

AN IMPROVED PIPE WRENCH.

A simple and durable tool, not liable to get out of order, and arranged to securely grip the pipe and readily release it when desired, is shown in perspective and in section in the accompanying illustration. It has been patented by Mr. A. L. Engelbach, of the Eagle Foundry and Machine Shops, Leadville, Col. A swinging jaw is movable opposite the fixed jaw, and is formed on the outer end of an arm pivoted in the forked end of a nut sliding in the hollow handle. The forked end of the nut is rectangular, fitting a similar opening in the handle, so that the nut is free to slide longitudinally, but will not turn in the handle, and the nut has an internal screw thread engaged by a screw rod, the longi-



ENGELBACH'S PIPE WRENCH.

tudinal movement of the rod being prevented by pins in the handle, which engage an annular groove near the rear end of the rod. The screw rod is turned by means of a knob on its outer end, abutting against the rear end of the handle, thus causing the nut to slide and carrying the swinging jaw toward or from the fixed jaw, as may be desired, according to the size of the pipe to be gripped. The opposite faces of the jaws are serrated, to insure a firm hold of the jaws on the pipe.

SIPHON FOR DOMESTIC USES.

Every one is familiar with the hydraulic ram and the services which it has rendered in this country for raising water for use in agriculture, gardening, domestic service, etc.

It seemed difficult to simplify this method, still the problem has been solved in a satisfactory manner by the siphon system of M. Le Michel, which is described in a recent issue of *La Nature*, to which we are indebted for our cuts and article. A model of his system was exhibited at an agricultural exhibition at the Palace of Industry, in Paris, last February.

The siphon has advantages over the ram in being able to cause a considerable flow of water over a long distance, and it occupies very little space, as the cut will show, while on the other hand it is only able to raise water a distance equal to the atmospheric pressure, and is not able to pass above 32 feet of elevation.

As its name indicates, the apparatus is founded upon the principle of the siphon. Fig. 1 represents the apparatus entire and Figs. 2 and 3 represent the detail and interior construction.

The siphon consists of two vertical pipes, A and H (Fig. 2), a distributing chamber, B, and a regulator, G. A valve, C, which moves in a horizontal axis, is mounted on the interior of the arc, and a plug,

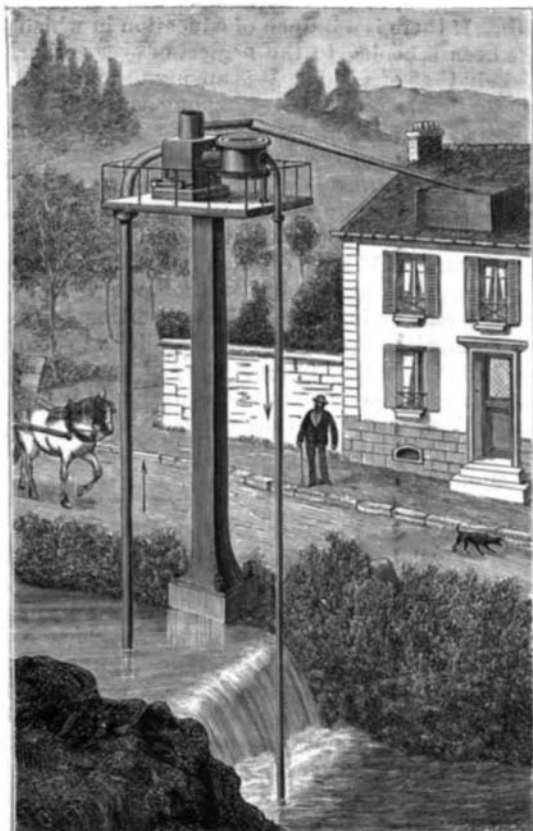


Fig. 1.—THE SIPHON APPLIED TO DOMESTIC USES.

D, is located above this, and is held closed by a spring. A lever bears against the valve to keep it in position, and serves as a counterweight.

These various parts are so simple that they require no attention to insure satisfactory service. The regulator, which is called the "lungs," owing to the function that it performs, consists of a cast drum and two undulating metallic plates, or diaphragms, 2 millimeters in thickness approximately. By their vibrations they maintain the flow of the water and prevent the siphon from becoming empty.

