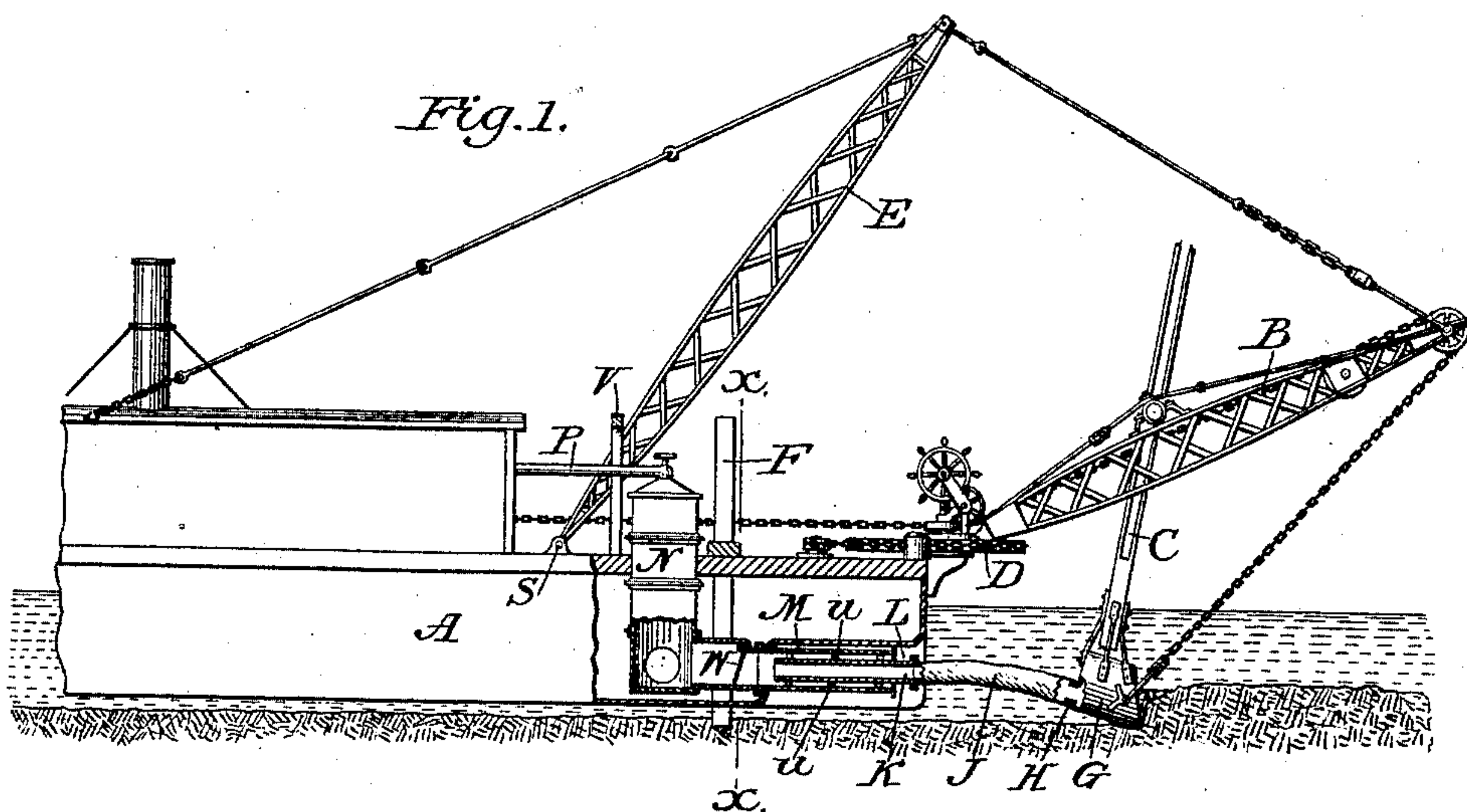


(No Model.)

