an ordinary hoisting engine operating an iron cylinder 4 feet in diameter by 15 feet in length. This cylinder or bucket will be lowered into the pump well, when it will fill with water through a butterfly valve in its bottom; when raised, a valve in the side of the bucket will be tripped automatically, and the contents—about 1,500 gallons—will be discharged into the blow-off pipe leading to the Harlem. Of course, the bucket each time needs only to be lowered far enough into the well to fill. As the pump shaft extends below the other, the complete emptying of the tunnel can be easily effected.

Wherever considered necessary, the aqueduct under the river will be lined with cast iron, 1 inch in thickness. This lining will be made up of rings, 2½ feet long, in the direction of the tunnel, and each ring will be composed of four segments, put together by means of bolted flanges. The joints will be made of lead, 2 inches wide and one-sixteenth of an inch thick. The side and flanges are to be accurately faced, and the holes through the flanges are to be drilled to templets, so that all pieces will be interchangeable. Extreme care will be exercised when putting these lining pieces together to make every joint watertight, and after each ring has been put up and fastened to the one already in, the masonry will be built around the iron until it completely fills up all the space between the lining and the inside of the excavation. The great pressure to which this section will be subjected makes necessary the taking of unusual care to insure work of the most perfect description.

The draining of the tunnel during construction will be by a drain cut in the rock below the floor of the excavation to such a depth as to entirely free from water the portions where the masonry of the floor is to be laid. Before the completion of the work, the drains, of vitrified sewer pipe, will be filled with masonry.

Compressed air drilling machines are to be used, and the work of blasting is to be done cautiously, so as not to endanger the roof by exploding too large charges of explosive.

The contract price of the section is $430,000.

Loss of Fire Hose by Acids.

A few days since, a fire occurred in the Harrison Chemical Works at Gray's Ferry, near Philadelphia, resulting in a loss of some $75,000. The firemen from Philadelphia were early at the scene, but were obstructed in their work from the fact that the fire released a large volume of chemicals in the building, which, flowing down the gutters of the street, saturated the hose and destroyed it completely. In a very few moments the chemicals ate holes through the hose, thus stopping the flow of water and destroying the hose entirely. As the adjacent buildings were also stored with various chemicals, the firemen worked in peril of their lives the entire time.

The Mefford Gun.

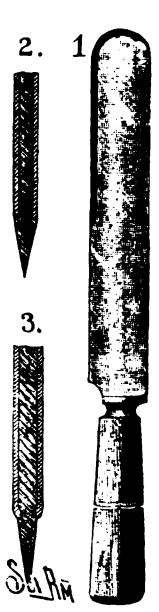
Some experiments were lately made in Washington at the foot of Pennsylvania Avenue southeast, near the navy yard. The gun is a small one, 3 inch caliber, composed of two concentric cylinders, the inside one being of steel, the outside or re-enforce of cast iron, and a space for a non-compressible fluid between. The aggregate strength of the two cylinders is only about one-third that of the navy 8 inch steel gun. The charges fired were the same as the regular charge of the navy gun, there being used one pound of powder and a seven pound projectile. Between the discharges a stopcock was sprung to allow the fluid to flow out, to compensate for the expansion of the inside tube by heat, thereby taking the strain off the re-enforce. The last charge fired contained double the amount of powder—two pounds of powder—and the gun stood the strain well. Lieutenant R. E. Impey of the navy; D. M. Mefford, the inventor; members of the Venezuelan, Japanese, and German embassies, and several members of Congress were present.

Cast Iron Guns.

The *Army and Navy Gazette* says: "It is not to be forgotten that cast iron guns burst in the olden time, as we know by sorrowful remembrance, in our own service and in every navy in the world." Of the iron guns cast on the Rodman principle in this country, we believe but one has ever burst in service, and that was the result of the jamming of a shell, which blew off the muzzle. This gun was mounted on board of one of our monitors. Mr. William P. Hunt, of the South Boston Iron Works, holds that the strength of heavy steel forgings is overestimated and the strength of gun iron underestimated, and that the divergence from the line of truth has become wide. He says: "It is my belief, based upon what I know of the endurance of gun iron castings, that guns made of this material, of the same weight and dimensions as the modern steel guns, are quite equal to the strain which modern gunpowder gives, using the charges adopted for steel guns, and are quite as reliable for endurance. I have backed up this belief by offering to furnish such guns for such test free of cost to the Government, on condition that, should the said guns endure this trial, an order should be given for similar guns, at half the cost of steel guns."

IMPROVED TABLE KNIFE.

Silver plated table knives, as ordinarily made, are formed of steel, are ground, polished, nickeled, and afterward silvered and burnished. Knives made in this way have a dull edge, and when ground the plate is apt to peel away, beginning at the exposed portion of the steel. These imperfections are overcome by an invention lately patented by Mr. Miles A. Morehouse, of Johnsburg, N. Y. The shank and upper part of the blade are forged in the usual way, but near the edge of the knife, at the rounded end and along about half the length, the blade is thickened to form shoulders (Fig. 2), either undercut or square, as the manufacturer may desire.



These shoulders may be produced by forming grooves (Fig. 3) in opposite sides of the blade, leaving the other parts of the usual thickness. An electro plating is then applied to the knife, covering the blade entirely. The edge is then resharpened by grinding and polishing the steel, from the extreme edge back as far as the shoulders. The edges of the electro plating which abut against the shoulders are protected by them, and the knife is provided with a sharp steel edge.

TEA KETTLE.

The tea kettle here shown is the invention of Mr. Pierce Ford, of Tucson, Arizona. It is simple in construction, and can be used for warming plates or keeping food warm. On the bottom edge, at each end of a sheet metal strip is a lug bent at right angles to the strip. These lugs are riveted, and the strip is soldered to the top of the kettle. The strip is in the shape of a semicircle, and is placed a short distance from the edge of the opening in the top. The ends of the bail are pivoted to the ends of the strip, so that no extra lugs are required. The dishes to be kept warm are placed on the bail and strip, which may be ornamented in any suitable manner.

Correspondence.

Cultivation of Orange and Other Fruit Trees.

To the Editor of the Scientific American:

A noted orange grower of Florida, whose grove is situated on very rich hummock land, plants sugar cane between the orange rows to deplete the soil, so that the orange trees will grow slowly. He claims that if this is neglected the trees will grow rapidly one year and then blight. Is it not possible that we find here an explanation of the blighting of pear and other fruit trees on the rich, deep soils of the West? Some pear grafts on our own farm grow six feet in one year—blighted the next. Some suitable system of soil depletion might prevent the too rapid growth and consequent blighting of fruit trees.

A great many Western fruit growers follow the instructions of Eastern men, who say manure your orchard. Good advice in the East, which has a poor soil, but probably not good in the West, where the soil is rich and deep. Let fruit growers consider this problem. S. P. C.

Warrensburg, Mo., May 18, 1886.

Discovery of Another Comet by Brooks—No. 3 of 1886.

To the Editor of the Scientific American:

I have the honor to announce to the readers of the SCIENTIFIC AMERICAN my discovery of another new comet—third one of the year.

This discovery was made last Saturday evening, May 22, and of which announcement by telegraph and cable was promptly given. The new comet is now in the western end of Virgo, and is moving slowly southeast. This is a nebulous region, and cometary detection therein is exceedingly difficult. Comet is quite large, nearly round, and at discovery a brightish telescopic object in large instruments.

Accurate observations are being secured, and its future developments will soon be known.

WILLIAM R. BROOKS.

Red House Observatory, Phelps, N. Y., May 27, 1886.

Brooks' Comet No. 1 of 1886.

To the Editor of the Scientific American:

Referring to the communication of Mr. Burt in your last issue, I beg simply to say that he is wholly mistaken in thinking the object he saw was the comet discovered by me April 27. My comet at the time he mentions was not in that part of the heavens, but on the opposite side of Cassiopeia—west—and much farther north. Moreover, he has described it as visible to the naked eye, while mine was a telescopic object, and, under the conditions of dawn and full moonlight existing at the time stated, was practically invisible in the largest telescopes.

The object he saw was the head of Fabry's comet, the slight tail which it had being rendered inconspicuous by the moonlight and dawn.

Comets are not identified simply by their appearance, or their resemblance to woodcuts, but by the more exact determinations of their positions and the elements of their orbits. WILLIAM R. BROOKS.

Red House Observatory, Phelps, N. Y., May 28, 1886.

A Remarkable Man and Successful Inventor.

The Williamsport *Gazette* says: "The deed conveying John DuBois' property, valued at about $8,000,000, to his nephew, John E. DuBois, is absolute. It bears date January 17, 1884, so that, although for more than two years young John E. DuBois has been in his uncle's employ, taking orders from whatever superintendent he chanced to be working under, he has been the actual owner of the entire property. No one knew it but himself and his uncle. The senior DuBois, who was seventy-seven years old, had been ailing lately, and decided to make the deed public. The only consideration in the deed is that John E. DuBois shall pay one dollar and all debts, and fill all contracts his uncle made till the day of his death. His purpose in making the deed was to make sure that his business should go on in single and absolute ownership, just as he had conducted it, for a period of twenty years after his death, and that the eight hundred workmen in his employ should not be distressed by the stoppage or embarrassment of his enterprise. The deed makes no mention of any of the other heirs, of whom there are a great many, John DuBois being the only bachelor in a family of fourteen. It is left entirely to the conscience of John E. DuBois whether any of them shall ever have any share in the estate or not. The young man is about twenty-five years old and unmarried. He was educated at Chester Military Academy.

"John DuBois stood easily at the head of the lumber business of Pennsylvania. It is doubtful if there is any man between Maine and Michigan who owned more timber land and cut more timber than he did. Every year he cut and sawed about 36,000,000 feet of lumber, enough to build the dwelling houses of a town of 10,000 people. He owned at the time the deed was made 33,000 acres of land in one connected body about his town of DuBois, on which there is standing 350,000 feet of white pine lumber, besides many million feet of hemlock. About 8,060 acres of it is underlaid with a valuable vein of coal, being on the western side of the Reynoldsville basin. Besides his large buildings, Mr. DuBois had one-fourth interest in a tract of 70,000 acres in West Virginia, which the ax has never touched, and large real estate interests in Havre de Grace and Williamsport. At DuBois he had mill improvements worth $75,000. When he went there, ten or twelve years ago, there were only three houses in the town. It sprang up without waiting for the timber to dry. It now has 7,000 population.

"John DuBois began life with almost no capital, and was a raftsman on the Susquehanna at the age of seventeen. His inventive genius helped him greatly. His mills are full of his devices. Whenever he found an impediment in his path, he invented something to overcome it. He recently recovered $30,000 from the Baltimore and Ohio Railroad Company for the use of his patent for deep water foundations. The automatic dam which bears his name is well known. He owned about fifty patents altogether. He owned the fine hotel and half the property in the town of DuBois, and had just completed a new opera house. He got the first large start in his fortune by investing in cheap timber lands, and the secret of his large profits in recent years has been the perfection of his machinery and the variety of his products, which enabled him to use up all the timber he cut and avoid waste and middlemen's profits. He manufactured houses and shipped them all fitted and complete, so that a hatchet and nails were all that were required to put them together at their destination. A rough pine log brought from the woods to his mill, over his own line of railroad, came out at the end of the works in the shape of boxes, boards, lath, and barrel heads. Every scrap was turned to profit. There was no waste except splinters and sawdust.

"His works at DuBois have a capacity of 75,000 feet of lumber, 6,000 boxes, 5,000 barrel heads, and 60,000 shingles a day, besides a hemlock mill with a capacity of 40,000 feet daily, and a large tannery and machine shop. He had a farm of 1,000 acres, employed 800 men, and knew every one of them. He had been seriously ill for several months, and recently had Dr. Agnew, of Philadelphia, taken up to DuBois on a special train. The Doctor stayed just thirty-five minutes. Though a man of warm heart and genial disposition, Mr. DuBois never married. He never used liquor or tobacco."

