

(No Model.)

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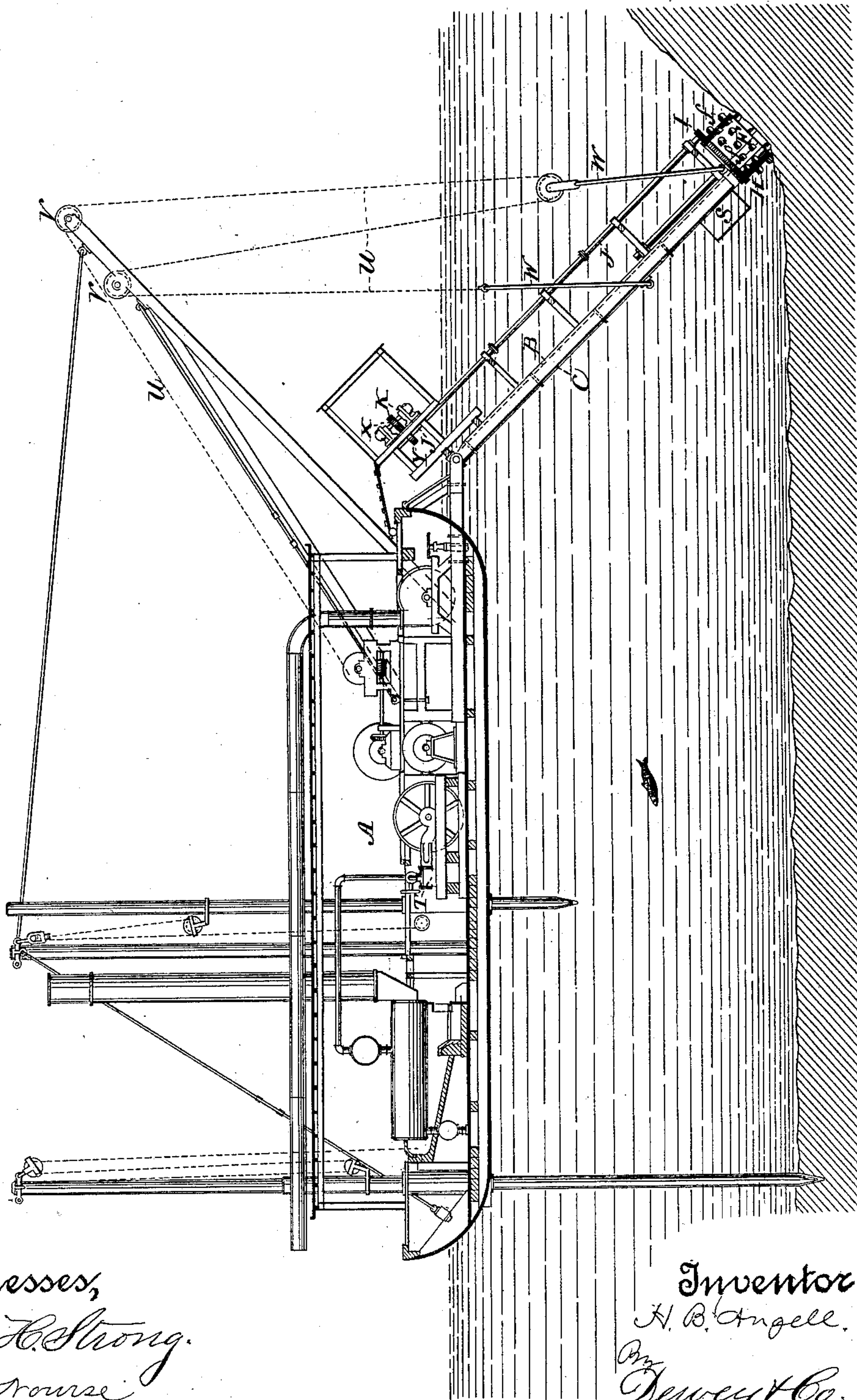
H. B. ANGELL.

