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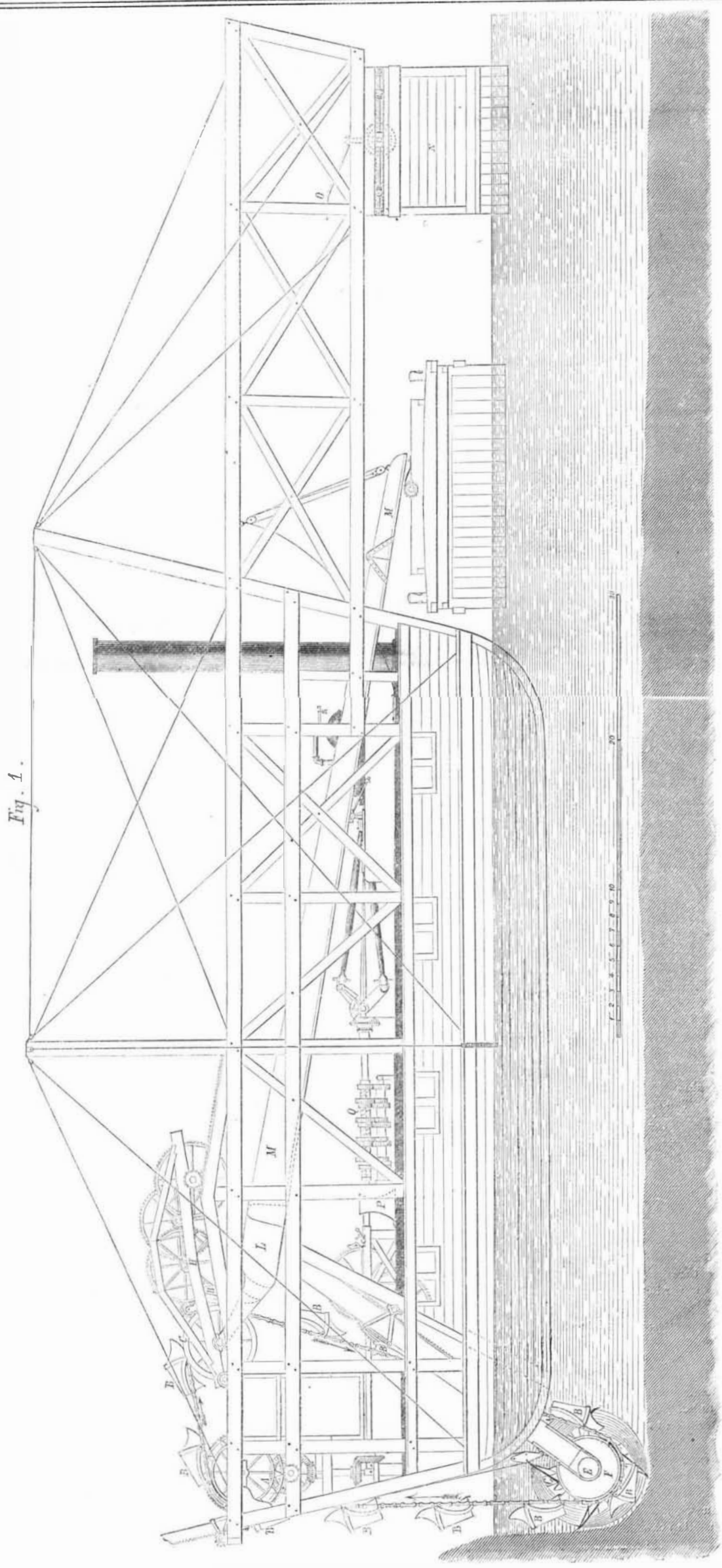


Fig. 1.

D. S. HOWARD'S IMPROVED DREDGING MACHINE.

Improved Dredging Machine.

The inventor of this machine, Mr. D. S. Howard, C. E., of Richmond, Va., after long experience in constructing dredging machines adapted to the various characters of materials to be excavated, and the different circumstances under which such machines are necessarily employed, has been led to the invention of the machine illustrated in the accompanying engravings, and which he claims is adapted to a much wider range of circumstances and situations than the machines heretofore employed.

He also informs us that the improvements in the materials and the construction of the machine render it so much more desirable, that its use has been advantageously extended beyond the immediate purposes for which it was originally constructed.