The siphon should first be filled with water through the orifice, K (Fig. 3), which should then be closed by the plug. As soon as both columns are filled, the water begins to flow as in an ordinary siphon. The water from the spring, well or river, under the atmospheric pressure, rises in the pipe, A, passes through the chamber, B, the regulator, G, and passes out through the return pipe, H. During this action the water bears against the valve, C, raises it up and closes it over the mouth of the pipe. As there is no other escape for the water, it forces open the valve, D, and flows out through this opening, whence it passes into the distributing pipe. In the meantime the column, H, is partially emptied and the water in the chamber, G, begins to fall and the diaphragms

regain their normal position. The pressure also on the outer face of the valve, C, is also diminished and the lever carries it back and opens the mouth of the pipe, which allows the water to flow again into the regulator, G. During this action the diaphragms have regained their second position, and the same functions take place again in such a manner that there will be found to be from 150 to 400 pulsations a minute, according to the height, and the water will flow out in a steady stream. Cocks are connected with the two pipes so that the flow of water may be stopped when desired. It is only necessary to fill the siphon once by means of the opening, K, in order to set the apparatus in action. The apparatus shown in Fig. 1 raised water a height of 4 meters, with a fall of only 1.80 meters. Thus it could raise 60 cubic meters every 24 hours, the water delivered being about one-third of the amount which passes through upper chamber.

Thus $\frac{4}{3.18} = 0.74$ or 74 per cent, which is a very satisfactory result, considering the feeble pressure.

The great simplicity of this apparatus, which operates without any attention or care, renders it particularly adaptable for agricultural purposes and for those having small country places and gardens.

World's Fair Notes.

The reproduction of Columbus' caravel, the Santa Maria, is being built by the Spanish government at the Carraca yard at Cadiz. The keel was laid on March 1. The caravel's dimensions are: Length at keel, 82 ft. 4 in.; length between perpendiculars, 75 ft. 5 in.; beam, 22 ft.; draught, 14 ft. 8 in. Great care is being taken with details, and the instruments and appliances of the time of Columbus will be in their places aboard the caravel. The Pinta and Nina, it is announced, are being reproduced by American capital. So visitors to the exposition will be able to see the Columbus fleet complete. The Spanish government will provide crews for the three caravels, dressed as were Columbus' sailors, and the trip across the Atlantic will be made under escort of a Spanish man-of-war. After participating in the naval review in New York harbor, the caravels will proceed to Chicago. After the fair closes they will remain the property of the United States.

A \$50,000 monument to Columbus, designed by Sculptor Howard Kretschmar, of Chicago, will be erected in Lake Front Park, which has been termed the "Gateway to the Exposition." It will be a statue in bronze 20 ft. high, surmounting a granite pedestal 30 ft. high. The monument will form the design for souvenirs of the exposition.

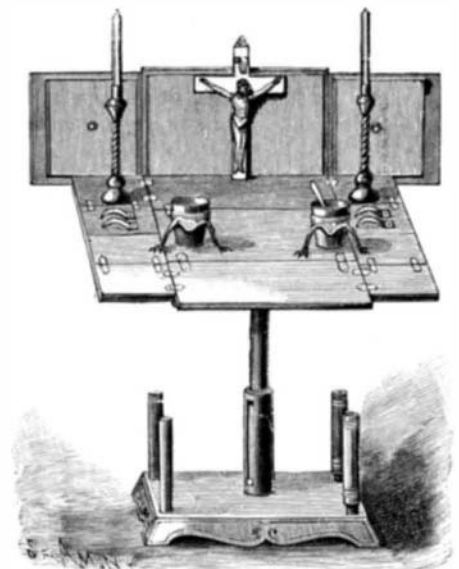
Visitors to the exposition will be able to go comfortably and expeditiously from one part of the grounds to another and obtain advantageous views of the buildings. They may do this either in electric boats through the lagoons or by the intramural elevated electric railway. The contract for the latter has been awarded. There will be five miles of double track, and stations at convenient points. The route, as mapped out, runs from one end to the other of the grounds in a sinuous course. The fare will be five cents, and the capacity of the road about 20,000 an hour.