DREDGER.

No. 341,539.

Patented May 11, 1886.

Fig. 1.



Witnesses,
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J. H. Mourse

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(No Model.)

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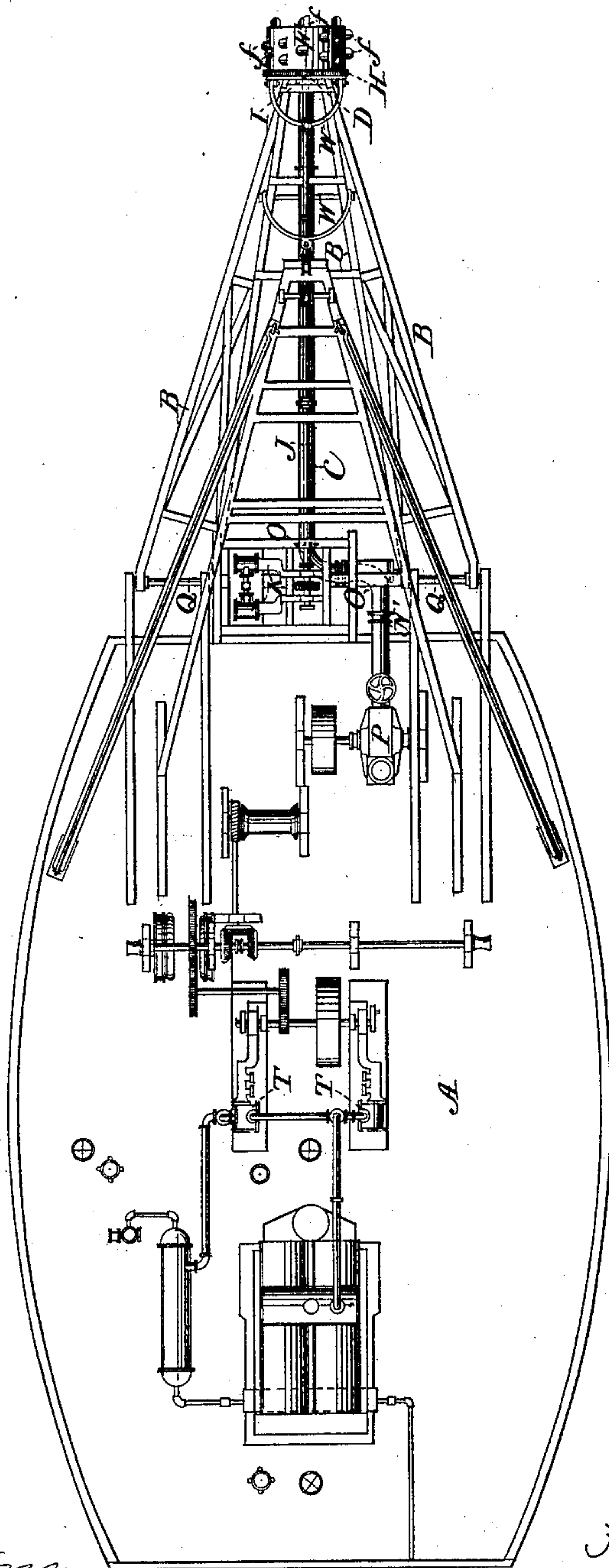
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Fig. 2.



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Fig. 4.