Fig. 1 is a side view of the machine which is designed to deposit in lighters over the stern or at the sides, as occasion may require. The machine is also constructed to work with any shaped bucket best adapted to the material to be excavated. Fig. 2 (see page 150) is an end view, showing the facilities for lateral deposit. In these engravings similar letters refer to the same parts.

The several parts, and their use in the general operation of the machine; are thus described by Mr. Howard:

A is the driving chain wheel, geared to the engine by wheels and shafting. The buckets, B, are attached to the chain, as shown in both figures.

C represents the center cylinders, with the spiral scrapers and hooks, for loosening and conveying the material to be excavated, from the center, each way, to the buckets.

D, in Fig. 2, represents short cylinders on the ends of the cylinder shaft, E, Fig. 1, with spiral scrapers for conveying the material to be excavated, from the outside to the buckets.

The short cylinder on the port side of the dredge, Fig. 1, is left off, to show the lower chain wheels and the lower attachments to the ways.

F is one of the lower chain wheels, attached to the cylinders and driven by the chains, in the same manner as the chains are driven by the driving chain-wheel, A, by cams fitting into alternate links of the chain.

G is one of the flange wheels seen in Fig. 1, over which the chain passes before descending to the lower chain wheels, F.

H is one of the movable frames, which suspends the flange wheels, G, on rollers running upon ascending ways, provided with powerful purchase wheels, terminating in a pinion working in a descending rack, shown in Fig. 1.

This purchase is worked by a cog wheel on the flange-wheel shaft (not shown in the drawing), working in a wallower wheel when thrown into gear, for the purpose of raising the buckets from the bottom when required, by forcing the flange wheels, G, up the inclined ways. When the machine is not in motion, the wallower wheel may be thrown out of gear, and worked by hand, with a long double crank, K, Fig. 2.

By the motion of the buckets in the direction of the arrows, the excavated material is brought up, and if it is to be deposited over the stern, it is dumped into the movable spout, L, Fig 1, which is attached to the axis of the flange wheel, G, by the extension of its sides, and moves freely within the stationary spout, M, allowing the flange wheel, G, to be drawn up, when necessary, with the movable frame, H, without changing its proper position, for receiving the contents of the buckets as they pass over the flange wheel, G.

N, Fig. 1, is the counter balance, situated about 25 feet aft of the hull, attached to it by a truss frame and hog chains, for the purpose of balancing the weight of machinery necessarily placed ahead of the hull, to enable the dredge to clear its own way. It is also used for transferring the lighters, by attaching the empty one to the outside of the counter balance, and the loaded one to the inside; then by the lever, O, which works the geared rollers between the counter balance and the truss frame, the two lighters are changed about, the empty one inside, under the spout, M, ready to be filled, and the loaded one outside, ready to be transferred to the dumping place. It is also used as a water tank for the engine, which may be filled in the morning, before the water has been disturbed by the dredging, sufficiently to afford clean water during the day.

B, Fig. 3, is a perspective view of a bucket used in this arrangement for depositing over the stern. It is provided with a loose bottom, which drops with the load about two inches, rendering the discharge perfectly certain when at work in the worst kind of material.

When the situation of the work is such as to require the deposit to be made on the bank, or into the lighters alongside, a bucket, like B, Fig. 4, is put on the chain, in place of B, Fig. 3, which dumps into the lateral spouts, situated between the driving chain wheel, A, and the flange wheel, G, by the tripping of the latch which lets fall the whole underside of the bucket, hinged to the bolt that fastens the bucket

[CONTINUED ON PAGE 150.]

(*Continued from First Page.*)

to the chain. This insures the discharge of the most difficult material. The short receiving spouts under the buckets, and the one between them, are hung on pivots in the center, so that either end may be elevated, and the contents of both sets of buckets discharged on either side, or both sides, as may be desired.

Whenever the extent of the work requiring a lateral deposit is sufficient, the hull of the dredge may be built long enough, and lean enough aft, to balance the machinery forward, without the counter balance.

When the work is situated in water deep enough in front of the dredge to float the loaded lighters, the buckets like B, Fig. 5, which dump through the bottom, are brought into requisition, the latch to these may be tripped anywhere on their perpendicular way up, and discharged into a short vibrating spout, which conveys the material directly into the lighter, placed much nearer than it can be in any other arrangement—thus saving power in proportion to the hight of discharge.