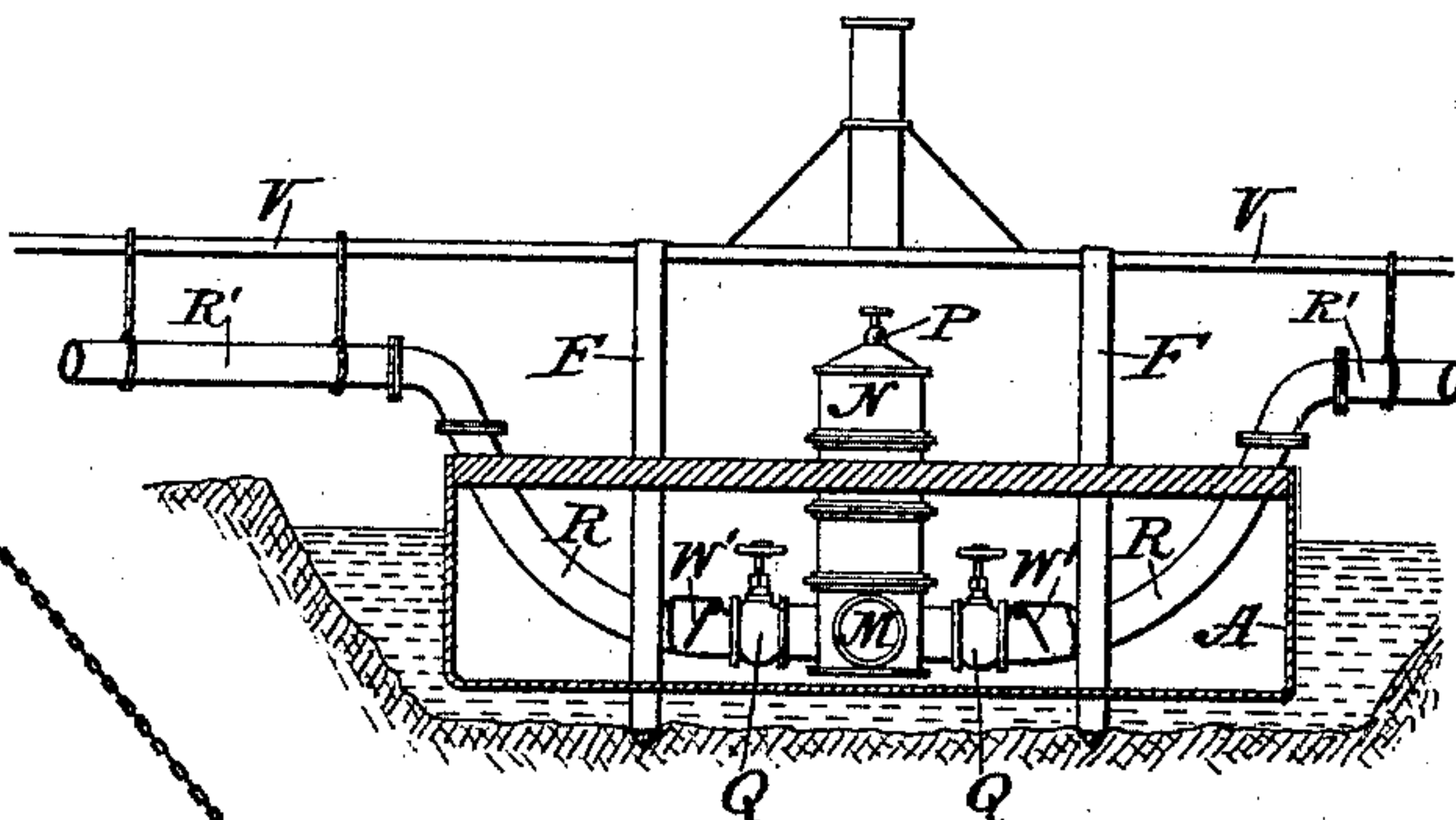
C. L. RIKER.  
PNEUMATIC DREDGE.

