

(No Model.)

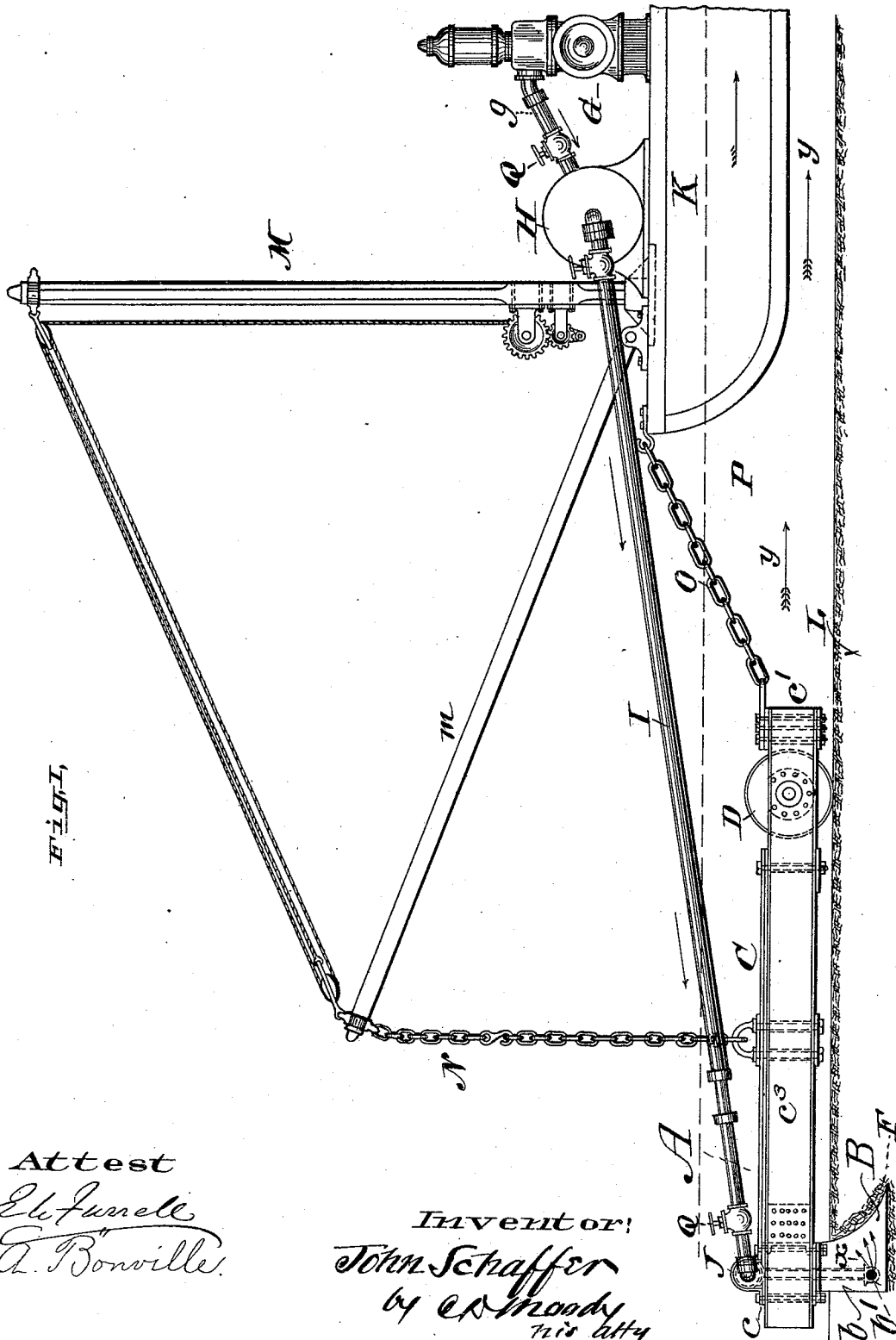
3 Sheets—Sheet 1.

J. SCHAFFER.

DEEPENING RIVERS OR OTHER WATER CHANNELS.

No. 486,957.

Patented Nov. 29, 1892.



(No Model.)