Fig. 6 is a gang of hooks, sometimes put upon the chains between the buckets, when working in hard, coarse material, like cobblestone, shale, or hardpan. The chain is so constructed that any shaped bucket, or any other device for loosening the material, that might be found in practice to be preferable, may be put upon it. All the articles here represented have been fully tested, and found very useful in their places. No sacrifice of power, or of economy in working, has been required in using all these appliances on the same machine; on the contrary, it is claimed that the perpendicular position of the working part of the chains, and their passing around three drums instead of two, are great improvements under all circumstances.

The perpendicular application of power secures economy of friction, in the wear of rollers, ways, etc., especially where no lubricating material can be used, nor the wearing parts secured from the destructive action of sand and water, which must always be present in dredging.

The third drum, which constitutes the flange wheels, G, is used to raise the buckets from the bottom, in the manner above mentioned, without changing the perpendicular position of the working part of the chain. It also furnishes the best possible position for the discharge of buckets like B, Fig. 3, at all times when that kind of bucket is in use. Also, that of B, Fig. 4, which dumps between the two upper drums, requiring nearly a horizontal position to discharge.

The bucket, B, Fig. 5, may be dumped anywhere on the perpendicular part of the chain, by raising or lowering the vibrating spout which trips the latch. This is the most economical of all the different buckets, where circumstances are favorable for its use, as it dumps, with perfect freedom, all kinds of material, and is discharged at a much less elevation, on account of its better relative position with respect to the lighters.

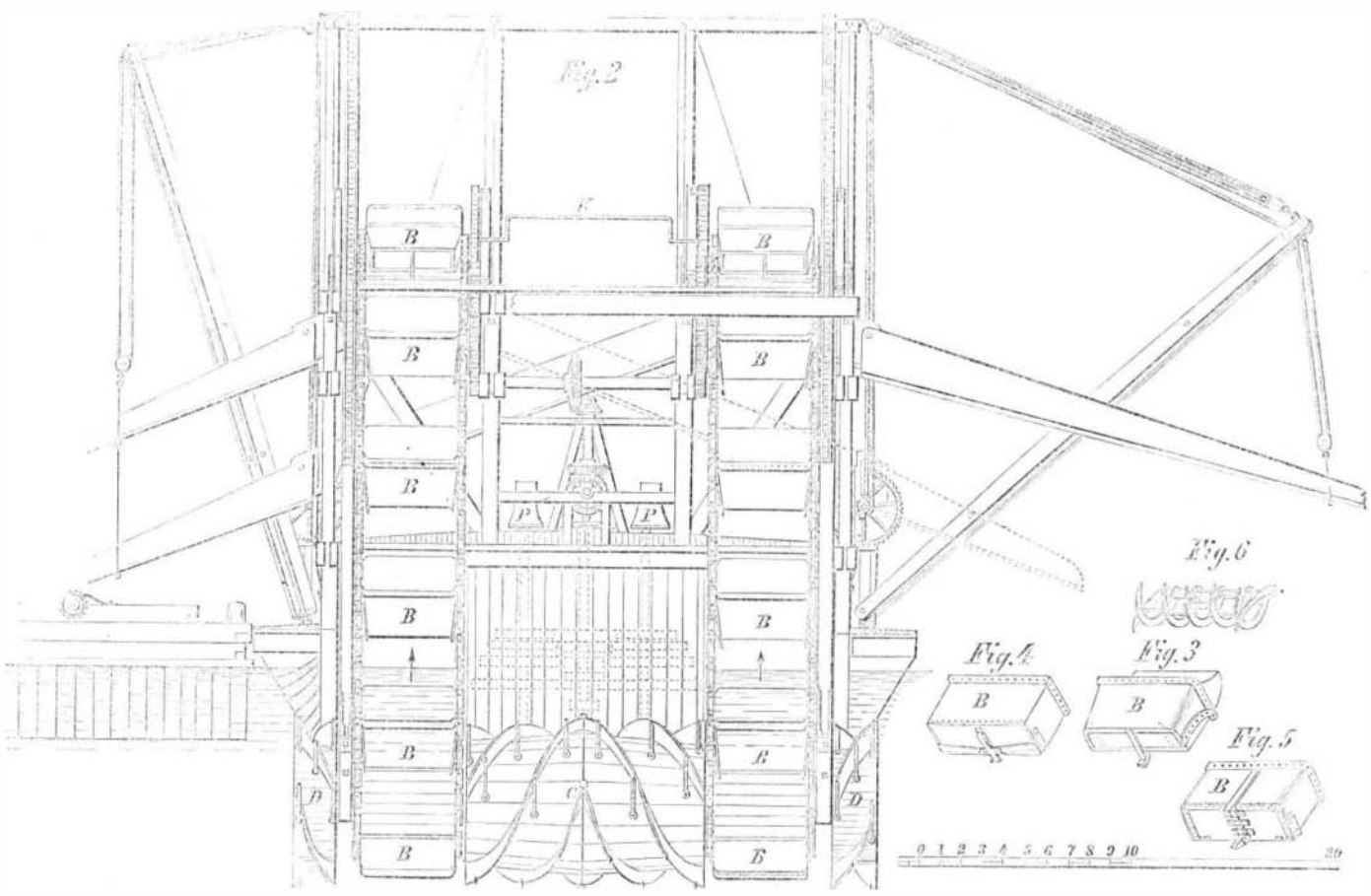
In working these machines, a pulley is anchored at a convenient distance ahead, with a feed line passing from one of the feeding capstans, P, through the pulley and back to the other capstan, either one of which, or both, may be worked by the adjustable machinery to any required motion, by a change in the series of clutches at Q, or a series of wheels below deck; while the spiral cylinders below water, with the buckets, clear the way to the full width of the dredge, and to the depth required, bringing up the material and depositing it in lighters, or on the banks, or at any distance in any direction horizontally, not exceeding one in twelve of the altitude overcome, by supporting a spout, lined with sheet iron of the length required, on a movable support, that it may coincide with the feed motion of the dredge.