The exposition, probably, will not have an Eiffel tower or anything approximating it in height, except the elevation to which the captive balloons will ascend. There will be, however, three observation towers about 300 ft. high, for the accommodation of visitors who want to take a bird's-eye view of the grounds and buildings. These towers will be of elaborate design

and beautiful in appearance, and will cost about \$200,000 each.

A SACRAMENTAL ALTAR FOR HOME USE.

The illustration represents a compact and ornamental altar table, which may be folded to form an inclosing box or cabinet holding the necessary adjunctive candelabra and vases when the altar is not in use. It has been patented by Mr. Leo C. Beaudet. Upon the base is a center column, made of tubular sections sliding together telescopically, locking pins projecting from an inner tube section into the slot of an enveloping section, and adapted to enter lateral notches of each slot, to hold the table at the desired



BEAUDET'S HOUSEHOLD ALTAR.

height. The table is composed of a rectangular center piece, to which are hinged two main leaves, there being hinged to the ends of the latter opposite supplementary leaves, the edge portions and hinges being so arranged that when all are in open adjustment the table will have a level top surface and the leaves will mutually support each other. A foldable wall piece is secured to the outer edge of the back leaf, and to it is attached a crucifix by a swivel-jointed clip, which holds the crucifix erect when the table is open for use, as shown in the illustration, or horizontally when the table is folded up. The sacramental service ware of cups or vases, candelabra, etc., is arranged on the table, as shown, the liquid-holding vessels being preferably held in bracket stands upon the table. To prevent injury to the candles when the device is packed for transportation and the table folded, a case is provided for each candle, and a holder piece, the cases removed when the candles are lighted being supported on the four corners of the base. The number and style of pieces used in the altar service will vary, of course, according to the desire or means of the user, but the improvement affords an easily portable device which may be readily taken to a sick chamber or set up in the most convenient place in any household.

For further particulars with reference to this invention address Mr. L. H. Beaudet, No. 91 Sixth Avenue, New York City.

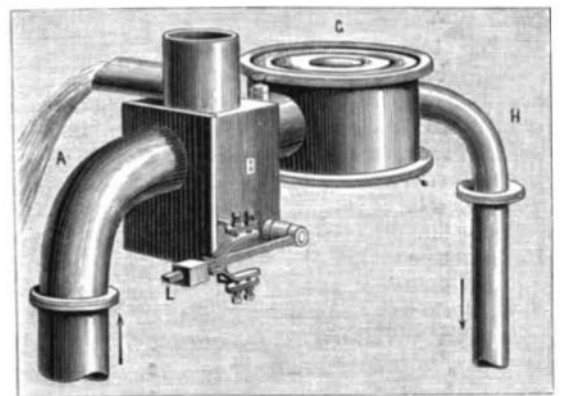


Fig. 2.—DETAIL OF SIPHON APPARATUS.

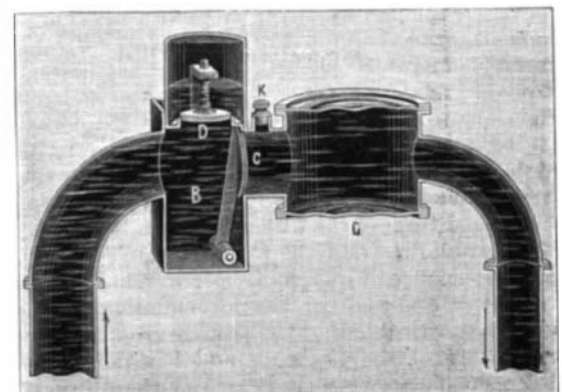


Fig. 3.—INTERIOR CONSTRUCTION—SIPHON APPARATUS.

Proposed Aquarium in New York.

