

(No Model.)

J. H. RAE.
VACUUM DREDGE.

No. 368,354.

Patented Aug. 16, 1887.

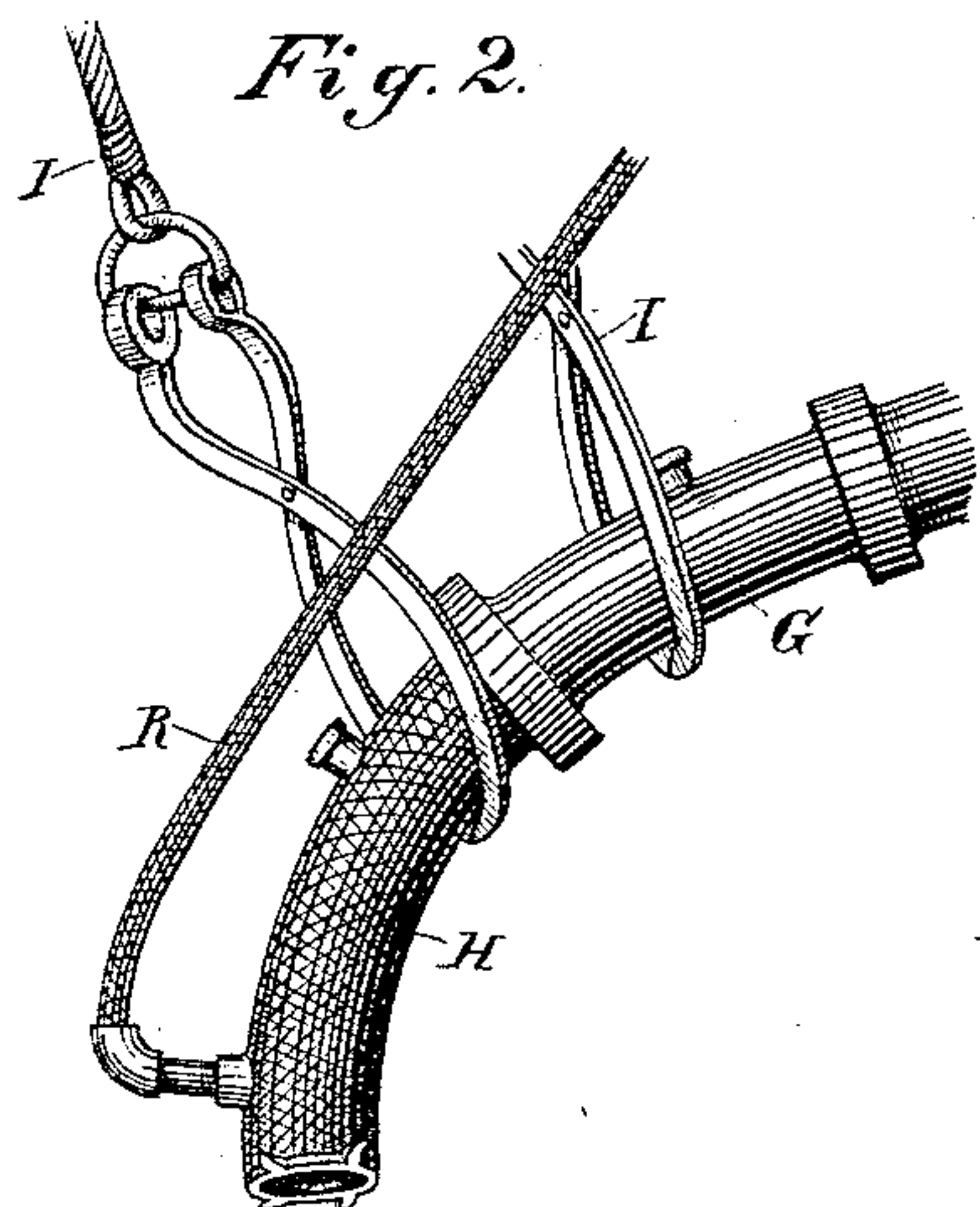
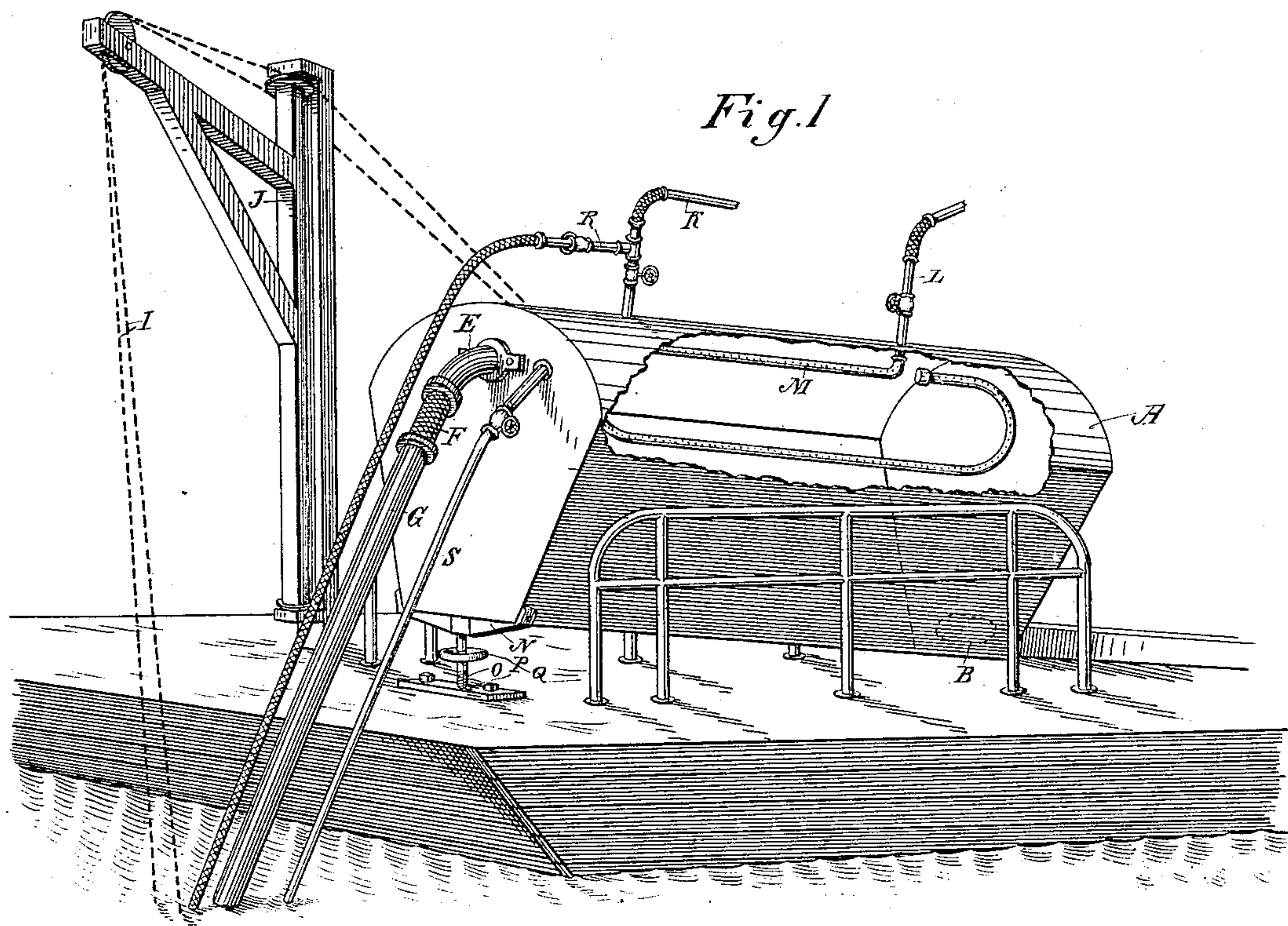