The distance from the dredge at which the deposit is required, determines the length and inclination of the spouts. Something, however, depends upon the nature of the material excavated. If it contain clay, or vegetable matter sufficient to prevent the water from draining out too soon, it will run on a descent of one inch to the foot, without more water than the buckets bring up with it; but if the material be pure sand or gravel, a pump will be required to assist in the discharge, without more inclination of the spout.

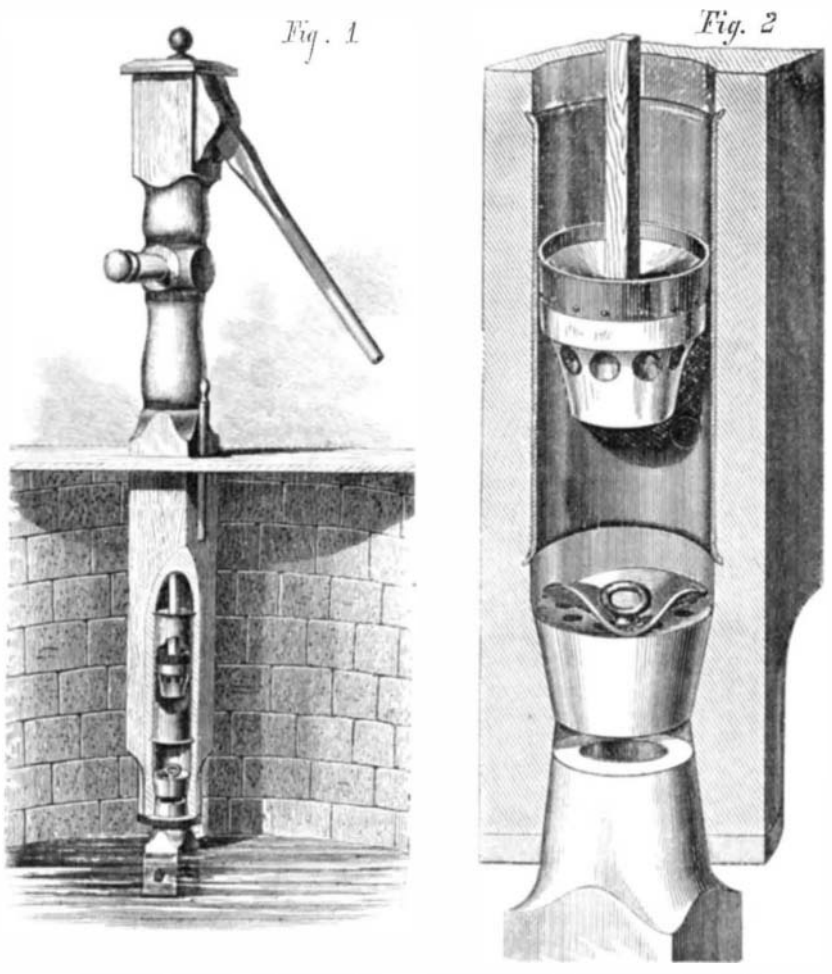
These machines can be constructed with any dimensions, to suit the magnitude of the work, provided the proper proportion of the parts be preserved for strength, motion, power, and durability—considerations very important for the success of any machinery, more particularly such as is supported on a floating foundation.