3 Sheets—Sheet 2.

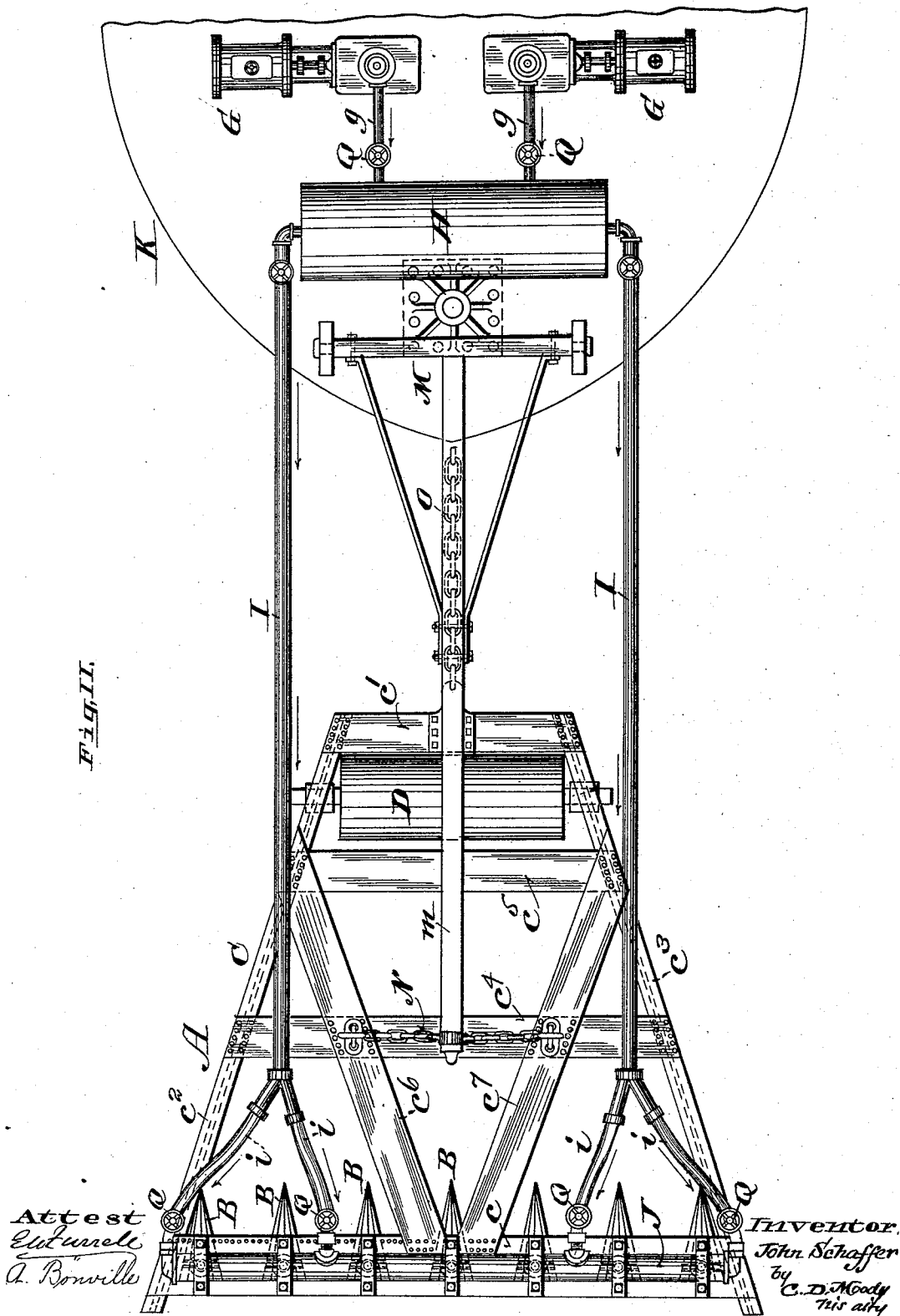
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FIG. II.



(No Model.)

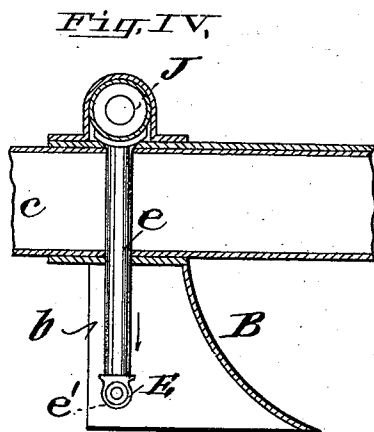
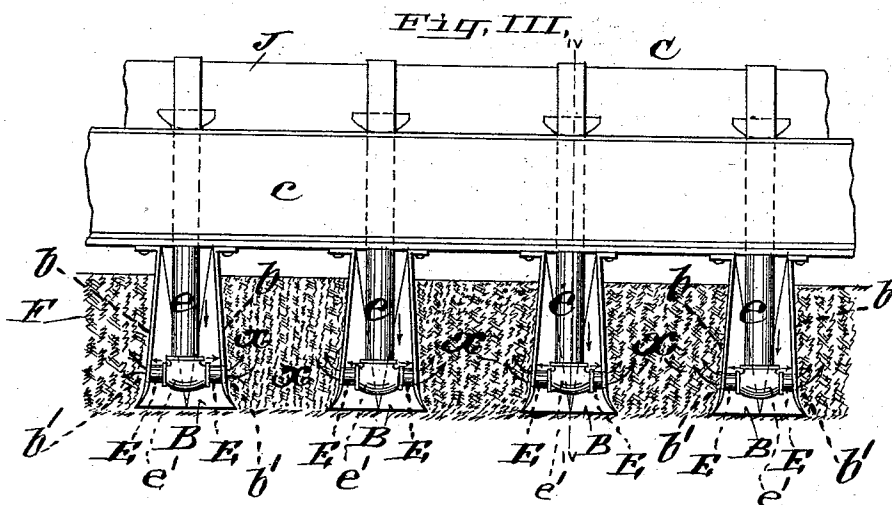
3 Sheets—Sheet 3.