No. 413,091.

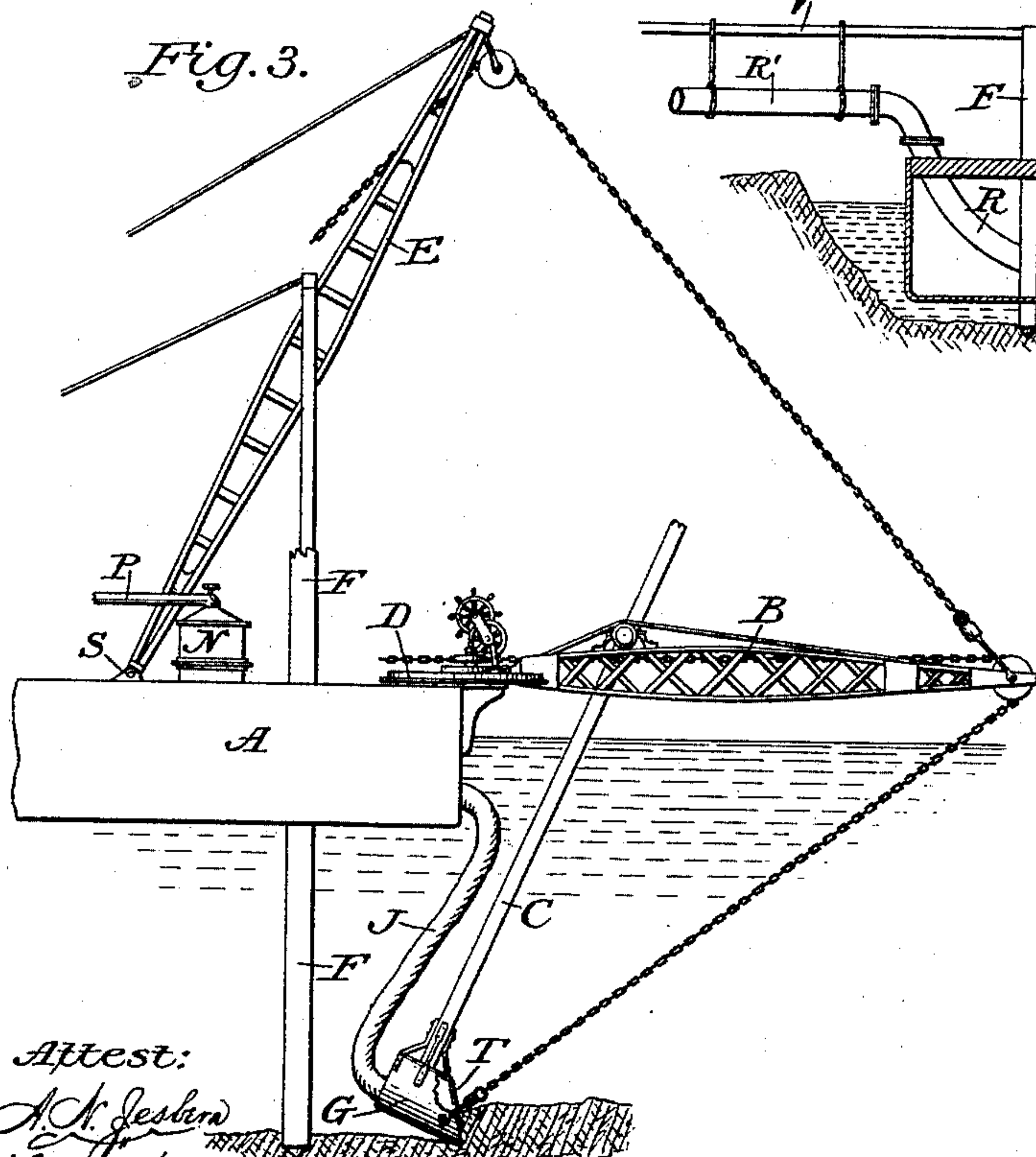
Patented Oct. 15, 1889.