International Competitive Trials of Seed and Manure Drills in Italy.

In conformity with the royal decree, 11th of February, 1886, an international competition of sowing machines (drills) will be opened at Foggia, for the purpose of extending the use of the best of them, and in order to diminish the expenses of cultivation and to increase and improve the production of the soil. The decree contains among others the following items: 1. An international competition of sowing machines shall be opened at Foggia on the 20th of October, 1886, and shall be closed on the 30th of November. 2. All national and foreign inventors, constructors, and agents can take part in the competition. 3. All agents, national and foreign, taking part in the competition are considered only as representatives of the constructors, and in case of merit, the prizes shall be awarded to the latter. 4. To the said competition are admitted machines to sow in rows and to scatter the seed, as well as those combined both to sow seed and to distribute manure. 5. An executive commission, according to the ministerial provisions, provides everything necessary for the success of the competition.

The said Commission is composed of the Director of the Professional School at Foggia, who is also the president; of a delegate of the Provincial Council, of a delegate of the Municipality of Foggia, of a delegate of the Chamber of Commerce, and of a delegate of the Royal Economical Society of Capitanata. 6. The prizes established by the royal decree aforesaid are as follows: (*a*) A diploma of honor, and the purchase, made by the Ministry of Agriculture, of five sowing machines of the system which shall obtain the first prize; (*b*) two silver medals, with 200 Italian lire each; (*c*) ten prizes, of thirty Italian lire each, to those laborers that during the experiments shall employ themselves in driving and regulating the machines, and that shall give proof of having best learned their management. 7. A special jury appointed by the Ministry awards the prizes. 8. All sowing machines presented to the competition must be subjected to all the experiments prescribed by the jury, both on flat and on hilly ground.

In order to facilitate the experiments, the jury is authorized to elect additional members with a consultative vote. (9) The expenses for the transfer of the machines to the railway station of Foggia and back are at the charge of the competitors; they shall, however, enjoy all such advantages as are granted in such cases by the railway and navigation societies for the transfer of the machines, as well as for the respective fare of the competitors and their agents and workmen. (10) The various expenses for the experiments of the machines, and for hire of the animals required, are defrayed by the Executive Commission on account of the Ministry of Agriculture. 11. Applications for admission to the competition must be forwarded to the Executive Commission, Office of Agriculture, Industry, and Commerce, Rome, not later than the 20th of September, accompanied with all such technical and economical information as the competitors shall deem useful for the better knowledge of their machines, stating the space occupied by them and the number of animals required to set them in motion.

What is Soda Water?

This question is answered by the firm of John Matthews, of this city, as follows: Soda water consists of ordinary drinking water impregnated with carbonic acid gas under pressure, usually sweetened with flavored sirups, and cooled to render it deliciously palatable and refreshing. Without sirups it is generally sold by druggists in siphon bottles as carbonic acid water, and is prescribed and recommended by all physicians as beneficial and healthful.

How is soda water made? Pure water, free from chemical or organic impurities, is the first requisite. Injurious chemicals dissolved and held in solution are invisible, often occurring in the brightest and clearest spring water. Chemical analysis only can detect them. Organic impurities held in suspension can readily be removed by filtration.

In New York artesian well water is unfit for use. Hygeia water or carefully filtered Croton is the best.

To obtain the gas, a compound of carbonic acid and lime (usually marble dust) is placed in a generator with sulphuric acid sufficiently powerful to combine with the lime and displace the carbonic acid, which is liberated as a gas.

The pure gas thus discharged accumulates under pressure, and is conducted from the generator through purifiers to a receiver about two-thirds full of pure water.

By agitation the contents are thoroughly mixed, the pressure raised to about 150 pounds to the square inch, and the fountain is ready to attach to the cooling box for use.

Bicarbonate of soda was used in the making of soda water by an old process—hence the peculiar name. We would suggest "carbonade" as more appropriate.

The sirups should be flavored only by the true juices, or by extracts made from the natural oils, expressed from fruits, etc. Artificial chemical flavorings are common, but dangerous.

Impure soda water is often the result of using polluted water, impure gas, deleterious sirups, etc., but the greatest danger arises from improperly constructed reservoirs for holding the soda water, from metallic contamination in the coolers, pipes, and connections, and metal sirup jars or faucets.

For the quality of materials used, you must rely on the reputation of the manufacturer.

The soda water should keep good indefinitely if stored in pure block tin fountains incased by steel.

Satisfy yourself that the dealer does not use copper fountains—which are always liable to poison the contents—by asking him frankly, "Do you use copper fountains?"

The sirups, to be pure, must be kept in glass tanks or bottles without metal spouts. Metal cans or metal faucets of any description are exceedingly dangerous.

The New York and Brooklyn Boards of Health have passed rigorous ordinances, and are taking steps to stop the sale of the poisonous trash so often sold as soda water by unscrupulous dealers, and even by some druggists of popularity and reputation.

Flint Walls.

Flint walls are formed between two planks or frames, the lime being poured among the flints in a liquid state. In some cases the largest flints are selected, two courses laid with them—one outside, the other inside of the wall—and the center filled up with smaller flints and liquid mortar; the lime should be mixed with sharp sand and clean gravel. The corners are formed of brick, and longitudinal bands of brick are also introduced from 2 feet to 2 feet 6 inches apart; these bands are formed of two courses of bricks, one header and the other stretcher. Where bricks cannot be had, flat bedded stones may be used for these bands.—*W. Fowler, in The Architect.*

Home-made Printing Press.

Referring to the home-made printing press described in our issue of May 1, Mr. Henry Pohlmann, of Louisville, suggests two improvements: first, the introduction of a roller let into the pieces for giving strength to the top of the platen, so as to reduce the friction between these pieces and the eccentric roller; and secondly, set screws and movable journal boxes in the two uprights, so that the eccentric roller can be raised and lowered for the use of long or short type.

TESTING MACHINE.

There are several different types of machines for testing the resistance of material under strain from traction, flexion, or compression. The house of Chauvin & Marin-Darbel, in France, makes a specialty of all types of machines for testing different substances.

The fundamental principle upon which these machines are constructed is shown in Fig. 1, which represents a cross section of one of them.

Under the immovable head, A, is a rubber packing in connection with a movable plate, the socket of which, B, supports through a cross bar the end of the lever, L, from which is suspended the double lever, M. This carries at each end pending arms, provided at the bottom with knives, upon which rests the bar which is to be subjected to a bending strain. To the middle of this bar is applied a yoke connected by the cap, P, with the piston, C.

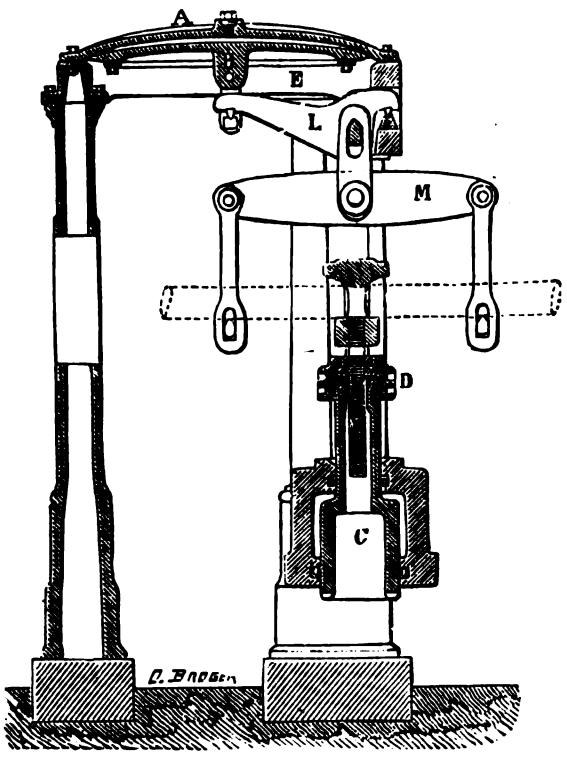


Fig. 1.

The space between the fixed head, A, and the rubber packing is filled with water, and is connected with a pressure gauge.

Everything being arranged as above, water is injected in the piston, C, which is forced down, drawing with it the bar to be tested, while the extremities of the bar rest on knives which answer as bearings equal distances from the axis. When the desired effect is attained, the exact measure may be read from the condition of the mercury in the pressure gauge. The mercury in the inner branch rises, owing to the slight fall of the movable plate and the partial vacuum produced between the head, A, and the rubber packing, while the other branch, which is open to the air, indicates a fall.

The difference of level of the mercury in these two arms, taken in connection with the diameter of the movable plate and the relation existing between the different arms of levers, gives the amount of pressure in the middle of the bar as well as that on the knives, which serve as points of bearing.

The scale of the gauge, graduated by calculation, is verified by the direct application of weights on the movable plate, B.

The variations in pressure which take place during the experiment may be readily observed.

The amount of traction can be estimated by the hydraulic pressure on piston, C, or simply as in the case of a machine of less power (Fig. 2), by means of a screw threaded shaft actuated by a conical wheel engaging with a pinion. The amount that a piece to be tested has been lengthened, bent, or compressed may be observed either directly by means of a compass or an instrument having two microscopes, which indicate the measurement within one-twentieth of a millimeter. Fig. 3 shows a very powerful type of machine of 30 to 60 and even 100 tons. The pressure gauge is clearly shown with its graduations, showing the pressure in kilogrammes and the power in square millimeters.

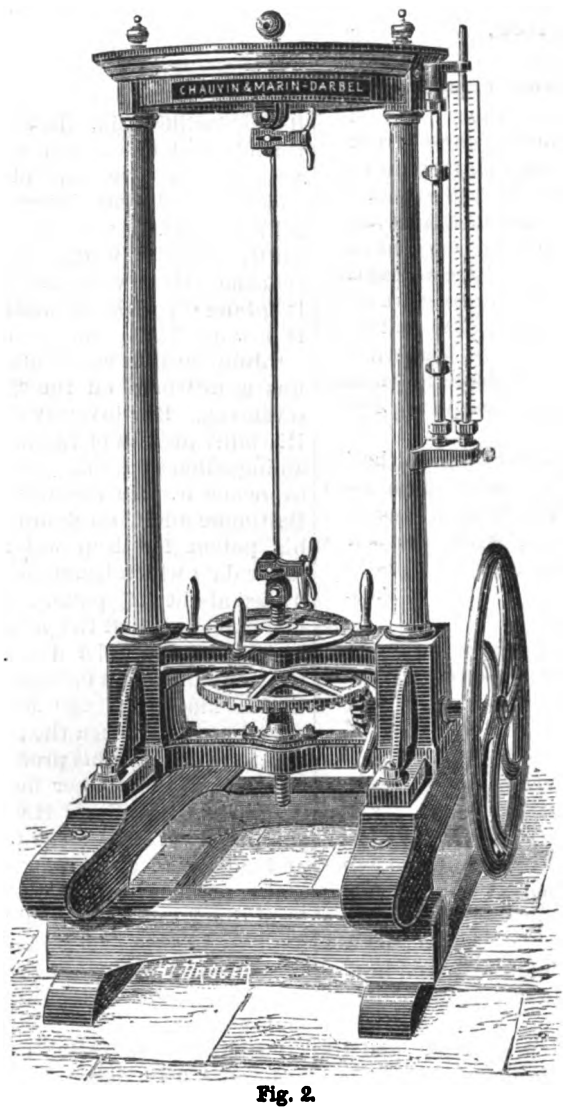


Fig. 2.