It is claimed that a machine of this kind, designed to raise 6,000 cubic yards per day, of ten hours, may be more economically worked than two designed to perform the same work, as all the help required to work the larger machine more than one of the smaller ones, would be that needed to dispose of the excavated material.

A machine capable of raising 3,000 cubic yards has been used by the Central American Transit Co., in the San Juan river and the harbor at its mouth, and is said to have worked with great satisfaction to the Company. Another, with some of the improvements described, was built in 1857, for the Corpus Christi Ship Channel Company, in Texas, with which the channel was finished to sixty-four feet in width, without the use of a lighter, except to support the long spout in which the excavated material ran off on an inclination of one inch to the foot.



HOWARD'S DREDGING MACHINE.



SMITH AND LAFFERTY'S IMPROVED WOODEN PUMP.

Wooden Pump

The wood pump has been so long in use, and is so well known, that, at first sight, it might seem hardly worth while to attempt its improvement, more especially as it now competes with a host of metallic pumps which have secured a widespread popularity. The wood pump has, however, the advantage of metal pumps on the score of cheapness, and it is claimed that the improvements herewith illustrated enable it to compete in all other respects.

The most prominent improvement is the placing in the pump a metallic spring lining, made of galvanized iron, copper, or other suitable material. The top and bottom of this lining —which is of sufficient length to give a bearing surface for the plunger—are turned out slightly, like the mouth of a trumpet, and forced into the wood. This holds the lining firmly in place. At the same time the vertical joint is so constructed that it allows the elastic spring lining to expand and contract, to compensate for the swelling and shrinking of the wood, so that it always fits the bore of the body of the pump. The plunger has also been improved. Its shape is distinctly shown in Fig. 2 of the accompanying engravings. It is made in a solid piece, curved holes passing through it so as to leave ribs between the holes, which serve to strengthen the plunger, the curvature of the holes being such as to give natural and easy flow to the water in passing through them. The top of the plunger is concave, and is covered by a corresponding leather valve, like that shown in the lower or check valve. This valve acts from the center outward, securing, it is claimed, greater rapidity and certainty in closing, so that, we are told, a gain of one fifth over the old valve is secured by a prompt stoppage of return flow. Both valves act as described, and this construction also prevents sand from preventing the closing of the valve. The seat of the lower or check valve is made tapering, as shown, and is provided with an eye in the center whereby it may readily be withdrawn from the barrel when desired.

The spring lining is also made slightly larger at the top than at the bottom, which permits the easy withdrawal of both plunger and check valve seat. The joints which connect the pipe to the pump barrel and the couplings of the wood pipe are made tapering, which secures not only a permanent and perfect fit, but a fit the whole length of the joint, instead of, as in the old method, an imperfect and short contact.

The length of the pump barrel is such that the working parts are placed below the reach of frost in the coldest weather, the water being vented just above the lining, so that although the upper part of the barrel is freed from water, the working parts remain immersed, and no priming is required in starting. The vent stopper is a flat bar of iron pivoted in the middle to the side of the pump, and having a leather packing at the lower end to cover the vent hole, the upper end of the bar passing up through the floor of the curb, so as to be readily opened or closed, and having its motion limited by stops attached to the pump barrel. These improvements are, we are told, so cheaply applied that the cost is but slightly increased over that of the less efficient old wooden pump.

Patented June 21, 1870, by R. M. Lafferty, of Three Rivers, Mich., and manufactured by Smith & Lafferty, of the same place, and by the Toledo Pump Co., Cleveland, Ohio, to either of whom orders or letters for further information may be addressed.