Fig. 3.

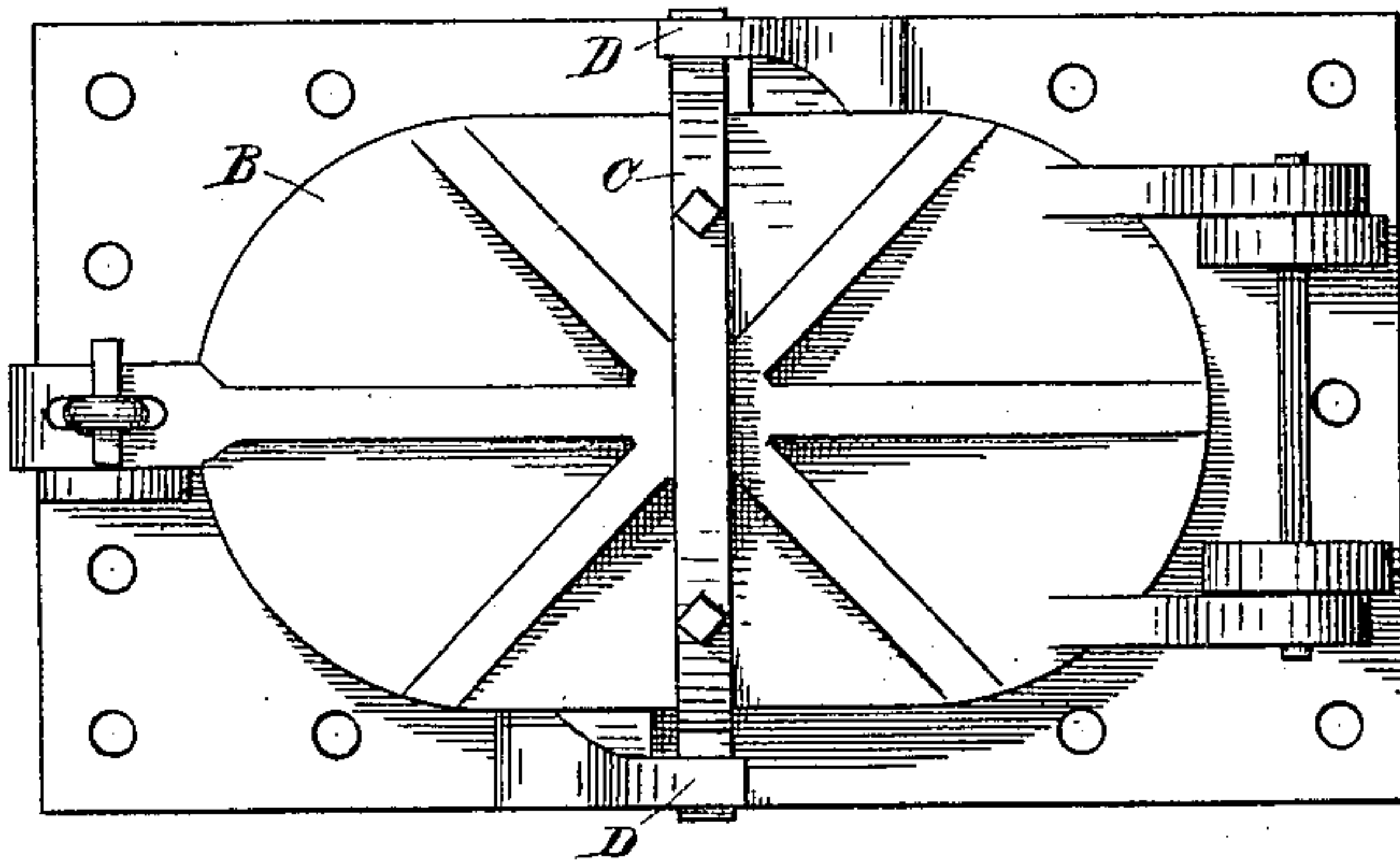
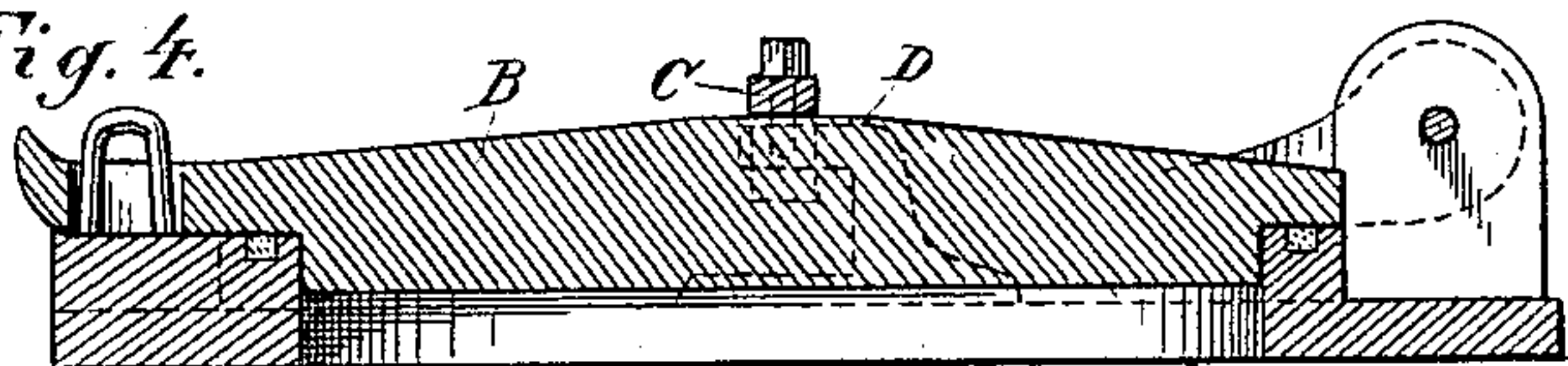