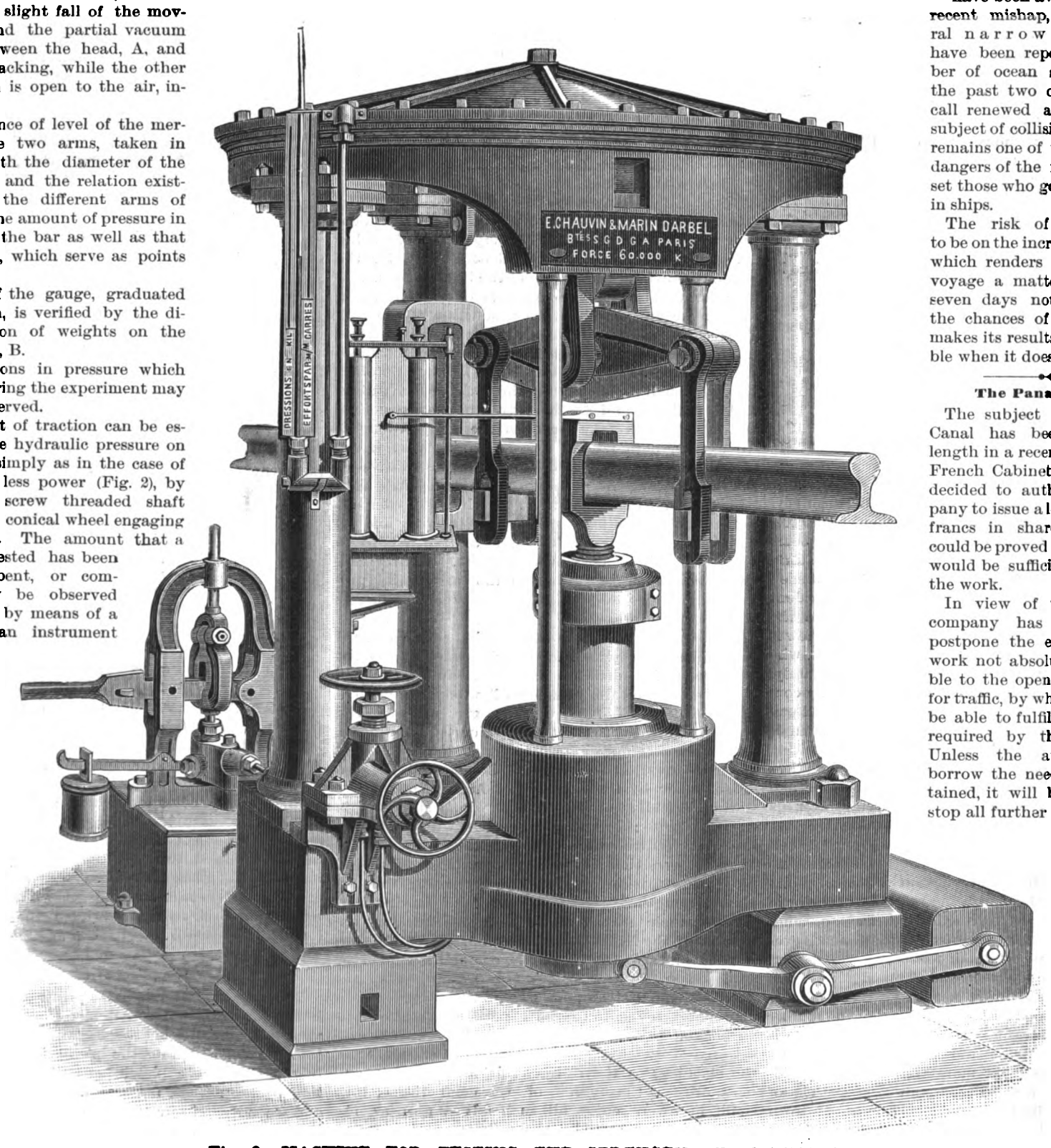


Fig. 3.—MACHINE FOR TESTING THE STRENGTH OF MATERIALS.

These machines are very exact and at the same time very powerful, and on account of their vertical position occupy but little space. —*Chronique Industrielle.*

Collisions at Sea.

During the last westward voyage of the Cunard steamer Gallia, dense fog and icebergs were encountered off the Newfoundland Banks, and when too late to avoid a collision a bark of 300 tons burden was discovered bearing down upon her port bow. The bark struck the steamer just aft the fore rigging, but glanced off without doing her any injury. The spars of the Gallia caught in the rigging of the bark, and snapped her foremast off short. Despite the fog, the steamer was going at full speed, trusting, it would seem, more to the proverbial luck of the company than to the ordinary precautions which vessels carrying passengers with less charmed lives find it necessary to follow.

Had the blow struck the Gallia 100 feet further aft, she would probably have met the same fate as the Oregon, but the parallel would have ended with the vessel, for terrible loss of life among the passengers and crew could hardly have been avoided. This very recent mishap, and the several narrow escapes which have been reported by a number of ocean steamers during the past two or three months, call renewed attention to the subject of collisions at sea. This remains one of the unconquered dangers of the many which beset those who go down to the sea in ships.

The risk of collision seems to be on the increase. The speed which renders the transatlantic voyage a matter of but six or seven days not only increases the chances of a collision, but makes its results the more terrible when it does occur.

The Panama Canal.

The subject of the Panama Canal has been discussed at length in a recent council of the French Cabinet. It was finally decided to authorize the company to issue a loan of 600,000,000 francs in shares, provided it could be proved that this amount would be sufficient to complete the work.

In view of this action, the company has determined to postpone the execution of all work not absolutely indispensable to the opening of the canal for traffic, by which they hope to be able to fulfill the conditions required by the Government. Unless the authorization to borrow the needed sum be obtained, it will be compelled to stop all further work.

A National Library.

The library bill has now passed the Senate, and only awaits the President's signature to become a law. It provides for the erection of a fireproof building on grounds lying east of the Capitol. When completed, the building will hold 3,000,000 volumes. It will measure 450 by 300 feet, and cover about three acres of ground. The architecture will be in the style of the Italian renaissance. It is expected that the building will be ready for occupancy in three years, and will be provided at once with shelving for 1,000,000 books.

The Congressional library now amounts to 543,441 volumes of books and 170,000 pamphlets. The British Museum, whose buildings cover an area of five acres, contains 1,500,000 volumes, while the National Library of France has 2,300,000 volumes. The proposed library building will have a reading room as large as the rotunda of the Capitol. On the second floor there will be an art gallery 300 by 35 ft., in which the large collection of photographs, photogravures, lithographs, and other art publications deposited with the librarian for copyright purposes will be displayed.

Aurora Sounds.

In March, 1885, Sophus Tromholt dispatched some thousand circulars to all parts of Norway containing different queries regarding the aurora, and among them also the following: "Have you or your acquaintances ever heard any sound during aurora, and, in this case, when and in what manner?" Up to Sept. 16, he had received answers to these queries from 144 persons. Of these, not less than 92, or 64 per cent, believe in the existence of the aurora sound, and 53 (36 per cent) state that they have heard it themselves, while the other 39 cite testimonials from other people; only 21 (15 per cent) declare that they have never heard the sound and know nothing about it, and the other 31 (22 per cent) have not noticed the query at all. There are thus 92 affirmations against 21 negations. The sound is variously described in these answers as sizzling, creaking, whizzing, rustling, crackling, hissing, whispering, rushing, buzzing, rippling, roaring, din, breezy, whipping, fanning, clashing, flapping, sweeping, etc.—*Nature.*

ART IN THE HOUSEHOLD.

The illustration herewith conveys an idea of elaborate ornamentation and richness of detail which it is to be supposed are only found in the choice rooms of any house—those which have to serve for the reception and entertainment of the most favored visitors. The apartment is of sufficient height to give full effect to its beautiful Corinthian columns and the arches that spring therefrom, while the rich carving on the furniture appropriately supplements that of their foliated capitals, and the high polish of the tessellated marble floor is abundantly evidenced by the mirror-like shadows which it reflects of all the objects in the room.

The Sanitary Value of Trees.

Dr. Stephen Smith recently read a paper before the New York Academy of Sciences on the sanitary value of trees in the city. It is a well known fact that during the intense heat of summer there is more suffering and death from sunstroke and high temperatures in the Northern cities than in the South, a result which must certainly be attributed to the absence of suitable protection. From three to five thousand people die every summer in the metropolis from the effects of heat.

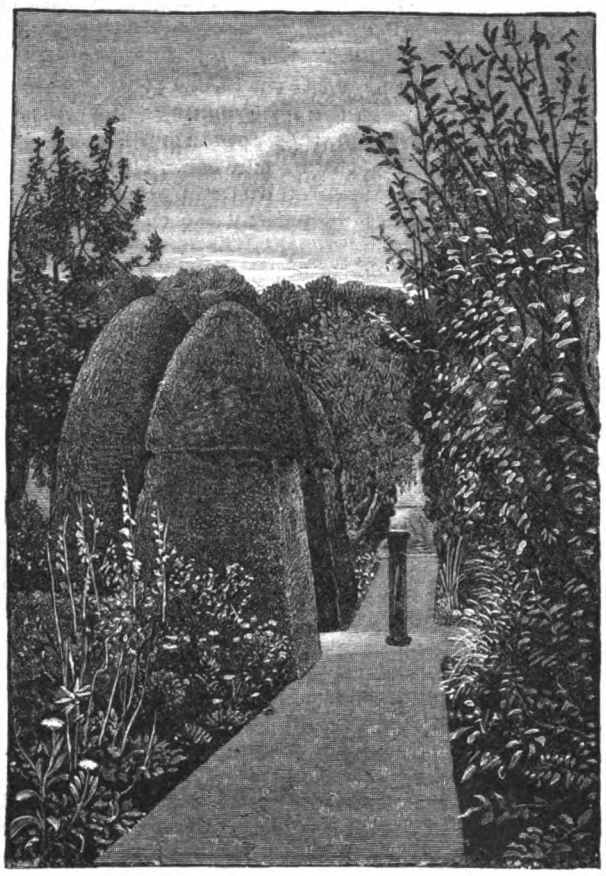
In the arid, treeless streets and avenues the temperature often runs from 130° to 150° Fah., when under the branches of a thrifty shade tree it would not exceed 70° or 80°. In the absence of sheltering trees, the stone and brick walls act on the principle of the regenerative furnace, and absorb the heat of the sun to yield it up again during the night. If trees were planted in the streets, the pavements and surrounding walls would be much cooler, and at the same time the trees would absorb the deleterious gases thrown off from the lungs and from decomposing matter, yielding, in return, a supply of pure oxygen.

The value of a systematic culture of trees in all of our large cities can hardly be estimated. From both a sanitary and artistic standpoint they are a very desirable addition to any city.

A SAFE and sure hypnotic, according to Dr. K. Gunzberg, of Moscow, is chloral hydrate in doses of one gramme, given diluted per anum.

ORNAMENTAL GARDENING.

The working out of elaborate designs in ornamental gardening, by the pruning and training of plants in



ART IN THE GARDEN.

accordance with a carefully studied plan, so that certain effects shall be produced as the plants grow, has been practiced to a considerable extent in some of the principal public parks in Europe and in the grounds forming portions of many extensive private estates. A straight path and border, forming a little scene on which a great deal of such labor has been expended, in the grounds of Naworth Castle, are shown in the accompanying illustration. A permanent border such as that here illustrated must be thoroughly dug and drained, and the soil varied wherever necessary to suit the needs of different plants, which must be arranged with due regard to the time of their blooming and to the color of those that are in bloom at the same season. A border thus prepared is a work of time, thought, and labor, but, once well made, it will not have to be dug up every season, and the necessary amount of pruning and training to keep in order such forms as those here shown, even, will not be very great, while the proper combinations of color, once obtained, repeat themselves without any further trouble or arrangement for several years. The training of trees and plants into many different forms of pyramidal and fan-like development is no way difficult, involving mainly the proper exposure of the different branches to light and the guiding of their direction, which largely affects the flow of sap, in connection with judicious pruning—details which the attentive gardener, with a loving appreciation of the varied effects to be attained, cannot fail to quickly master.

AN ORNATE DRAWING ROOM.

Seasoning Stones.