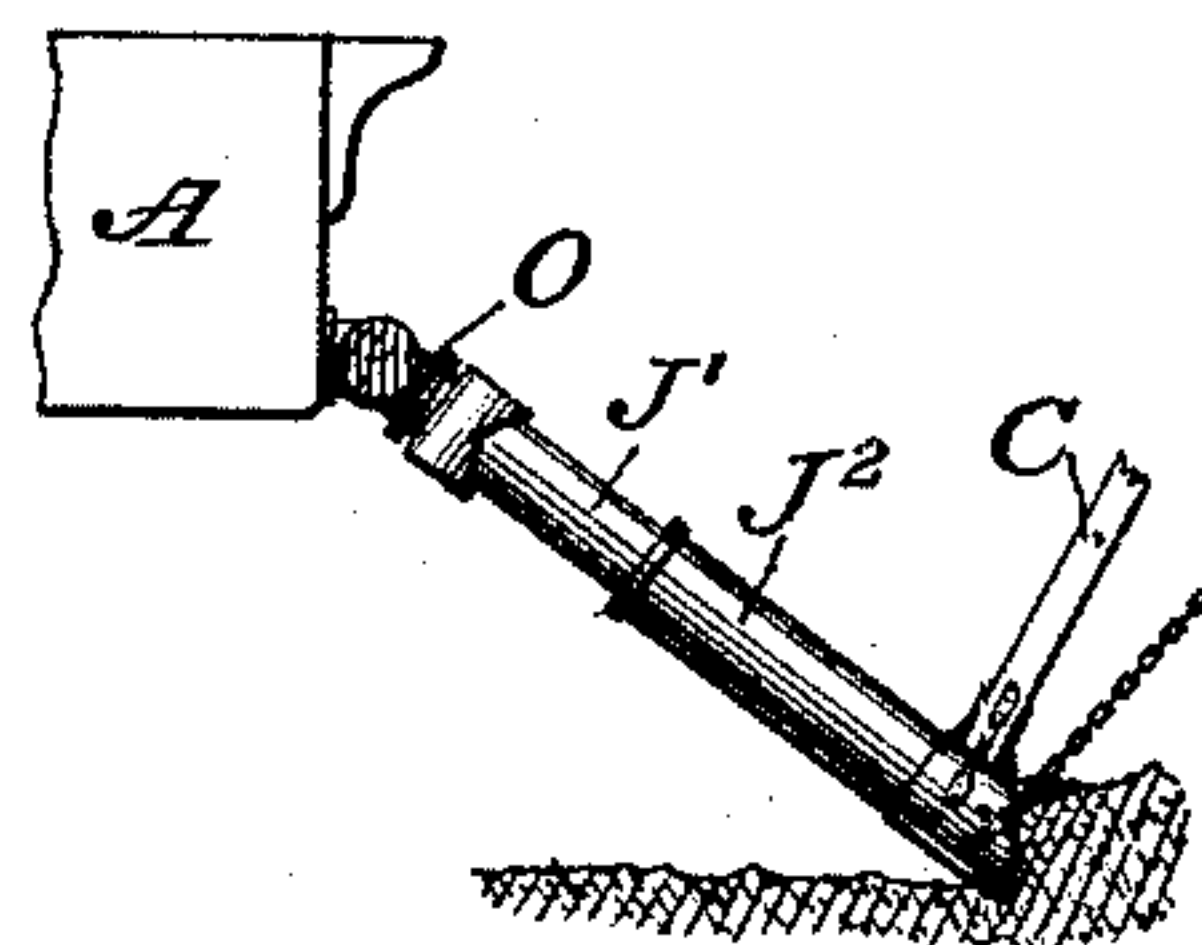
*Fig. 2.*



*Fig. 3.*



*Fig. 4.*



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# UNITED STATES PATENT OFFICE.