Fig. 4.



Witnesses,
Geo. H. Strong,
J. H. Source

Inventor,
Julio H. Rae,
By Dewey & Co.
attys

UNITED STATES PATENT OFFICE.

JULIO H. RAE, OF DAYTON, NEVADA.

VACUUM-DREDGE.

SPECIFICATION forming part of Letters Patent No. 368,354, dated August 16, 1887.

Application filed February 3, 1887. Serial No. 226,449. (No model.)

To all whom it may concern:

Be it known that I, JULIO H. RAE, of Dayton, in the county of Lyon and State of Nevada, have invented an Improvement in Vacuum-Dredges; and I hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to certain improvements in apparatus for raising sand or other material from the beds of rivers or other bodies of waters, and it is especially applicable to the dredging of valuable auriferous sands or tailings, to be afterward worked by the usual processes to extract gold or valuable sulphurets or other materials.

It consists of a peculiarly-shaped vacuum chamber or vessel, a means for adjusting its position, means for creating a vacuum, and means for moving and regulating the position of the suction-pipe and also preventing its becoming clogged with sand, together with certain details of construction, all of which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a view of my apparatus. Fig. 2 shows the end of the suction-pipe. Fig. 3 is a front elevation of the gate. Fig. 4 is a longitudinal horizontal section through the same.

A is the chamber within which the vacuum is to be produced. This chamber is made with a flat bottom and arching top and straight inclined sides, with ends corresponding in shape with these outlines, the whole being made of boiler or other iron of sufficient strength, riveted together, so as to be air-tight. At one end, near the bottom, is a door or gate, B, through which the material is discharged after the chamber has been filled. This gate is preferably hinged so as to swing open, and is secured when closed by means of a bar, C, extending across the top, and having its ends passed beneath lugs or cleats D upon each side of the door-opening. Set-screws pass through this bar, and may be turned down so as to press the gate against a surface beneath with any desired amount of force. In order to make a perfect joint, the gate closes upon a raised flange surrounding the opening, and this flange is grooved to receive a rubber or elastic packing, which projects sufficiently so that when the gate is closed against it it will make a tight joint.

At the opposite end of the chamber, and preferably near the top, is a hole having a pipe, E, extending a short distance outward, and this pipe is connected by a flexible joint, F, with the rigid suction-pipe G, which is made in sections, and may extend as far as is necessary to reach the bottom where the material to be dredged is lying.

Suitable couplings are made upon each section of pipe, and also upon the section E and the flexible portion F, so that the parts may be readily coupled together and made airtight. The flexible portion may be made in any suitable or desirable form to resist compression by exterior pressure, and of sufficient length to allow the rigid portion of the suction-pipe to be moved from side to side, so as to reach any point upon the bottom from which it is desired to raise the material. The lower end of the suction-pipe has a suitable mouth or opening for receiving the material, and a flexible joint or section, H, constitutes the extreme lower end, which allows this lower end to be moved around bowlders or rocks, so as to pick up the material which lies close around the rock without the necessity of moving the whole length of the suction-pipe.

The suction-pipe and also the lower section are suspended by means of independent wire ropes or chains I from a crane, J, by which either part may be raised or lowered or swung from side to side as may be desired, the crane being suitably mounted upon the dredge-boat or bank of the stream, as the case may be.

K is the inlet-pipe through which steam is admitted to the interior of the chamber A, so as to first drive out all the air which may be there contained, and L is a pipe through which water is afterward admitted to condense the steam, the cock of the steam-pipe having been previously closed after the chamber is full of steam. In order to make this condensation as instantaneous as possible, the pipe L is connected with an oval perforated spray-pipe, M, situated in the upper portion of the chamber A, and so shaped as to extend over a large proportion of its length and breadth. The water being let in under pressure is discharged in a fine spray through the openings in this pipe, and the steam is then instantly condensed, producing a nearly or quite perfect vacuum within the chamber A.