A consideration in the use of stone for important buildings is that of having it quarried, stored, and seasoned for some time before being hewn and placed in the walls. By these means the natural sap is allowed to evaporate, and the stone tested as to its quality. This would add to the cost, but the money would be well spent if this precaution prevented the wasting of stones from the rains, frosts, or atmospheric influences which, especially in our cities, soon act on the surface of a newly quarried stone. Stone that is quarried the one day and built in the next is in a green state, and unfit for use. It is not in condition—it is at its weakest—its pores are open and ready to absorb, not only moisture, but the gaseous and disfiguring influences which tend to its destruction. Every hewer knows that to get a polished surface on a stone that has lain for some time is very different from what he gets on one fresh from the quarry, and this of itself should be sufficient evidence to warrant the precaution I have recommended, which is to thoroughly season the stone before using.—*J. Gowans, in the Architect.*

American Newspapers.

The wonderful growth of American newspapers is shown by a comparison between the directories published in 1776 and in the present year. The one contains in its sixteen small pages a list of 37 newspapers which were published in this country one hundred and ten years ago. The other is almost as large as an unabridged dictionary, and in its two thousand pages contains the names of 14,160 newspapers and periodicals of all classes. Of this large list, only seven were found in the directory of 1776. The net gain of the year has been 666. The daily newspapers number 1,216, a gain of 33. There are about 1,200 periodicals of all kinds which presumably enjoy a circulation of more than 5,000 copies. The increase in the rural weekly press, comprising about two-thirds of the whole list, has been most marked in States like Kansas and Nebraska. Kansas is also accredited with the greatest gain in daily newspapers. In Massachusetts the weekly press is growing, but magazines and monthly publications are losing ground. The tendency of this latter class seems to be toward New York city, as at least 23 monthly periodicals have been established here during the year.

Among the many newspapers published in this country, almost every social movement and industrial interest finds expression. A glance at the long list reveals many curious facts. There are about 700 religious and denominational newspapers, nearly one-third of which are published in New York, Philadelphia, Boston, and Chicago. New York is far ahead in this respect, while it will be a surprise to many to know that Boston is behind Chicago. Three newspapers are devoted to the silkworm; six to the honey bee; thirty-two to poultry; eighteen to dentistry; and nine to phonography. There are three publications issued in the exclusive interest of postage stamp collectors, and one of dancers. The Prohibitionists have 129 papers, and the liquor dealers 8. The organs of women's suffrage number 7, of candy makers 3, of gastronomy 3, and gas 2. Of the foreign newspapers, there are about 600 in German, and 42 in French. New York, New Orleans, and Worcester, Mass., each has four French publications. Two dailies are in Bohemian. Besides these, there are papers in the Swedish, Finnish, Polish, and Welsh languages. There is one publication in Gaelic, one in Hebrew, one in Chinese, and one in the Cherokee language.

Gaining and Achieving.

There are two purposes influencing and shaping the life of every healthy and active man and woman—the purpose of gaining something and the purpose of doing something. Both are needful for the welfare of the individual and the best interests of society, but the emphasis which is laid on one or the other marks an important distinction in character and result. Though blended together, one generally comes to be the ruling purpose of life, the other exists to do it service. All that some men do is done for the purpose of gain; others gain for the purpose of doing.

Two persons are employed side by side. The mind of the one is entirely occupied with thoughts of the pay he is to receive. On this all his hopes and anticipations are fixed. No other result of his labor interests him. His aim is to get the maximum of money for the minimum of work, and all his efforts are directed, wisely or unwisely, to this end. The other is by no means indifferent to his compensation. He looks forward to pay day, and sees in it various means of happiness. But he also has another purpose in view. Not only nor chiefly what he is going to *get*, but what he is going to *do*, dwells in his thoughts and animates his hopes. He wants to make his work excellent; he feels an honest pleasure in its quality, its strength, its fair proportions, or its finish. He hopes to acquire still greater skill, and to work out still better results.

Here again are two employers; they may be contractors, or manufacturers, or merchants. One is absorbed with the desire of gain. He looks on his workmen, or operatives, or clerks as upon so many machines, which may be made to fill his coffers, and his settled policy is to get from them the most work for the least pay, while in dealing with his customers his chief aim is to secure as much money for as little value in goods as possible. The other hopes for a fair reward for his exertions, but he hopes also for other things. He gauges his business prosperity, not alone by his yearly balance of profits, but also by the character he has established for integrity and fair dealing, by the welfare and happiness of those he has employed, and the degree to which his labors have benefited the community. His gains, whatever they may be, are not the one end to which he has sacrificed all else, but rather the means by which he intends to enlarge his power for good, both to those who serve him and those whom he serves.

So in every occupation, and in all the phases of life, the same distinction may be seen. Some are struggling for name and place, applause and fame, fortunes or dignities, not caring much how they attain them, or whom they knock down in the mad conflict; and if they fail to secure the prizes for which alone they toil, they are wrecked in happiness and life. Others are gratified with what falls to their lot of such things, but are still more interested in a higher kind of success. What have they done? is a more vital question to them than What have they gained? Has the artist embodied his finest conception? Has the author instructed or elevated his readers? Has the orator inspired and uplifted his audience? Has the physician battled with disease? Has the reformer aided the weak and erring? Has the statesman benefited his country? Has the mother made home a blessed place? Unless such questions can be affirmatively answered, the true toilers in these spheres cannot deem themselves successful, though rich prizes may have fallen at their feet. All our great men—all whom history cherishes and posterity honors—have belonged to the latter class. They have not spent their lives in acquiring, accumulating, enjoying; they have *achieved* something, and thus their names live in remembrance. When we recall such names as Washington, Franklin, Jenner, Shakespeare, Jefferson, it is their deeds, not their gains, that inspire us. Indeed, every *loss* by which they furthered the good of humanity sparkles like a gem in the setting of their lives, while what they may have gained is hardly thought worthy of record. When a rich man dies, his wealth is soon disposed of, and, if he has left nothing else, his name will soon be forgotten. But if he has used his wealth in the service of justice and mercy, righteousness and truth, if he has aided the weak, lifted the fallen, encouraged struggling merit, and has thus been a blessing to humanity, then his deeds will live after him, and his children may well cherish them as a richer legacy than gold or lands.—*Phila. Ledger.*

When Water Boils.

Water does not boil until the tension or outward pressure of the vapor formed by heating it is greater than the atmosphere's pressure. At the sea level, where the pressure of the atmosphere is about 15 lb. per square inch, the water must be heated to 212° before its vapor has sufficient tension to overcome this pressure. At Argenta, Montana, where it is so much above the sea, having a much less depth of atmosphere the pressure is not so many pounds, and the boiling point is correspondingly lower. Water boils at about 200° there. On Mount Black it boils at 187°; and in a vacuum at about 98°, accordingly as the vacuum is more or less perfect.

Singing Mice.

The twittering sound occasionally made by mice is believed by some observers to be the result of voluntary action, but by others to be the result of disease. Dr. Nolan states that the opinion of naturalists is divided on the subject. It has been suggested that many or all mice may have the power of producing musical notes so high in the scale that, like the cry of the dormouse or the bat, they approach the limit of sounds perceptible to the human ear. This theory, however, has never been substantiated by observation. The sound is at times undeniably like the wheezing that would result from bronchial or asthmatic difficulties. If the result of disease, the sound is caused by the presence of a worm (Cysticercus) or by a fungoid growth in the windpipe. A correspondent of the Philadelphia *Ledger* states that his observations confirm the belief that the sounds are purely involuntary, the unmistakable signs of disease. They resemble an attempt at twittering after the manner of young birds or female canaries, and the apparent variation in the character of the notes is due presumably to the rapid movements of the animal and its varying distance from the observer. It has also been noticed that when excited by fear and activity in its efforts to escape, the character of the sounds becomes more harsh and asthmatic. It is also urged that if voluntary, the so-called singing would certainly cease in presence of danger, whereas, in fact, it becomes louder. But it is quite possible that in this instance fear might be more powerful than caution. Many animals, when excited, utter a cry of alarm, which assists in effecting their ultimate capture.

Natural History Notes.

The Tendrils of Cucurbitaceous Plants.—Mr. Duchartre has made the following curious observations on the tendrils of cucurbitaceous plants. Out of 22 species examined by him, it was found that 14 had tendrils that were quite straight in the very young state, and remained so during their development; and in 8 species only were the tendrils spirally rolled from their first appearance, and before they had come into contact with any foreign body. Among these latter are included the pumpkin (*Cucurbita Pepo*) and the bryony (*Bryonia dioica*). It is remarkable that, while the ordinary forms of the melon (*Cucumis Melo*) have their tendrils spirally developed from their very first appearance, this is not the case with the variety *erythræus* of the same species, in which the tendrils are straight from their earliest stage. Mr. Duchartre remarks that the side of the tendrils that grows most rapidly, and thus causes it to assume the spiral form, consists of much larger parenchymatous cells than does the opposite side of the tendril. Among the species that have straight tendrils from the first are the dishcloth gourd (*Luffa acutangulata*), the balsam apple (*Momordica Balsamina*), and *Cyclanthera explodens.*

An Invasion of Bugs.—In April, Washington was suddenly invaded by swarms of insects of formidable appearance that attracted considerable attention. The habits and appearance of these are described as follows by one of the government entomologists:

This large insect, of two inches and a half, or more, in length, is the *Belostoma Americanum* of entomologists, and belongs to the order of Hemiptera, or true bugs. It lives in ponds and sluggish streams during the immature state, in which it has no wings, and is full grown in fall, remaining in the ponds during the winter. When, in the spring, the warm weather awakens them, they come forth at dark, often in immense numbers, and fly about; the sexes mate, and they return to the ponds, in which the female deposits her eggs. They are strongly attracted by light, and especially by electric lamps, under which vast numbers often strew the walks, and are crushed under foot. Their sudden appearance often creates alarm; and during the past week or two, specimens have been received from various parts of North Carolina and other Southern States, the writers often in evident fear of damage from this invasion.

But they are perfectly harmless. They are, it is true, able to inflict a very painful bite, for they are provided with a short, sharp beak; but they never do so voluntarily, and they do not live on anything in the way of vegetable matter outside of the water. They are carnivorous, feeding principally on less powerful water insects, and not despising an occasional fish, frog, or other bit of flesh that may come in their way. They have been just as abundant in previous seasons, but have not been so much noticed, for the reason that there have not been so many electric lights to which they could be attracted. Like so many of the true bugs, they have a very peculiar and rank smell. A number of other water insects are also attracted to light, but never in such quantities.

The Petals of the Buttercup have, as well known, a peculiar varnish-like luster. The cause of this has been investigated by Dr. Mobius, who attributes it to a highly refractive yellow oil existing in the epidermal cells, increased by the fact that the layer of cells of the mesophyl is densely filled with minute starch grains.

Development of Leaf of Eucalyptus.—Some instructive experiments have been made by Mr. S. Grosglik on the development of the leaf of *Eucalyptus globulus.* He finds that in the youngest stage the tissue of the leaf between the epidermis, with the exception of the vascular bundles, consists of a uniform tissue composed of cells equal in diameter in each direction, which the author calls primitive mesophyl. If the leaves are forced to remain in the horizontal position, they develop the usual leaf structure of palisade cells on the upper and spongy tissue on the lower side of the leaf; but if the leaves assume the vertical position, palisade cells are developed on both sides of the leaf next to the epidermis. He therefore arrives at the conclusion that there is in leaves a tissue which is capable of differentiation, and that under the influence of light there is a tendency to form palisade tissue, while shade favors the formation of spongy tissue.

Markings of Animals.—Eimer advances the view that the markings on animals were primitively longitudinal stripes that have subsequently broken up to form dots, and these fusing to form transverse rings. This view is supported by the ontogeny of many animals. Dr. Haacke controverts this view from the study of an Australian fish, *Helotes scotus.* In this species the adult is marked with eight longitudinal black bands. Young specimens have in addition a row of clear transverse bands, which disappear when the fish attains maturity.

Color Perception by the Human Eye.