CARROLL L. RIKER, OF ESOPUS, NEW YORK.

## PNEUMATIC DREDGE.

SPECIFICATION forming part of Letters Patent No. 413,091, dated October 15, 1889.

Application filed February 1, 1889. Serial No. 298,367. (No model.)

*To all whom it may concern:*

Be it known that I, CARROLL L. RIKER, of Esopus, in the county of Ulster and State of New York, have invented certain new and  
5 useful Improvements in Pneumatic Dredges; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and  
10 to the letters of reference marked thereon, making a part of this specification.

The object of my invention is to dispense with the need of continually lifting, swinging, and dumping the dipper of a crane or boom dredge in the work of excavating there-  
15 with and to provide means for discharging the material scooped up from the river-bed without elevating the dipper for the purpose and without material change in the devices customarily employed for moving the dipper  
20 into contact with said material.

It consists in the combination, with the scoop-dipper and traveling dipper-handle in a crane or boom dredge of any approved form of construction, of a suction-pump mounted  
25 in the hull of the dredge and provided with a flexible suction-pipe coupled to the bottom of the dipper, and in the details of equipment and construction of the several coacting parts, as hereinafter fully described and claimed.

30 In the accompanying drawings, Figure 1 is a side elevation, partly in section, of my improved pneumatic boom-dredge; Fig. 2, a transverse section in line *x x* of Fig. 1, illustrating the machine fitted with discharge-  
35 pipes to deposit the material excavated thereby over or upon an embankment on either side; Fig. 3, a side elevation illustrating the machine at work in deep water, and Fig. 4 a detail illustrating a modification in form of  
40 the dipper-tube and dipper.

A represents a dredge of approved construction fitted in the customary manner with a light boom B, from which is suspended the traveling dipper-handle C. The boom is  
45 hinged at its lower end to the turn-table D of the usual form, and its outer end is supported and adjusted by chains or cables extending to the upper end of an A-frame E. This frame is preferably jointed at its lower end  
50 to iron sockets S, bolted to the deck of the hull.

F F are the spuds which anchor the dredge

in position when at work, and which are fitted to be hoisted by steam-power by means of chains and friction-drums, or by a rack-and-  
55 pinion gear to be worked by hand.

A steam-engine (not shown in the drawings) is provided for adjusting the dipper and pulling it into the bank.

As thus far described, the dredge and its  
60 mechanism are of well-known form, and my invention may be fitted thereto without material changes therein.

The scoop or dipper G is of the usual form and is secured to the handle C in the usual  
65 manner. The bottom of the dipper, however, instead of being made in two parts to form a door, is left entirely open and is provided with an annular flange H, Fig. 1, by means of which a flexible suction-pipe J may  
70 be readily connected thereto, and the area of its mouth is preferably reduced by means of an upper plate T, (see Fig. 3,) covering a third or more of its upper portion, the area of the opening being made to correspond with that  
75 of the diameter of the pipe. The pipe J is adapted for connection at its opposite end to the inner section K (see Fig. 1) of a telescopic tube, which is mounted in a recess L, formed longitudinally and centrally under the hull at  
80 the bow of the dredge, the outer concentric section M of said tube being fixed to the hull in said recess, so as to be submerged in the water and made to extend at its inner end into the hull to connect with the bottom of  
85 a steam vacuum-pump N, which may be of any approved construction and of suitable dimensions, or with a centrifugal pump as an equivalent therefor. The inner section K of the telescopic extension-tube is adapted to  
90 play freely longitudinally within the outer section M, the friction between the two being reduced to a minimum by a series of interposed concentric friction-rollers *u u* and the joints packed by rings of suitable material.  
95

The suction-valve W for the pump is fitted at the inner end of the tube M, and consists of a hinged metallic flap set at an angle and left free to lift and open inward. This valve  
100 extends from side to side of the valve-chamber and finds a seat therein at its lower edge only, leaving the valve-chamber unobstructed by lateral offsets or recesses.