The mouth of the suction-pipe being placed in contact with the mud or dredgings at the bottom and beneath the water, the atmospheric pressure caused by the vacuum forces the material up through this pipe until the chamber has been filled. After this has taken place, the door B is opened and the material discharged into any receptacle or sluice, or to any point where it may be desired. The chamber A stands preferably at an angle, as shown in the drawings, with the front or discharge end lower than the rear or receiving end, so that the material may readily flow out when the discharge-gate is opened. In order to regulate the position and raise or lower the rear end at will, this end is supported upon a heavy bar or yoke, N, which rests upon the upper end of a strong screw, O, turned within a nut, P. (Shown in Fig. 1.) The screw may be provided with a hand-wheel, Q, or any means for turning it, to raise or lower this end of the chamber. In order to relieve the suction-pipe in case the sand becomes too dense so as to clog it, I employ a steam-pipe, R, which leads from the pipe K down along the suction-pipe, having flexible joints in it corresponding with those in the suction-pipe. This pipe may have one or more openings communicating with the suction-pipe at different points; or, if desired, I may use different pipes for each point of communication. These pipes are provided with cocks by which steam may be admitted into the suction-pipe, thus softening and loosening up the sand and enabling it to flow freely upward into the vacuum-chamber. By this construction I am enabled to operate this mechanism for raising valuable sands or tailings very rapidly and efficiently.

The pipes K and L have flexible joints, to allow the chamber A to be adjusted without disturbing them.

In order to cool off the chamber when it becomes too hot, and also to wash it out and cleanse it without disturbing or interfering with the main suction-pipe, I employ a small pipe, S, which opens from the upper rear end of the chamber and leads down into the water. This pipe is provided with a valve or stop-cock, and when desired, the main suction-pipe being closed and a vacuum formed, as before described, water may be admitted through the pipe S, the chamber A being thus cooled and washed out. The peculiar shape of this chamber A makes it easy to discharge and clean out because of the inclined sides and narrow flat bottom, and also provides a large steam-space at the top, so that when a vacuum is formed within it it can be more completely filled than a cylinder or other similar shape.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a vacuum-dredge, the chamber A, having the flat bottom, arched top, vertical ends, and inclined sides, substantially as described. 65

2. The vacuum-chamber shaped as shown, and having a gate or door at the lower side of one end, with the gasket and fastening-bar for making a tight joint, in combination with the suction-pipe extending from the upper part of the opposite end, and having the flexible joint with couplings, substantially as described. 70

3. The vacuum-dredge consisting of the vacuum-chamber with the discharge door or gate at one end, and the steam and water inlet pipes, in combination with a suction-pipe made in sections and having suitable couplings, and the intermediate flexible section near the lower end, whereby the whole pipe or the suction end only may be moved, substantially as described. 75

4. The vacuum-chamber with its discharge-gate and inlet and water pipes and a sectional suction-pipe having intermediate flexible sections, in combination with the supporting-ropes and crane for moving said pipe from one point to another about the upper flexible section, and permitting the lower end to be moved independent of the rest of the pipe, substantially as herein described. 85

5. The vacuum-chamber dredge with the sectional and flexible suction-pipe and discharge gate or door, in combination with the steam-inlet pipe and the water-inlet pipe having the oval spray-pipe fixed within the chamber, substantially as described. 95

6. The vacuum-chamber with its suction-pipe and discharge gate or door, and steam and water inlet pipes, in combination with the supplemental pipe leading from the steam-pipe down alongside of the suction-pipe, having the flexible joints corresponding with those in said suction-pipe, said supplemental pipe opening into the suction-pipe, so that the jet of steam may be introduced therein, substantially as herein described. 105

7. The vacuum-chamber dredge constructed as shown, with the discharge-opening and the jointed and flexible suction-pipe, said chamber being supported at an angle and having the adjusting-screw, whereby its angle of inclination may be changed, substantially as herein described. 110

8. The vacuum-chamber with its suction-pipe, discharge gate or door, and steam and water inlet pipes, in combination with the supplemental water-pipe S, by which the chamber is cooled and washed out, substantially as herein described. 115

In witness whereof I have hereunto set my hand.

JULIO H. RAE.

Witnesses:

S. H. NOURSE,
H. C. LEE.