The fatigue of the human eye in connection with observations of colored objects, especially when these are brightly illuminated, has been explained in *La Nature* by M. Rosenstiehl and others. These remarks have recently been collated, with the published results of novel experiments, by M. Albert de Rochas. It has been laid down by M. Chevreul that the human eye cannot be long employed in the perception of a given color without tending to become insensible, and to arouse an impression similar to that ordinarily produced by the perception of white light. Dr. Beclard has also noticed that when one eye is directed for a time upon a colored field, the other eye being closed, if the eye which was open is in turn closed and the other opened, a specter of the complementary color will be perceived. Thus, if the right eye has observed a red disk, the left being shut, a reversal of this state of things would result in the perception of a green disk by the freshly opened left eye. In virtue of the same property of the eye, when two tints are placed beside each other, the nearest edge of the one will appear as though deprived of all the colored rays which it may have in common with the other. An analogous effect is produced with grays non-colored—that is to say, formed simply of white and black. When a dark and a light gray are placed side by side, the one will look darker and the other lighter, beside the line of junction, as though the black had been taken out of the one and the white out of the other. Hence the difficulty in estimating the equality of different colored lights. When they are looked at simultaneously, the eye passes from one to the other, and both colors are subject to a double modification—first of tint (for each tends to become the complementary of the other), then of tone; the lighter appearing more light, and the dark still darker.

Electric Street Cars in Philadelphia.

The Union Electric Company has recently been operating an experimental electric motor car on Ridge Ave., between 32d and 33d Streets, Philadelphia, and has met with very fair success. Each afternoon, a car carrying the usual burden of passengers has been run over the track at the rate of nine miles an hour. The system employed is that of underground electrical transmission. A conduit, 4½ inches wide by 9 deep, and having a central slot similar to that employed on cable roads, extends along the center of the track. This has been laid on concrete and covered with Portland cement. At suitable intervals, connections are made with the sewer, in order to permit the rain water to discharge or the conduit to be washed out, should that become necessary. A copper conductor, one-quarter inch deep by one inch wide, runs along the conduit on each side of the slot. A grooved piece of channel iron is attached to the bottom of the conductors. A so-called "traveler," supported by wheels, runs in the slot, and is provided with two springs which slide along the channel irons on each side of the slot, and thus receive the electric current. The traveler is connected to the car by small chains. From its center, wires extend into the car, connecting the motor on board with the copper conductors in the conduit, by which the electric circuit may be closed. A regulator on the car controls the current, and permits the car to be driven in either direction. The trials covered a very stormy period, but it is stated that the bad weather caused no interruption in the working of the system. The estimated cost per day of running the electric car, according to the *Ledger*, is $1.84, while that of operating a horse car is $4.74. Neither estimate includes salaries. The cost of ten miles of electric railway on this system, and fifty cars, is stated to be $175,000.

Origin of the Potato.

An interesting article on this subject is given in a recent number of *Nature*, from which it appears that we have as yet no certain knowledge of the original home of our popular tuber. Whether it came from Peru or Virginia has yet to be settled. The writer says: The question of the introduction of the potato is a very complex one.

Potato is but the English way of pronouncing batata.

But what is the word batata? To what language does it belong? The first European knowledge of it appears to be traceable to Cuba, San Domingo, or some of the neighboring isles at the time they were discovered by Columbus, 1492, etc. But then the sixteenth century writers on Peru also use it as if it were a common word there, and, if it were, it is at least interesting, if not strange, to find a word thus widely spread over and across districts where, it has been said, languages so vary with tribes that one cannot even understand another, though neighboring, tribe. But first we have to consider, Is there any *contemporary* evidence that the West Indian natives did make use of a word which, when written by the Spaniards, appeared as *batata*? It would involve a special search among such materials as Navarette had at his disposal to decide that. Compilations are not to be trusted, and English versions are of no avail. What the actual word was, written by Columbus or his companions, is what is wanted. Then, if it were a true West Indian word, and introduced and known with some plant in Spain and Portugal in the early part of the sixteenth century, what is the probability that, at the middle of it, writers on Peru used it as a name that would be understood at home, even though not used by the South American natives? With regard to papas, it is distinctly stated by Acosta it was a native name in South America, but the writer does not know of any passage in which batata is said to be. It has been pointed out above how the mistake arose that papas has been considered a Virginian name, and it is possible batata may prove to be not a South American name at all. There is a Quichau word, ascu, equivalent, apparently, to papas, to which only Mr. Clements Markham among English writers seems to have drawn attention. At present, in English translations of travels in Peru, papas and batata appear often confounded.

Then in regard to our own use of the word batata, did we have it with roots through the Spaniards, or direct from the West Indies? The earliest use of the word does not yet seem to have been fully searched for. It may, however, be found earlier than in the list of literary quotations usually given. For example, it occurs in the account of Sir J. Hawkins' voyage, 1565: "Hennes, potatoes, and pines." The earliest description the writer has been able to trace of what the potato was is in the botanical work of 1570, published in London, Lobel's "Stirpium adversaria nova." A figure is given of the root of the batata, and at the heading is "Anglice Potades."

In 1596 the form potaton is met with. In 1627 and 1676 potadoes, and in 1655 pottato. Batata itself, by the Spaniards, seems to have been spelled indifferently batata or battata.

Then there is another curious point. How has it come to pass that for the same plant the Spaniards of to-day retain papas, while the Portuguese use batata, for the plant we *now* call the potato?

In speaking of questions in connection with our having changed the use of the word potato from one plant to another, it is an advantage for preventing confusion to refer to the two plants by their present botanical names, the *Batatas edulis*, which belongs to the convolvulus "order," and the *Solanum tuberosum* (perhaps including the supposed different species, *Maglia*), our common potato, which belongs to the nightshade "order." Of the two it was *Batatas edulis*, called then, long before Linnæus' binomial system, simply battata, that seems to have been first known in Europe.

The first European knowledge of the plant *Solanum tuberosum* (or *Maglia*) was under the name papas, by which it was known till Caspar Bauhin recognized that it was a Solanum in 1596. The date 1596, if not exactly that of his knowledge, is the date of his first publishing it in his *Φυτοπιναξ*.

Then as to dates of introduction.

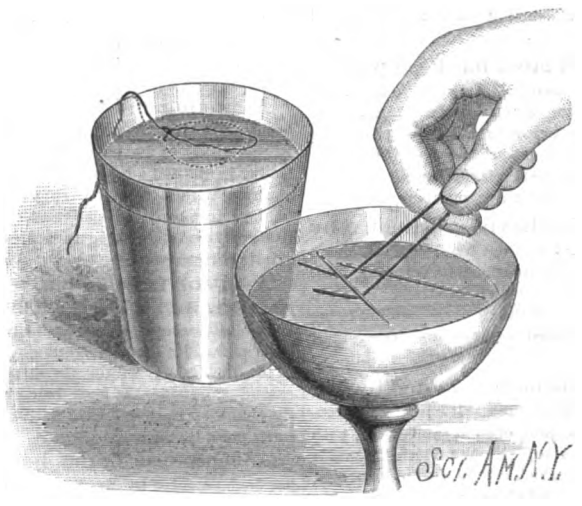
As already said, the first European knowledge of battata was in 1494 or 1495, that is, assuming that it was among the valuable products of the West Indies Columbus sent home to his patron sovereigns to demonstrate the value of his discoveries. It is mentioned he sent home vegetable products as well as gold. He sent spices, dye woods, fruits, and herbs, or intended to. In the history "Primer viage de Colon" (Navarette, cap. 1) is the passage: "And besides there are trees of a thousand species, each having its particular fruit and all of marvelous flavor, so that I am in the greatest trouble in the world not to know them, for I am very certain they are each of great value. I shall bring some home *as specimens*, and also *some of the herbs*." Taking Washington Irving's inspection of Navarette's materials as reliable, Columbus knew the potato—the battata.

FLOATING NEEDLES.—THE TEARS OF STRONG WINE.

T. O'CONOR SLOANE, PH.D.

Few subjects are more prolific in suggestions for experiments of the simpler class than surface tension. A very striking example of the exercise of this force was shown in the wire gauze cylinders described a few weeks ago. A simple experiment in the same line is shown in the cut. By carefully placing needles upon the surface of water, they will float.

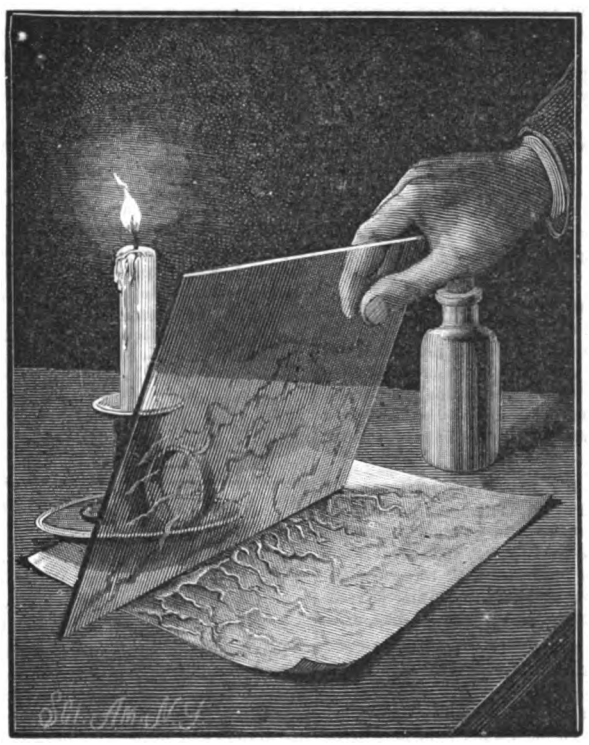
Surface strength, in which expression viscosity and tension are both intended to be included, is due to the attraction for each other of contiguous mole-



FLOATING NEEDLES.

cules. In the case of a vessel of water, this attraction does not exist alone at the surface. All through the body of the fluid, molecule attracts molecule; but as this attraction within the mass is exerted in all directions alike, it does not interfere with the mobility of the fluid. On the surface the state of things is different. Here the superficial molecules are attracted laterally and downward, and force is required to break through the sheet or film that, practically speaking, they form. If therefore a body even of higher specific gravity than water is placed upon this film, it will encounter resistance, and if not too heavy will be supported upon it. If some counteracting force is called into play, the film may be ruptured, and the body will sink. This force may be gravity. The body may break through the film by reason of its weight. Or if this is insufficient, and if the fluid wets it, adhesion and capillarity will come into play. The fluid will creep up and over the body, and it will sink.

In a needle we have an object that is quite light in proportion to its sectional area. It also has the property of retaining in strong adherence a film of air. If a bright piece of steel is immersed in water and then withdrawn, it will come out nearly dry. The water has not touched it, on account of the adhering film of



TEARS OF STRONG WINE.

air. If, therefore, a needle is carefully placed upon the surface of water, the fluid will not come in contact with it, or only over a small area. It will rest upon the film, and on the support being withdrawn from under, it will float securely on the surface. It is supported by the surface tension and viscosity of the water, or by its cohesion.

To place it on the surface, a hairpin, bent up at the end as shown, may be used. The needle is lowered as nearly horizontal as possible, until one end or the other touches. Then the other end is lowered, and the support withdrawn in a downward direction. The needle, as soon as it touches the surface, makes a slight dimple in the fluid. This may be used as a guide in placing it on the surface.

An old explanation of the flotation of a needle referred it to buoyancy. But on examination it will be seen that the dimple is extremely small. If the needle floated by displacement, the dimple should have a cross section six or eight times the area of the cross section of the needle. Therefore we are obliged to call upon some other force as the agent, and in cohesion we find the explanation. The same force supports the insects familiarly called skaters upon the surface of ponds. The depression formed around their legs where they rest upon the water is very perceptible.