Where a steam vacuum-pump is used, it



may consist simply of a cylindrical chamber N, fitted at its upper end with a steam-supply pipe P from a suitable steam-generator and with a condensing-pipe from an elevated water-tank or otherwise under pressure. The steam and condensing pipes both open centrally into a deflecting device fitted in the top of the chamber, and which consists of a hollow vessel having a solid bottom and perforated sides, but which constitutes no part of the present invention, and need not therefore be herein more fully described. Two discharge-pipes R R may be provided—one on each side of the pump N—to extend from the bottom thereof at an angle upward to the level of the deck near to its outer edge. Each discharge-pipe R is governed by a suitable open-way valve Q, placed near to the pump, and is fitted with check-valves W' W' similar in form to the suction-valve W. Spars V V are rigged to extend out from the dredge horizontally over the discharge-pipes R R, and said discharge-pipes may be extended by means of sections R', adapted to be coupled thereto, so as to reach out therefrom to such distance as may be required for the delivery of the material discharged by the operation of the pump, these additional sections being supported, as required, by suspension-straps depending from the spars V V.

Instead of using a suction-pipe flexible throughout its entire length, a metallic suction-pipe J' may be connected by means of a double or universal joint, as shown at O, to the horizontal suction-pipe fixed to the pump, so that the pipe may be readily adjusted both vertically and horizontally. The end of this metallic suction-pipe may be fitted to any suitable form of scoop, or be itself beveled at its end, as shown in Fig. 4, to operate as a scoop to take hold of the sand and mud to be drawn up by the action of the pump. It is also made adjustable in length by means of a telescopic joint J<sup>2</sup>.

In the operation of the machine the dredge is properly anchored by the spuds F F in position to allow the scoop-dipper G or the end of the scoop-pipe J' to be carried into and through the bank of mud or sand to be excavated. The discharge-pipe R, on the side of the machine next to the river-bank, if the material is to be delivered on shore, or next to the scow if it is to be carried away, is then properly extended and supported by the spars V V and the discharge-valve of the pipe on the opposite side of the pump closed. The dipper is then adjusted, by means of the boom B and the traveling handle C, so as to

bring its mouth in contact with the bank, in readiness to be drawn forward into and through it, the suction-pipe being lengthened or shortened to adapt it to the length of cut of the dipper.

The vacuum-pump N is brought into action by filling the cylinder P with steam, so as to eject through the discharge-pipe the contents thereof, and then condensing the steam by an admission of cold water to the chamber from the condensing-pipe. Under the influence of the vacuum created by the condensation of the steam, the material in front of the dipper is drawn into it and, through the suction-pipe J or J', into the pump, to be thence discharged by the next charge of steam admitted thereto. The dipper is drawn forward automatically as the material in front is drawn into it, and this forward feed of the dipper is assisted and its direction determined by the action of the hoisting chains and drums.

It is evident that my invention is applicable to dredges having the dipper and its traveling handle supported, adjusted, and operated in the customary way by means of a triangular crane instead of a boom, and I contemplate its use with a traveling scoop-dipper suspended in any well-known manner.

Every advantage and every desirable point which characterize the boom-dredges heretofore employed are retained in this invention, while the loss of time, the expenditure of power, and the strain required in raising and swinging the dipper each time it is filled, in the old machines, are hereby avoided, and superior facilities are provided for the ready discharge of the material at any desired point, irrespective of the position of the dredge.

I claim as my invention—

The combination, with the dredge-boat, the scoop-dipper, the traveling handle supporting the same, and means, substantially as described, for supporting, guiding, and moving the handle, of a suction-pump, an adjustable suction-pipe extending from the pump to the bottom of the dipper, one or more discharge-pipes extending from the pump outwardly, and valves controlling said pipes, substantially in the manner and for the purpose herein set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

C. L. RIKER.

Witnesses:

A. N. JESBERA,  
E. M. WATSON.