Castle Garden, New York City, is an ancient stone fortress that stands on the extreme point of the southern end of the city, where the waters of the Hudson and East Rivers unite and flow into the Bay of New York. The fortress is circular in form and its walls inclose about four acres of ground space. After a long and checkered career, Castle Garden is about to enter upon another period of usefulness. It has been a fort, an amusement hall, and a depot of immigration. Now it is to be an aquarium, where people may watch fish and marine forms disporting themselves in surroundings like their native haunts.

At the last meeting of the board of park commissioners, Architect Julius F. Munckwitz, Jr., submitted the preliminary plans, which were approved and sent to the board of estimate and apportionment. The Legislature passed a bill permitting \$150,000 to be used for an aquarium, and all that is necessary is for the board to order the issuing of the bonds.

Mr. Munckwitz's plans provide for the building of a gallery around the inside of the building. The tanks will be arranged in two tiers, one on a level with the floor, the other on a level with the gallery. There will be about 150 tanks, each separated from the next by a brick partition. A solid brick wall will form the back of all the tanks, and the front will be of glass. The light will come through skylights in the roof.

In addition there will be a big pool 50 feet in diameter and four or five feet deep, in the center of the main floor, built up so that people may look down into it. In a circle around this pool will be six others somewhat smaller in diameter and of about the same depth.

The pools are for very large fish, the lower tier of tanks is for small fish, both of fresh and salt water, and some of the most interesting forms of marine life, both animal and vegetable. The upper tier of tanks are for the more common forms of fresh water fish and the smaller and more frequent forms of marine life.

The pools will be the great feature of the aquarium. In the circle of pools will be sharks and other fish of the large and dangerous types. In the central pool there will be a grampus whale, not of the largest size, of course, but big enough to be impressive.

From the roof over the tanks and in the unoccupied floor space there will be skeletons and stuffed specimens of all kinds of huge and unusual fish and sea animals. These will form about the only decorations to the hall. Near the entrance will be a restaurant.

The cost of the fittings and furnishings will be about \$80,000, which with \$30,000 for repairs will bring the total cost to about \$110,000, leaving a good margin to the \$150,000 of the appropriation for the getting of fish, animals and plants.

The park commissioners hope to have the aquarium open to the public in the early fall.

The Canadian Pacific Railroad.

The Canadian Pacific had on the 5,766 miles of railroad which it worked last year a traffic equivalent to the movement of 76 passengers and 330 tons of freight daily over the whole system, which is a very light business, as was to be expected. We must not suppose, however, says the *Railroad Gazette*, that the Canadian Pacific is wholly in a wilderness, or was when it was first built, as were most of our Pacific railroads. On the contrary, it has 2,800 miles east of the Great Lakes, just north of New England and the Middle States; and there, where nine-tenths of the population of the Dominion is, doubtless it finds its chief traffic and earnings. The inclusion of these lines prevents any fruitful comparison with our Pacific railroads. Fully 3,300 miles of its lines are east of the eastern terminus of the Union Pacific. A great part of its eastern lines, however, are in a very thinly populated country, and very few parts of its line, doubtless, have what would be considered a large traffic on lines so far east on this side of the border.

In the whole system the gross earnings last year were \$3,570 gross and \$1,390 net per mile. The latter is 5 per cent on less than \$28,000 per mile; but the Canadian Pacific Company had the good fortune to have a large part of its cost paid by the Dominion, and it has unusually light fixed charges, amounting last year to only \$800 per mile of road. Its great land grant yields but small direct returns, but a great increase in sales is reported for the first four months of this year. The traffic and earnings have grown with considerable rapidity. Per mile of road the passenger traffic has grown nearly 30 per cent since 1888, and freight traffic 52 per cent. The expense of maintenance of way last year was \$437 per mile of road; the cost of motive power, \$7,958 per locomotive; of maintenance of cars, \$46 per car—all very small amounts, as may be seen by comparison with the expenditures of the Union Pacific in the same year, which we showed (May 13) to have been \$710 per mile for maintenance of way, \$9,110 per locomotive for motive power, and \$107 per car for maintenance of cars. It is also noticeable that the average gross earnings per mile (\$3,936) of the branches and leased lines of the Union Pacific are 12 per cent greater than those of the Canadian Pacific, trunk lines and all; but the net earn-

ings of the latter were \$1,390, against \$974 on the aforesaid lines of the Union Pacific, or 43 per cent greater. If the fixed charges of the Union Pacific were as light per mile as those of the Canadian Pacific it would have paid nearly 4 per cent dividend on its large share capital.