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Attest

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UNITED STATES PATENT OFFICE.

JOHN SCHAFFER, OF KIRKWOOD, MISSOURI.

DEEPENING RIVERS OR OTHER WATER-CHANNELS.

SPECIFICATION forming part of Letters Patent No. 486,957, dated November 29, 1892.

Application filed October 19, 1891. Serial No. 409,169. (No model.)

To all whom it may concern:

Be it known that I, JOHN SCHAFFER, of Kirkwood, St. Louis county, Missouri, have made a new and useful Improvement in Deepening Rivers and other Water-Channels, of which the following is a full, clear, and exact description.

This improvement is based upon the use of hydraulic power in combination with means of a mechanical nature for loosening the earth—that is to say, appliances, such as plows or analogous tools or implements, are used to plow, rake, stir, loosen, overturn, score, drag, and variously move, agitate, break up, and carry away the earth at the bottom of the river or other place to be channeled or dredged, and in connection therewith jets, streams, or currents of water are used to render the earth more or less fluid. The water referred to is applied in the immediate vicinity of the point or points at which the mechanical appliances referred to are operating and substantially at the same time they are operating, in order that the two agencies may coact as a single force, substantially, in loosening the earth and transferring it to some other point more or less remote.

The improvement relates to the means employed in carrying out the described method, all substantially as is hereinafter described and claimed, aided by the annexed drawings, making part of this specification, in which—

Figure 1 is a side elevation of the mechanism. The bed of the river is indicated, and the view includes a sufficient portion of the boat or other craft or support which sustains the mechanism for an understanding of the improvement. Fig. 2 is a plan of mechanism; Fig. 3, a rear elevation showing a portion of the mechanism which is more immediately in contact with the earth operated upon, and Fig. 4 a vertical longitudinal section on the line 4 4 of Fig. 3. The last two named views are upon an enlarged scale.

The same letters of reference denote the same parts.

A represents the device used at the bottom of the river or other place being deepened. It may have a single plow or it may be constructed after the manner of a gang-plow. In practice several plows B B are stocked in a

single frame C, and the plows are preferably provided with a double mold-board *b b*, substantially as shown. The plows may be arranged side by side and at the same level, as shown, or they may be relatively arranged in any other desirable manner. The frame C in the present instance is composed, mainly, of the rear cross-beam *c*, to which the plows are more immediately attached, the front cross-beam *c'*, the side beams *c² c³*, and various cross-braces *c⁴, c⁵, c⁶, and c⁷*. The frame preferably tapers, as shown, toward the end having the cross-beam *c'*, and the frame is also preferably furnished with a roller D, suitably arranged, substantially as shown, which, in conjunction with the plows, serves to support the frame. The plows are preferably connected directly with the cross-beam *c*, and as shown more distinctly in Figs. 3 and 4; but any other suitable connection will answer. The water-nozzles E, through which the water in question is applied, are conveniently sustained by the plows, and preferably in the manner shown—that is, a pipe *e* extends between the mold-boards of each plow and connects, say by means of the T, *e'* with the nozzles E E, which respectively in turn connect with orifices *b' b'* in the mold-boards *b b*, respectively. Any equivalent arrangement can be employed so long as it enables the water to be applied to the earth F in the vicinity of the plows.

What I consider the most desirable arrangement for delivering the water to the pipes *e* is as follows: G G represent pumps adapted for forcing water, the water being delivered by them through pipes *g g* into a chamber H, and from said chamber the water flows through pipes I I and thence, say, through the flexible tubes *i i* into a tube J upon the cross-beam *c*. The pipes *e* extend and connect with said tube J, and in this manner a connection is made between the nozzles E E of all the plows and the pumps, and when the pumps are operated the water is discharged through the orifices *b'*, as indicated by the arrows *x*, Figs. 1 and 3.