The limiting film is stretched in all directions like a fine membrane of India rubber. The introduction of any foreign matter may modify this tension a great deal. Alcohol reduces it greatly. If the needles are brought into parallelism, and a drop of alcohol is allowed to fall upon the water between them, the tension of the film between them is diminished, and they fly apart. If ether is used, the effect is still stronger. A loop of twisted sewing silk may be floated on the surface of water just as the needles are. Then if a drop of alcohol is introduced within the loop, it flies open nearly or quite into a circle. This is quite a striking instance of the phenomena described, and is shown also in the cut.

In what has been said is the explanation of the tears of strong wine. If a wine glass containing some strongly alcoholic wine is inclined so as to wet one side and then restored to its position, quite curious changes will take place in the adhering layer. It will gradually draw itself together, sometimes receding from the fluid below, or rising upward in opposition to gravity, and it increases gradually in thickness until it forms drops, that, as they form, rapidly run down the walls of the vessel into the body of the fluid. These are the tears of wine. It is possible, according to Clerk Maxwell, that they are alluded to in the Bible (Proverbs 23, xxxi.).

What takes place is explained by what we have seen in the case of the needles and loop of thread. When the wine wets the glass, the layer is bounded by a film of slight tension, owing to the presence of alcohol. As the alcohol evaporates, the tension of the bounding film increases until it begins to pull the liquid together, acting like a tightly stretched elastic membrane. The film tends to contract to the smallest possible area, which, in the case of invariable volume, is the sphere. Hence it thickens the layer, and ultimately draws it into drops that are nearly spherical.

In the second cut accompanying this article is shown a simple way of observing this action. A plate of glass, which may be three inches square or upward in size, a sheet of white paper, and a candle or lamp must be provided. A mixture of alcohol and water, about half of each, is the most convenient fluid to use. The glass is held horizontally, and the liquid poured upon it, and by inclining it in different directions is caused to flow over most of its surface, just as a wet plate in photography, is coated with collodion. The excess is poured off into the bottle again, and the glass thus moistened held in the position shown, with the moist side toward the paper. At first nothing is seen, but presently the action begins. It is accelerated by gently blowing upon the wet glass. The most curious movements in the fluid are shadowed upon the paper with magnified effect. An area of the finest wrinkles appears, then the fluid may begin to rise from the bottom edge, and after several changes forms drops, that run rapidly down the glass. Sometimes a row or fringe of drops forms along the bottom. The appearances vary every time. They can be projected quite well with a lantern, but not with so good an effect as by the simple means given here. The movements, by the process shown, appear greatly magnified, or rather intensified, and produce changing effects that are most interesting.

Aluminum in Ohio.

We see it stated that large works are to be built at Findlay, Ohio, for the production of aluminum from clay, using natural gas for furnace fuel. The clay from which the metal is to be extracted is brought from West Virginia, but great beds of it exist in nearly all the States and Territories. And while it is true that all clay contains the metal, some is far richer and yields a better return to the operators than others. The cost of production where fuel is cheap, as natural gas, will bring the metal into common use. The difficulty has been to find a means of obtaining the metal aluminum by heat or a carbon process, and at a cost so extremely low as to secure its adoption for the commoner utensils. Beyond the great reduction in the cost, the time required has been also greatly reduced.

Director-General Boyer.

Leon Boyer, Director-General of the Panama Canal works, died at Panama on May 1, of yellow fever. he reached Panama in January last. He was a distinguished engineer, and his loss is greatly deplored. The ravages of fever among the canal employes are frightful.

ENGINEERING INVENTIONS.

A car brake has been patented by Mr. Henry J. Romberg, of Newark, N. J. It is designed to take the place of the hand brake usually employed on street cars, substituting therefor a braking mechanism controlled by a lever that is operated by the driver by a pedal arranged upon the platform of the car.

A spark arrester has been patented by Mr. John C. Albrecht, of Columbus, Ga. It consists of a cone to arrest and deflect the sparks, with a device for facilitating the separation of the sparks from the smoke and carrying them more rapidly to the firebox, the invention being an improvement on a former patented invention of the same inventor.

A balanced slide valve has been patented by Mr. John W. Stokes, of Pana, Ill. It has vertically sliding bars forming a frame fitted in grooves on top of the slide valve, the frame being moved to and held in contact with the under side of the balancing plate on the steam chest cover or lid by the pressure of the live steam.

A steam motor has been patented by Mr. George Wood, of Philadelphia, Pa. This invention relates to steam engines in which curved or segmental oscillating pistons are connected with a crank on the main driving shaft, and is designed to combine economy of steam with great compactness, stability, and lightness for large powers.

A dumping car has been patented by Mr. Nicholas Marnell, of Savannah, Ga. Combined with a truck car which has standards is a box having swinging sides and trunnions, the trunnions riding in bearings formed in the standards of the truck, with rock shafts and manipulating levers, whereby the load can easily be dumped on either side of the track.

A rock drilling machine has been patented by Mr. John Jennings, of Canon City, Col. This invention covers improvements in the mechanism for rotating and forcing the drill, and for feeding the drill carriage and adjusting it at various angles and rotating it on a traveling turntable, to facilitate mining and boring and tunneling rock.

An aerial railway and car has been patented by Mr. Andrew J. Morrison, of Hume, N. Y. This invention relates to cars suspended on elevated wire cables sustained from towers, there being means for raising and lowering the cables, and the tracks, by being raised behind the car, causing it to continually travel upon an incline from tower to tower.

A car coupling has been patented by Mr. Jackson J. Kennedy, of Cleveland, Tenn. It consists of a rotatable drawbar having its forward end bent laterally, and provided with a hook, a shaft being journaled at the side of the drawbar with cranks at its opposite ends, the invention being intended to improve and simplify the construction of a coupling formerly patented by the same inventor.

MECHANICAL INVENTIONS.

A screw cutting machine has been patented by Mr. Ernest Landelle, of Paris, France. The slide rest is actuated by a lever of variable effective length, in order to change the pitch of the thread cut in a corresponding degree, and this invention covers a novel mechanism for the control of the slide rest, whereby the travel of the tool may be readily augmented or diminished at will.

AGRICULTURAL INVENTIONS.

A sulky plow has been patented by Mr. George Ross, of Chatham, Ontario, Canada. Its construction is such that one or more plows can be used at a time, as desired, the plow points directed upward or downward by a lever, the plows made to cut deep or shallow furrows, or the machine can be readily adjusted to travel from place to place, with other novel features.

A combined cotton chopper and cultivator has been patented by Mr. Anthony Flewellen, Sr., of Brenham, Texas. The inner rear corner of the chopping hoes are rounded, so their inner rear edges will be in curved lines, with other features whereby the chopping will be done with a sliding cut, while the plows are placed close in the rear of the chopping mechanism, and are designed to bar off the plants left for a stand, the machine chopping cotton to a stand while removing dirt, weeds, and grass from the sides of the row.

MISCELLANEOUS INVENTIONS.

A tube cutter has been patented by Mr. Newton Bond, of Buffalo, N. Y. It is a revolving cutter, mounted on a carrier, sliding in a guide, by applying a wedge attached to a spindle, which revolves the device, and having an adjustable gauge.

A method of strengthening drawers and similar articles has been patented by Mr. William Mitchell, of Richmond, Va. The invention consists in a special method of securing a Y-shaped facing strip at the front opening, making a strong and seamless front facing.

A nut lock has been patented by Mr. Charles W. Smart, of Carbondale, Ill. It consists essentially of an improved form of washer and an improved form of bolster block, with the combination of these parts and other necessary coacting devices, including a locking wire and groove therefor.

A fan has been patented by Mr. Isaac A. Allion, of Hiogo, Japan. The side sticks or handle sections are so made as to constitute locking devices, without the aid of additional means, to hold the fan in its open and closed positions, the web of the fan being opened or closed by turning these pieces about, or either of them, or with the pivot as a center.

A sand feeding mechanism for stone sawing machines has been patented by Mr. R. Lester Barney, of Swanton, Vt. It consists of adjustable boards, troughs, and switches or diverters, so constructed and arranged that the sand may be fed to any portion of the stone in such way that in striking it will not spatter.

A nailing jack has been patented by Mr. Judson Clark, of Newburyport, Mass. It has a mortised standard, with notches, and anvil with slotted shank, cross bar, and spring-acted catch, with other novel features, to facilitate nailing the heels of boots and shoes of all sizes, and supporting other parts during the operation.

A burglar alarm has been patented by Messrs. Emmanuel Chol and Delphin Monnier, of Thibodeaux, La. Combined with traction devices connected with doors or windows and the trigger of an alarm is a spring trip bar, so arranged that the opening of a door or window exerts traction on the trip bar and causes a signal to be given.

A book pull and label has been patented by Mr. Gayger D. Tolman, of Shawano, Wis. Combined with a slotted plate adapted to be secured to the back of a book is a shield with a tongue projecting through and held in the slot of the plate, the device facilitating the taking of books from the shelves, and also being adapted to receive titles, numbers, etc.

A sink connection has been patented by Mr. James D. McEntee, of New York city. It has a conically shaped outlet and intermediate coupling, with upwardly projecting rods, by which the strainer is drawn firmly down upon its seat in the sink, the strainer being easily removed and replaced without interfering with the couplings.

A garden tile has been patented by Mr. Louis S. Flatau, of Pittsburg, Tex. It has a semicircular or U-shaped cross section, open at the bottom, with one or more necks on its top, through which the plants can grow, making a tile which can be used as a curbing for walks, or as a curbing and plant protector at the same time.

A carving implement has been patented by Mr. William A. Ligon, of Sonora, Ky. It consists of two blades pivoted like shears, one of the arms having a tooth at its forward end and a second upwardly projecting tooth between the latter and the pivot, the other arm having a cutting edge and its extremity pointed for insertion into the flesh to be carved.

A thill coupling has been patented by Messrs. Abijah L. Romans and John M. Peregrine, of Jamestown, N. Y. It consists of a combined anti-rattler and thill bolt holder, with a fulcrumed spring and a bolt-holding and tension lever with two arms, one to act upon the spring and the other against the bolt, with other novel features.

A sleigh shaft has been patented by Mr. Levin F. Liebfried, of Bethlehem, Pa. Its construction is such as to permit of readily shifting the shafts to adapt them for center or side draught without unhitching the horse, the shafts being similar in appearance to those designed for carriages, and such as can be ironed and finished in substantially the same way.

A filter has been patented by Mr. James T. Walls, of Butler, Mo. It is intended for use in connection with a hydrant, or where the water is furnished in a stream, and is so made that the first portion of the water received will pass directly out of the receiving chamber of the filter to cleanse it, while the water following is directed through the filtering or purifying chambers.

A tufting attachment for knitting machines has been patented by Mr. Gustav A. Olson, of Albert Lea, Minn. Its construction is such that with it the loops of ruching or similar work can be made of any desired length, and can be arranged to be in each course of knitting or in alternate courses, or blank courses can be left, separate threads being used for the usual knit fabric and for the tufted work.

A machine for turning terret rings has been patented by Mr. Walter S. Bishop, of New Haven, Conn. In the face of a chuck plate arranged to screw upon the head of a lathe are radial T shaped grooves in which slide ways with flanges on their rear sides, with other novel features, whereby the concave surfaces and side edges of terret rings can be turned quickly and accurately.

A shingle sawing machine has been patented by Mr. George E. Cooke, of Clarksville, Tenn. Its construction provides simple means for preventing the shingles from slipping under the action of the shaving knife, also for discharging the shaved shingles and for resetting the discharging devices, while being adapted as well for shaving staves and shaping pieces for use in building wagons, etc.

An apparatus for repairing dikes and dams has been patented by Mr. Guillaume Dembrun, of New Orleans, La. Combined with an inner supporting framework are outer posts, palisades, and canvas sheets formed with pockets, and provided with ropes or binding cords, whereby a temporary abutment may be readily placed in position to protect a break in a dike, dam, or levee.