Molasses and Sirups.

The common notion of molasses or sirup is a product derived wholly from sorghum, sugar cane, or maple sap. The popular idea of an adulterated molasses or sirup would be one made from other materials or compounds than those mentioned. It is true that the word molasses, in a more limited and technical sense, should be applied only to the liquid material draining from granulated cane sugar made from sugar cane, either by natural percolation or by being treated in centrifugal machines. The commercial term molasses, however, applies to a larger number of products. It includes the molasses made from sorghum, and this is no mean product when the whole country is considered.

Perhaps the best distinction to be made between the term molasses and the term sirup is this:

Molasses is the natural product of the manufacture of sugar cane, sorghum, or maple sap, or any product from which a part of the sugar has been removed. Sirup is the product of the refining of these articles or the mixing of various other articles together.

It has long been known that a large part of the maple sirup sold in the market is made from glucose, understanding by this term the liquid product of the conversion of starch into sugar. It is also well known that large quantities of maple sirups are sold on the markets which are fabrications made up of other sweets, to which a little maple molasses is added for the purpose of giving it flavor, or, as is often the case, being entirely free from any addition of maple product whatever. The maple flavor is imparted to sirups by mixing with them an extract of hickory bark, and this product has been made and sold under the term of "mapeline." It is safe to say that perhaps the greater quantity of maple molasses or sirup sold on the market is an adulteration in the true sense of the word. These definitions, however, are only of a popular nature, and a sirup could not be said to be adulterated, legally, unless some statute is enacted establishing a standard by which these products could be judged.

For the purpose of this report a molasses or sirup is adulterated whenever it contains glucose or any other substance which would not be a natural product of sorghum, sugar cane, or the maple tree. Molasses or sirups which are made exclusively of the products of sorghum, sugar cane, and maple sap cannot be said to be adulterated in the strict sense of the term, no matter what the method of their preparation may be.

The presence of chloride of tin in molasses in any large quantity is declared to be highly objectionable. Molasses, therefore, which is the natural product of the sugar cane, but which contains tin as a result of washing the crystals in the centrifugal with that substance, should be considered adulterated. In looking for tin in a number of instances copper also was found in the molasses. This copper doubtless comes from the copper pans and copper coils used in evaporating the juices and sirups. Its presence being merely accidental, it could not be considered as an adulteration. Copper salts are, however, not palatable, and their presence in a molasses or sirup is highly objectionable.

In regard to glucose, it may be said that its presence in molasses or sirup is an adulteration, unless the article containing it is distinctly so marked. A few years ago, when sugars and molasses were higher priced than they are now, the manufacture of sirups from glucose was very profitable. The price of genuine molasses, however, has at the present day fallen so low as to make the manufacture of glucose for the above purpose much less profitable than before. The advantage of using glucose, nevertheless, is very great, aside from its cheapness. It gives to a sirup a fine body and a light color. A molasses or sirup, therefore, made chiefly of glucose and flavored with the refuse molasses of a refinery, makes a very attractive article for table use, in so far as appearance goes. In regard to wholesomeness, also, it is not possible to condemn glucose.

When properly made it is as wholesome an article of diet as cane sugar. In fact, the starches which are consumed in our foods are all converted into glucose during the process of digestion. A glucose food, therefore, is a starch food already partially digested. The use of acids in converting the starch into glucose would prove detrimental to health unless they were carefully removed. Glucoses are, therefore, often made with ferments for the purpose of converting the starch into sugar rather than by the use of acids. Diastase is sometimes used for this purpose, and other ferments are also employed. At the present time the use of glucose in the manufacture of molasses and sirups cannot be said to be a fraud, from a commercial point of view, inasmuch as the glucose costs quite as much as the other materials of which the molasses and sirups are made.