A leading feature of the improvement is the adjustment and manipulation of the plows and water-forcing appliances with reference to the current in the river or channel whose

bottom is being operated upon. As represented in Fig. 1, the pumps and the adjacent portion of the water-delivery mechanism are arranged upon a boat or vessel K, whose draft is such as to enable it to float below the bar or whatever place L is to be dredged. By means of a derrick M, arranged upon the boat, the plow has been dropped into position for operating. A chain N connects the plow with the boom *m* of the derrick, and another chain O ties the plow to the boat. The current of the river P is indicated by the arrows *y*—that is, the plow is pointing downstream and the boat is in position to draw the plow in the direction in which the current is flowing—and the operation of deepening the river proceeds as follows: The plows penetrate the earth F at the bottom of the river and the water is discharged and mixed with the earth in the vicinity of the plows, and is thereby more or less loosened and prepared for being carried away by the current of the river. The plows act to break up the earth into a shape favorable of being acted upon by the water delivered from the orifices *b'*, and the water thus discharged in turn facilitates the action of the plows upon the earth. The two agencies co-operate in bringing the earth of the river-bottom into position, and also into condition for being borne by the current farther downstream and to a point therein deeper than is the river at the point being dredged. In practice the dredging commences at the downstream end of the bar or place to be dredged. By means of the boat and derrick the plow is brought into position and dropped onto the lowest portion of the bar and the pumps are started. The boat is then operated to drag the plow downstream until the plow has been dragged from off the bar. The channel is thereby deepened more or less, and if the desired depth of the channel is not yet attained the plow is dropped again onto the same spot as before and the operation of dragging the plow downstream is repeated, and so on until the requisite depth of channel is secured. The boat can now enter the just-formed channel and the plow is similarly dropped and operated upon that portion of the bar which is next above the part which has been operated upon and the deepening of this second portion of the bar is accomplished in a similar manner, and so on until the operation of deepening the river is accomplished. It will be observed, therefore, that the river-current is utilized in transferring the earth which is thus plowed and thinned to a deeper part of the river. The water-currents, which are forced, as described, to the bottom of the river, are useful in themselves in stirring up the earth to enable it to be more or less held in suspension by the river current and thereby carried away, and in conjunction with the mechanical appliances herein referred to they are more useful, and when the mechanical appliances are

in the form of drags or earth-moving implements the earth can not only be loosened and thinned, but also be transferred; but the improvement cannot be carried out to its fullest extent saving in a river or channel having a current which can be utilized to bear away the particles of the earth which have been loosened and raised from the bottom of the river in the manner described. The plows serve to protect the pipes *e* and nozzles E when they are relatively arranged, substantially as herein shown. The water when applied as described in the vicinity of the plow is a useful agent, even when it is ejected with but little force from the orifices *b'*, and its utility is increased as the water is ejected in larger quantity and with greater force. I desire not to be restricted to a boat or vessel for sustaining and moving the plows and other herein-described mechanism, as in some instances the support may be on land and stationary or otherwise suitably arranged. Neither do I wish to be limited to a derrick or to any special means for raising and lowering the plow and adjusting it in position upon the bottom of the river. I consider, however, the mechanism substantially as is represented the most desirable for the purpose in question. The various pipes of the water-ejecting mechanism are provided with suitable valves Q for controlling the flow of the water. The nozzles E, as shown in the drawings, point directly sidewise; but they may point more or less obliquely—say obliquely forward in the direction of the points of the adjacent plows, respectively—for a feature of the improvement is the co-operation of the water-nozzles in one of the plows with the adjoining plows, facilitating their action as well as the action of the plow to which the nozzles are immediately attached—that is, the water escaping from the nozzles of one of the plows penetrates and acts in the manner described upon the earth in the immediate vicinity of the adjacent plows as well as upon the earth close to the plow holding the nozzles. All the plows thus mutually assist the action of each other.

Another feature of the construction is the upholding from overhead of more or less of the weight of the plow as it is operating, for as the earth by reason of the described use of a water-current becomes more or less softened the plow is liable to sink more or less into the earth. It is important to be able to gage the position vertically of the plow with reference to the river-bottom, now lowering it to plow deeper and now raising it to plow shallower. An overhead support, substantially such as is shown, by means of which the plow can be raised or lowered and held at the desired level, enables these ends to be satisfactorily accomplished.

So far as the plow serving as a protection to the water-delivery pipe against abrasion by the earth being excavated is concerned, I

desire not to be restricted to a water-delivery pipe, which is immediately behind the plow, as such protection is afforded when the pipe is somewhat in rear of said plow, provided it is in line with it.

I claim—

1. The plow B, having the pipe *e* and one or more nozzles E, substantially as described.

2. A plow B, having a water-passage extending within it and having its outlet in the mold-board of the plow, for the purpose described.

3. The combination of the frame C, tube J,

pipes *e*, nozzles E, and plows B, substantially as described.

4. The combination of the pump G, the pipe *e*, the water-passage connecting said pump and pipe, the nozzle E, the plow B, and the plow-frame, substantially as described.

Witness my hand this 17th day of October, 1891.

JOHN SCHAFFER.

Witnesses:

C. D. MOODY,

A. BONVILLE.

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