An extension attachment for oil tank faucets has been patented by Mr. George P. Saunders, of Derrick City, Pa. It is detachable, with an angular pipe, and a device for securing a water tight joint at the point of connection with the ordinary draw off pipe in the tank, and a rod screwed into the extension, to facilitate drawing off the pure oil at the top in a tank without disturbing the sediment.

A vehicle spring has been patented by Mr. Thomas S. King, of Atlanta, Ga. It consists of a rod of round spring metal bent between its ends to form a coil, the outer end drawn out flat and bent to form an eye to connect with the shackles of the running gear, and the inner end bent to form loop bearings opening in the opposite direction, the spring being cheap, easily applied, and making easy riding.

A lock for wagon brakes has been patented by Mr. William Moore, of Mooney, Ind. It has a double fulcrumed lever carrying a spring pressed pawl of novel construction that engages with a double curved rack, the axes of the two curves being at the two fulcrums of the lever, to increase the throw of the brake shoe from the wheel, so it will not collect mud, and to increase its power.

An iron coated fire brick has been patented by Mr. John P. Comins, of Elizabeth, N. J. The bricks are painted on the surfaces to be exposed to the fire with the oxide of iron, preferably Prince's metallic paint, and then subjected to a furnace heat that will melt the oxide of iron, changing it to metallic iron, to so coat the surface and fill the pores as to prevent the adhesion of clinkers to the bricks when in use.

An end gate hinge has been patented by Mr. Frederic B. Spees, of Tabor, Iowa. It consists of an expanded U-shaped bar pivotally connected to the gate, the arms riding in perpendicular apertures in the bottom of the wagon, and the fastening being of peculiar construction, whereby the gate may be held close to the bottom of the wagon, or so as to have a space between its lower edge and the bottom of the wagon.

A copying and printing instrument has been patented by Messrs. William F. Kirtley and Charles R. Spurgeon, of Laclede, Mo. Combined with a box having in one end a telescopic tube and at the other end a mirror, with a rotatable supporting frame, is a lens holding frame and a negative-holding frame, each relatively adjustable, making an improved arrangement for printing from negatives.

A button fastener has been patented by Mr. Albert Hall, of Cypress Hills, N. Y. The button has a slotted shank and a fastening hook with a bent inner end wider than the remaining part, the wider part of the hook being within the shank and the other part extending outside, the hook being mounted to swing in the shank and being locked in place by spring tension, so its point is concealed.

A combined twine holder and cutter has been patented by Mr. Michael H. O'Brien, of St. Ignace, Mich. It consists of a simple form of frame for conveniently holding a spool or ball of twine on a rod or wire, in connection with which is a knife-holding lever, carrying a knife in such position that the twine may be readily reeled off as desired and then cut, leaving the end ready for the next use.

A tubular sawing machine has been patented by Mr. John H. Whitaker, of Davenport, Iowa. Combined with a tubular saw and its hollow mandrel is a hollow stock guide extending into the saw mandrel and fitting closely to its inner wall, with a support therefor rigidly connected to the framework outside the mandrel, the machine being adapted to economize the cutting of mouldings.

A gas cooking stove has been patented by Messrs. John Somerville, of Bankside, Southwark, and William H. Y. Webber, of Forest Hill, Surrey Co., England. The lining or oven chamber is removable, and there is a clear space round it which serves as a hot jacket, the burners projecting their flames through holes in the outer casing so as to radiate their heat freely into, the oven, with other novel features to adapt the stove for roasting or baking or other uses.

A folding bedstead has been patented by Mr. Lewis E. Morrison, of New York city. This invention consists in a novel and advantageous system of balancing devices, including levers or pivoted legs applied to the body of the bedstead and connected with counterbalance weights in the upright portion of the bedstead, the folded bedstead thus requiring a narrower base for the upright, and the improved form facilitating handling and moving about.

A bucket for steamboat paddle wheels has been patented by Messrs. John C. Trullinger and Uriah B. Scott, of Astoria, Oregon. The buckets are on the wheel arms in the regular manner, are wedge-shaped, and have their front and rear sides so inclined as to act upon the water to slightly raise the vessel, entering and leaving the water with the least possible disturbance to its particles, and reducing the "slip" to a minimum.

Wood pulp machinery forms the subject of four patents issued to Mr. Warren Curtis, of Corinth, N. Y. The inventions relate to machines in which block pressers are operated by cylinders and piston presses, and cover improvements in devices for supplying the presses with air and water under pressure, the block presser being so constructed as to show by the projecting piston rod the position of the block, and to stop the feed automatically when the block is consumed. The pulp is made by grinding the wood on a stone, the machine being so constructed that the wood is pressed against the stone with uniform pressure, and is fed very easily and rapidly, while no dirt and chips can get into the pulp, and the casing can be easily raised to renew the stone, all the inventions being especially calculated to facilitate the making of wood pulp.

NEW BOOKS AND PUBLICATIONS.

THE PRACTICAL MECHANIC'S WORKSHOP COMPANION. By William Templeton; revised by Walter S. Hutton. London: Crosby, Lockwood & Co.; New York: D. Van Nostrand.

This handbook presents in modernized form a work which has long been popular in England, and which is quite as much intended for the engineer as the mechanic. It affords a convenient reference book for useful rules and formula in mechanical science, with much practical data touching many lines of work.

TOMMY'S FIRST SPEAKER, FOR LITTLE BOYS AND GIRLS Edited by Tommy himself. Chicago: W. H. Harrison, Jr., 1886.

In this selection of two hundred and fifty pieces suitable for recitation by very little children, the author has chosen what seemed to him best out of a large collection made during his own experience. With perhaps a half dozen exceptions, the pieces are all in rhyme. They are for the most part very short, and can readily be learned by a child of ordinary memory. Several are adapted for more than one speaker. Considering the limited field, the selection has been very judiciously made. The analyzed index will be found useful in indicating which are particularly suitable for girls and which for boys.

Business and Personal.

The charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

Wanted—Party representing and traveling for large iron firm through the West, one or two hardware specialties. Only first class articles will be considered. A No. 1 references. Address B. V., Chicago *Journal of Commerce.*

Wanted—Prospecting machinery—diamond drill preferred—to locate gypsum. Correspondence solicited. Buena Vista Plaster Co., Saltville, Va.

Haswell's Engineer's Pocket-Book. By Charles H. Haswell, Civil, Marine, and Mechanical Engineer. Giving Tables, Rules, and Formulas pertaining to Mechanics, Mathematics, and Physics, Architecture, Masonry, Steam Vessels, Mills, Limes, Mortars, Cements, etc. 900 pages, leather, pocket-book form, $4.00. For sale by Munn & Co., 361 Broadway, New York.

For Sale—Patent of Automatic Boiler Leveling Apparatus. Illustrated in SCIENTIFIC AMERICAN May 8. Reasonable figures. J. M. Kramer, Maria Stein, Mercer Co., O.

Wanted—A capitalist to take a half interest in or to manage a valuable patent on Automatic Freight Car Brake. A splendid chance to the right man. For further particulars, address R. B. V., Box 607, Iowa Falls, Iowa.

Send to the *Railroad Gazette*, 73 Broadway, New York, for a catalogue of Locomotive, Track, and other railroad books.

Emery Wheels of unusually superior quality for wet grinding. The Tanite Co., Stroudsburg, Monroe Co., Pa.

Guild & Garrison's Steam Pump Works, Brooklyn, N. Y. Pumps for liquids, air, and gases. New catalogue now ready.

Nickel Plating.—Sole manufacturers cast nickel anodes, pure nickel salts, polishing compositions, etc. $100 "*Little Wonder.*" A perfect Electro Plating Machine. Sole manufacturers of the new Dip Lacquer Kristaline. Complete outfit for plating, etc. Hanson, Van Winkle & Co., Newark, N. J., and 92 and 94 Liberty St., New York.

Send for catalogue of Scientific Books for sale by Munn & Co., 361 Broadway, N. Y. Free on application.

The Knowles Steam Pump Works, 44 Washington St., Boston, and 93 Liberty St., New York, have just issued a new catalogue, in which are many new and improved forms of Pumping Machinery of the single and duplex, steam and power type. This catalogue will be mailed free of charge on application.

Machinery for Light Manufacturing, on hand and built to order. E. E. Garvin & Co., 139 Center St., N. Y.

If an invention has not been patented in the United States for more than one year, it may still be patented in Canada. Cost for Canadian patent, $40. Various other foreign patents may also be obtained. For instructions address Munn & Co., SCIENTIFIC AMERICAN patent agency, 361 Broadway, New York.

Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J.

Iron Planer, Lathe, Drill, and other machine tools of modern design. New Haven Mfg. Co., New Haven, Conn.

Nystrom's Mechanics.—A pocket book of mechanics and engineering, containing a memorandum of facts and connection of practice and theory, by J. W. Nystrom, C.E., 18th edition, revised and greatly enlarged, *plates*, 12mo, roan tuck. Price, $3.50. For sale by Munn & Co., 361 Broadway, New York city.

Supplement Catalogue.—Persons in pursuit of information of any special engineering, mechanical, or scientific subject, can have catalogue of contents of the SCIENTIFIC AMERICAN SUPPLEMENT sent to them free. The SUPPLEMENT contains lengthy articles embracing the whole range of engineering, mechanics, and physical science. Address Munn & Co., Publishers, New York.

Curtis Pressure Regulator and Steam Trap. See p. 142.

Best Automatic Planer Knife Grinders. Pat. Face Plate Chuck Jaws. Am. Twist Drill Co., Meredith, N. H.

Iron, Steel, and Copper Drop Forgings of every description. Billings & Spencer Co., Hartford, Conn.

See Burnham Automatic Engine adv. last and next week.

We are sole manufacturers of the Fibrous Asbestos Removable Pipe and Boiler Coverings. We make pure asbestos goods of all kinds. The Chalmers-Spence Co., 419 East 8th Street, New York.

Steam Hammers, Improved Hydraulic Jacks, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Grimshaw.—Steam Engine Catechism.—A series of thoroughly Practical Questions and Answers arranged so as to give to a Young Engineer just the information required to fit him for properly running an engine. By Robert Grimshaw. 18mo, cloth, $1.00. For sale by Munn & Co., 361 Broadway, N. Y.

60,000 *Emerson's* 1886 Book of superior saws, with Supplement, sent free to all Sawyers and Lumbermen. Address Emerson, Smith & Co., Limited, Beaver Falls, Pa., U. S. A.

Hoisting Engines, Friction Clutch Pulleys, Cut-off Couplings. D. Frisbie & Co., 112 Liberty St., New York.

"How to Keep Boilers Clean." Send your address for free 86 page book. Jas. C. Hotchkiss, 93 John St., N. Y.

Barrel, Keg, Hogshead, Stave Mach'y. See adv. p. 366.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 365.

Timber Gaining Machine. All kinds Wood Working Machinery. C. B. Rogers & Co., Norwich, Conn.

Brass and Iron Working Machinery, Die Sinkers, and Screw Machines. Warner & Swasey, Cleveland, O.

Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocom & Son's Shafting Works, Drinker St., Philadelphia, Pa.

The Windmill as a Prime Mover. Comprehending everything of value relating to windmills, their use, design, construction, etc. By A. R. Wolff. With many fine illustrations. (Shortly.) 8vo, cloth. Price, $5.00. For sale by Munn & Co., 361 Broadway, New York.

The Shame of a Great Merchant

was that a skin disease made him look like a drinking man. Dr. Pierce's "Golden Medical Discovery" is a certain cure for all diseases of the blood and skin. It should be tried by all afflicted with tetter, salt-rheum, scald head, St. Anthony's fire, erysipelas, ring-worms, pimples, blotches, spots, eruptions, boils, carbuncles, sore eyes, rough skin, scrofulous sores, swellings, blood taints, affecting the skin, throat, and bones, ulcers of the liver, stomach, kidneys, lungs, and uterus. Purify the blood and health will return. By druggists.

Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all, either by letter or in this department, each must take his turn.

Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

(1) I. B.—It is a very difficult matter for an expert to braze iron pipe that has been split. It is much cheaper to use new pipe. The brazing is done by cleaning the split edges, covering with borax that has been ground on a stone with water, and binding a piece of brass wire along the seam, with small iron wire wound around the pipe. Place the pipe in a charcoal fire commencing at one end of the split, drawing the pipe through the fire as the brass melts. Soldering is done with a copper, using soldering acid, which is made by dissolving zinc in muriatic acid and adding a little sal ammoniac to the solution. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 20, for a complete description of the various methods of soldering.

(2) B. F. S. asks: How much of a battery will I need, say 6 inch gravity cells, to run the induction coil described in SUPPLEMENT, No. 160? For curiosity I tried two Leclanche cells, but they would only magnetize the core enough to attract a medium sized wire. The core is made of 250 No. 18 wires. A. Eight gravity cells ought to be enough. Leclanche cells are quite unsuitable.

(3) G. W. C. asks: 1. Why does it tend to preserve a magnet to have a keeper on it? A. The reason is unknown. 2. Is the positive side of a secondary battery when charging the same as when discharging? A. The direction of the current from the secondary when charged is the opposite of the charging current. 3. How many layers and of what size should the sheets of tin foil be in the condenser of a medical battery whose primary current is furnished by one Leclanche cell? A. Medical coils are often used without a condenser. A dozen sheets might suffice, but the number required varies with the size of the coil and the area of each. It is a question of area of tinfoil and dielectric, not of number of sheets.

(4) J. C. asks: 1. What liquids or solutions, if subjected to an electric current, change their original state? A. Acidulated water, and many solutions of metals, etc. 2. Is there any way of effecting or hastening the decomposition of green vegetable matter by electricity? A. We know of no practical way. 3. For experimenting on a small scale, which form of apparatus is best suited? A. We can only suggest a galvanic battery.

(5) D. D. H. asks: What number wire and size of core should I use in making electro magnets to run sewing machine, using three battery jars such as used on telegraph instruments, and the magnets to be of the horseshoe pattern, also the amount of wire required? A. The question is too general. Three gravity cells such as generally used on telegraphs would not run a sewing machine. You would need ten times the number at least.

(6) C. W.—With the present labor disturbances in the United States, we could not encourage you to come here at present from a foreign country to look for work in a machine shop. If there is any preference in any part of the States, it may be found in the South. Georgia and Alabama seem to be progressive in the mechanical trades. We cannot name establishments in want of help. Atlanta, Ga., Chattanooga, Tenn., and the iron regions of Alabama are points at which you may make a venture with perhaps as fair a chance of success as anywhere else.

(7) J. H. W. desires a lacquer to spread on sheet zinc to make it appear like copper. A. You can make lacquer of various tints by putting 4 ounces best gum gamboge into 32 ounces spirits of turpentine, 4 ounces dragon's blood into the same quantity of spirits of turpentine as the gamboge, and 1 ounce annatto into 8 ounces of the same spirits. The three mixtures should be made in different vessels. They should then be kept for about two weeks in a warm place, and as much exposed to the sun as possible. At the end of that time they will be fit for use, and any desired tints may be obtained by making a mixture from them, with such proportions of each liquor as the nature of the color desired will point out.

(8) A. H. S. asks: What is the chemical compound in the so-called phosphates, used as beverages? Pear phosphates for extracts—are they flavored in any way? A. Pear phosphates are made as follows: Take Bartlett or other good pears, cut or chop very fine, press, allow to settle, pour off supernatant liquid. To one pint of this pear juice add one pint acid phosphate and one pound of sugar, or enough to sweeten. The acid phosphate referred to is generally a solution of the phosphates of lime, magnesia, potash, and iron, in such a form as to be readily assimilated by the system.

(9) W. M. M. asks (1) a receipt for filler for maple, oak, and cherry wood, also instructions how it should be used. A. You can use a filler composed of: Whiting 6 ounces, japan ½ pint, boiled linseed oil ¾ pint, turpentine ½ pint, corn starch 1 ounce; mix well together, and apply by continuous rubbing in. On cherry wood add a little Venetian red to the above mixture. A cheaper, and for most uses a better, filler than this can be bought already prepared. 2. What will give the best polish—varnish or shellac? A. A very simple polish for wood is obtained by using a piece of pumice stone and water, passing it repeatedly over the work until the rising of the grain is cut down. Then take powdered tripoli and boiled linseed oil, and polish the work to a bright surface. 3. What is oil finish? A. It is the finish produced by using a preparation of linseed oil, such as linseed oil 1 gallon, alkanet root 3 ounces, rose pink 1 ounce. Boil them together 10 minutes, and strain so that the oil will be quite clear.

(10) J. A. M.—Deuto-chloride of mercury is properly called mercuric chloride, or corrosive sublimate, and can be procured at any druggist's. It is highly poisonous. You can clean coral by immersion in a mixture composed of one part of hydrochloric acid and thirty parts of water; keep it in this liquid until it becomes quite white; it should then be washed well in cold water.

(11) P. B. asks the formula for making a white japan or drier used in paints and oil. A. An excellent transparent drier can be made by taking zinc carbonate 9 parts, manganese borate 1 part, linseed oil 9 parts. Grind thoroughly, and keep in bladders or tin tubes. The latter are preferable.

(12) J. E. C. asks: How much will a mixture of gas and air in the proportion of 1 to 10 expand in exploding? A. A safe figure to work by as a maximum is 4½ times the original volume of the air.

(13) G. C. asks: Is it practical to transmit power by compressed air a distance of 4,000 feet or more, and to the amount of 25 horse power, and what sized pipe would it require, and where can compressors be had at the bottom price? A. It has been fully demonstrated that compressed air can be conveyed a distance of one or more miles with greater facility and economy than is now done so extensively with steam in New York. It has been used in tunneling and mining at great distances. For compressors and application address some of our advertisers in that line. It will require a 3 inch pipe for 25 horse power.

(14) J. B. asks: Is there any kind of burner that would prevent the forming of lampblack on the bottom of a copper boiler heated by gas? A. You must use gas burners arranged on the Bunsen burner principle; these can be procured from any dealer in chemical apparatus, and consist of an iron tube so perforated as to admit sufficient air, thereby producing a colorless flame.

(15) D. H. D. asks the simplest way to distill water. A. Perhaps a rubber tube from the spout of a tea kettle, to conduct the steam to a cool receptacle, where it would be condensed, would be the simplest way. It would not be expensive to fix up a worm in connection with a boiler and suitable vessel for condensing for a larger use.

(16) Inquisitive asks the cause of single and double rainbows. A. It is due to the combined reflection and refraction of the sun's rays from drops of rain. The rain must be on the side away from the observer. The position of the rainbow depends on the height of the sun, and rain drops at different definite elevations can produce the effect, so that double or triple rainbows are possible.

(17) B. S. H. asks the best drug or ingredient to color alcohol a bright red; something that will cost not to exceed 25 or 30 cents to color a gallon. A. Use an aniline color.

(18) J. J. D. asks how to make a regulator for an incubator, so that the heat will not rise above 103 or 105 degrees. A. You can make a regulator with stripe of sheet zinc and sheet iron, about 2 feet long, 1 inch wide, soldered or riveted together at each end, and riveted between ends to hold them close together. Fasten one end to the woodwork of the hatching box, the other to a delicately hung shutter, arranged for ventilating the box or controlling the incoming heat. The variations in temperature will move the free end of the metal strips sufficiently for working the ventilators.

(19) J. B. S.—Various proportions of borax and oxalic acid with water, in connection with pipe clay, chrome yellow, and turmeric root, have been used to whiten and give an oak appearance to the soles of shoes, but they are not generally so successful as the mixtures sold at a low price by the findings dealers.

(20) G. W. C. sends us an account of an elm, the two terminal forks of which are so unlike in appearance as to suggest two different species; and he wishes to know the cause of the difference. A. The phenomenon is due to a variation in the bud that produced the branch, resulting in what gardeners would call a "sport." The sporting of certain buds into characters in branch, flower, or fruit unlike those of the stock is known in a good number of plants. These variations, when once originated, usually persist, but are not transmitted to the seed. Their origin is unaccountable. From a scientific point of view, they are of slight consequence. (See Darwin's Variation of Animals and Plants under Domestication, chapter xi.)

(21) J. W. B. desires a good formula for making a paste that will hold labels tight and securely on wood. A. Take of starch two drachms, white sugar 1 ounce, gum arabic 2 drachms, water a sufficient quantity. Dissolve the gum, add the sugar, and boil until the starch is cooked.

(22) W. Y. asks how to straighten a shaft 1 inch in diameter and 6 feet long, that has been sprung about 1 inch out of a straight line. A. By carefully springing back with a lever between two bearings. 2. Is there any way of putting together a small broken casting so that it can be used for a pattern by the moulder? A. Heat and cement with shellac.

(23) C. H. P. desires a cheap color or stain for articles made of wood, such as clothes horses, step ladders, etc. Want a yellow color that will not rub off. A. Brush over with the tincture of turmeric.

(24) A. and P. desire a formula for making stove polish, by which a new stove can be polished without much labor. A. 1 pound of pulverized black lead, turpentine 1 gill, water 1 gill, sugar 1 ounce.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined with the results stated.

F. H. D.—The sand contains magnetite and garnets. It has little or no value. The magnetite might be separated by a magnetic separator, but its value would have to be determined by analysis.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted,

May 25, 1886,

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

Addressing machine, R. Morgan 342,575
Advertising apparatus, C. A. Shattuck 342,645
Air for gas, depositing solid particles suspended in, A. O. Walker 342,548
Alarm. See Burglar alarm. Prison, vault, and safe alarm.
Aluminous compounds, making neutral, F. P. Harned 342,599
Ammonium bichromate, manufacturing, W. Simon 342,647
Auger, earth, H. & L. Iwan 342,516
Automatic switch, Purviance & Hills 342,760
Awning, C. Bernhardt 342,568
Axle boxes, dust shield for car, Flower & Ross 342,742
Axle journal bearing, car, G. W. Fulmer 342,486
Bag. See Feed bag. Paper bag.
Bar. See Grate bar.
Barber and dental chair, G. W. Archer 342,724
Barns, gable or loft door for, J. H. Morgan, Jr. 342,374
Barrels, manufacturing veneer, J. R. Allgire 342,672
Basins, etc., plug for stationary wash, J. W. Reid 342,538
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Badge, J. T. Mullen..... 16,711
Bed frame, folding, S. S. Burr..... 16,707
Bottle, J. T. Underwood..... 16,712
Comb, F. V. Jones..... 16,710
Dish, T. Davis..... 16,708
Rug, R. P. Hemming..... 16,709

TRADE MARKS.

Boots and shoes, certain, Sharp, Clarke & Co..... 13,338
Bronze in ingots and wire and castings, phosphor, Phosphor Bronze Company..... 13,337
Canned fish or salmon, Knappton Packing Company..... 13,335
Coffee, W. H. Milnor & Co..... 13,326
Compound for the treatment of piles, W. Gifford.. 13,327
Compound of herbs, barks, and roots for the cure of consumption, bronchitis, asthma, etc., Grover & Diamond..... 13,330
Cornmeal, Indian, Hillhouse & Day..... 13,332
Glassware and fancy glass articles having colors shading into each other, F. S. Shirley..... 13,339
Gum, chewing, C. T. Heisel..... 13,331
Mineral waters and effervescing beverages, J. Graf..... 13,329
Silk goods, silk threads, twists, and yarns of all kinds, Unicorn Silk Manufacturing Company... 13,340
Silverware or imitation silverware, Holmes & Edwards Silver Company..... 13,334
Table wares of silver, German silver, and plated or imitation silver, flat and hollow, Holmes & Edwards Silver Company..... 13,333
Tea, Oolong, H. W. Banks & Co..... 13,326
Tonic beverages, J. C. Gilbert..... 13,328

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