The department does not approve of the addition of

bleachers in the treatment of molasses, and was unsuccessful in getting samples of the bleaching agents for analysis. The secret of their preparation and method of their use are carefully guarded by the makers and users. Following is a list of the bleaching agents supposed to be most commonly used:

(1) Sulphur fumes; (2) chloride of tin, about one ounce of a saturated solution to each barrel of molasses; (3) sulphites and sulphuric acid; (4) sulphite of soda and zinc dust, afterward oxalic acid to precipitate the zinc.

Sugar is so cheap that the housekeeper can substitute it for molasses and make her sirup, and thus avoid all risk of adulteration.—*American Grocer*.

Remarkable Mines.

There are many coal mines of which the galleries extend under the water of rivers, such as the mines near Liege, in Belgium, of which the galleries form a connection of the mines situated on both sides of the river, regular subaqueous tunnels; but more remarkable are those mines of which the galleries extend under the ocean, as is the case with some coal mines in England. More remarkable still is one of the coal mines at Nanaimo, on Departure Bay, beyond Victoria, British Columbia. This mine is known as the Wellington, and its galleries are situated 600 feet under the surface of the ocean, which here surrounds an archipelago of islands, very similar to the Thousand Islands, at the head of the St. Lawrence River. The length of the galleries of this mine is continually increasing, and extends at present six miles under the bottom of the waters of the Pacific Ocean. Nearly the whole population of the town of Nanaimo, amounting to nearly 1,000, is engaged in the mines, and earns as much as \$3 to \$6 a day. Liberal as this appears to be, the cost of living in that inhospitable region is so high that the miners can only make ends meet. A great drawback in these mines is the excessive amount of combustible gases, by an explosion of which, three years ago, 100 miners lost their lives.

It appears that the coal mines here are more profitable than the gold mines, even in Alaska (where they are numerous), for the simple reason that they can be worked the whole year round, while the gold mines can only be worked four months in the year, so that the miners must live in idleness eight months, and that in a country which cannot produce the necessities of life, which are all brought from the United States, and therefore burdened with heavy freightage. As the miners cannot be left to starvation during these eight months, the parties to whom the mines belong have such an enormous continual expense to bear that the ore has to be of a very high grade to make it pay, so that low grade ores are not worked at all, except when other circumstances compensate for it. Such is the case in the Treadwell mine, on Douglas Island, which is situated near the shore, where water is convenient, and for which the owners ask \$20,000,000; while a small mine, "The Bear," situated on the same island, was sold recently for \$1,000,000, while the "Mexico" is so profitable that it is not for sale, but the owners are erecting an 80-stamp mill.

Sex and Music.

There is no room for the contention that, as compared with the boy, the girl has not had fair play—that opportunities for cultivating the art have in her case been few, in his case many. The reverse is the truth. If there is a branch of education in which girls have been schooled to the neglect of every other, it is precisely that of music. It is among the primary subjects to which she is put, and among the very last she is allowed to leave off. Not one hour a day, but many hours out of the twenty-four are consumed by her at the piano, to say nothing of other instruments, while singing lessons are usually given in supplement to these. It might have been thought that if practice gives perfection woman would have excelled her male counterpart not only as an executant but as a composer. But what are the facts? In instrumental performance she cannot for a moment compare with him, while as to composition she is nowhere. The repertory of music from the dawn of the art to the present day owes simply nothing to her. Considering the time she has spent over it, her failure to evolve new harmonies or even new melodies is one of the most extraordinary enigmas in the history of the fine arts. It has been remarked, but never explained, by such accomplished æsthetic writers as Lady Eastlake in her celebrated essay on "Music," and by such keen psychological analysts as Mr. G. H. Lewes in his "Life of Goethe;" it is, indeed, a problem still awaiting solution, unless we can solve it by an appeal to such facts as Sir J. Crichton-Browne adduced in his recentoration—the inferiority of woman to man in the cerebral substratum of ideo-motor energy. Why with such a record of "no results"—so far, at least, as the production of a female Handel or Beethoven or even a female Gluck or Bellini is concerned—music should usurp such a preponderant place in girls' education it is difficult to divine.—*Lancet*.