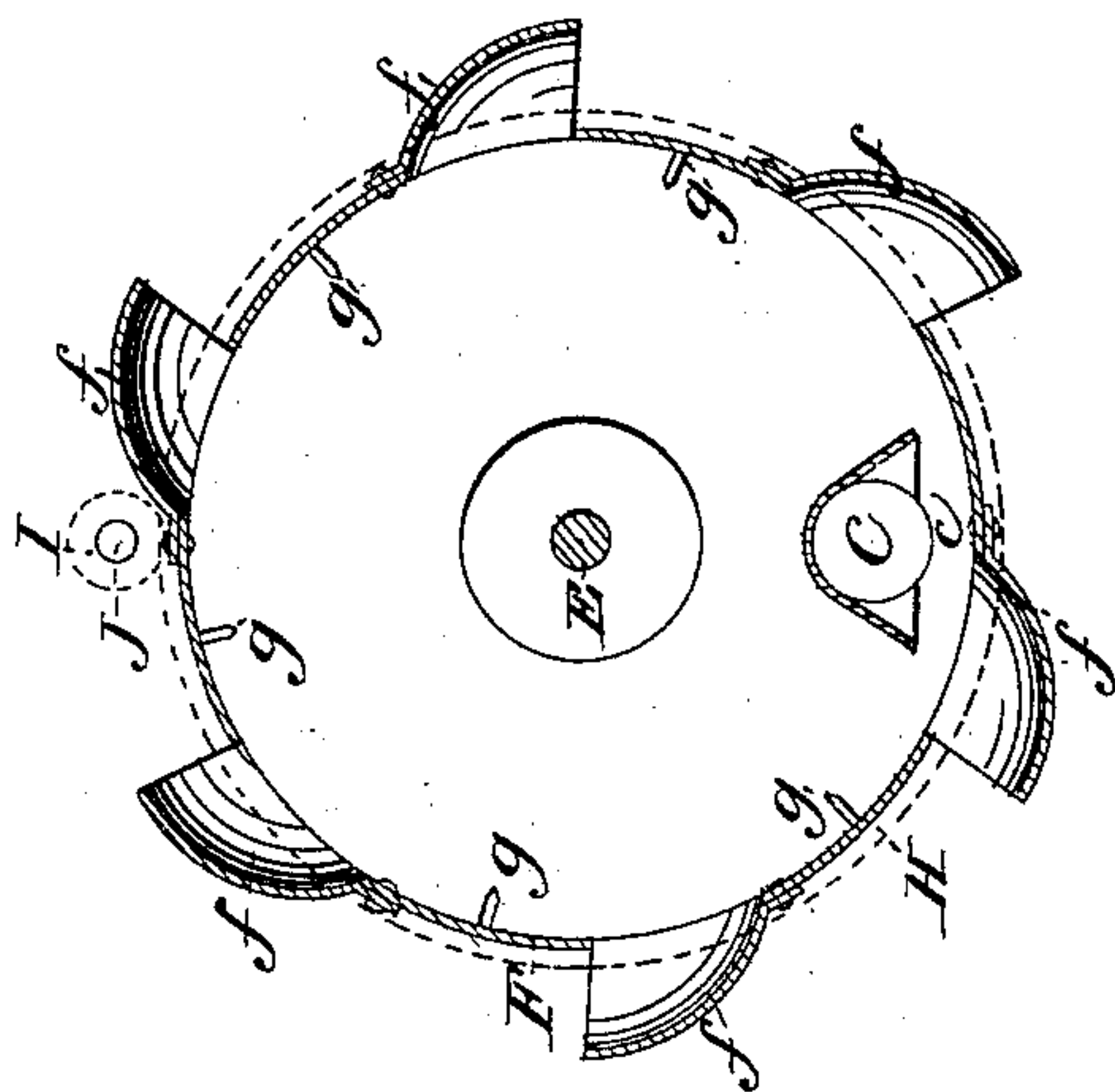
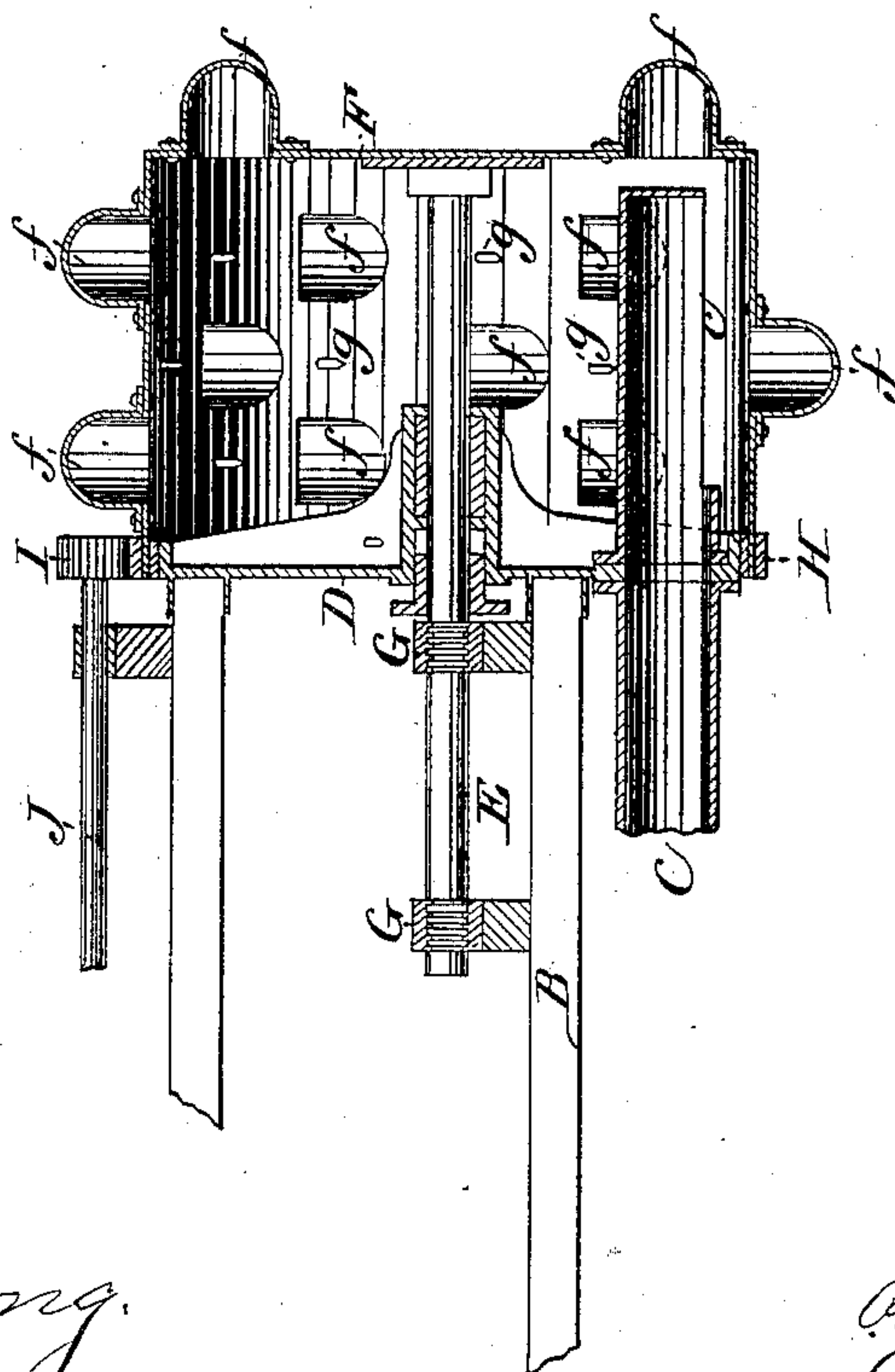


Fig. 3.



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Fig. 7.

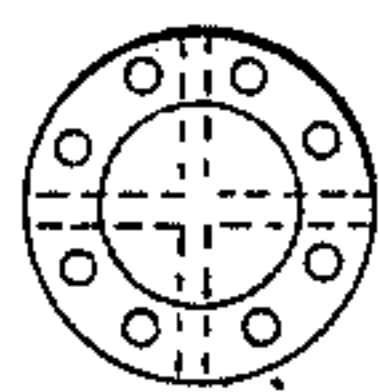


Fig. 5.

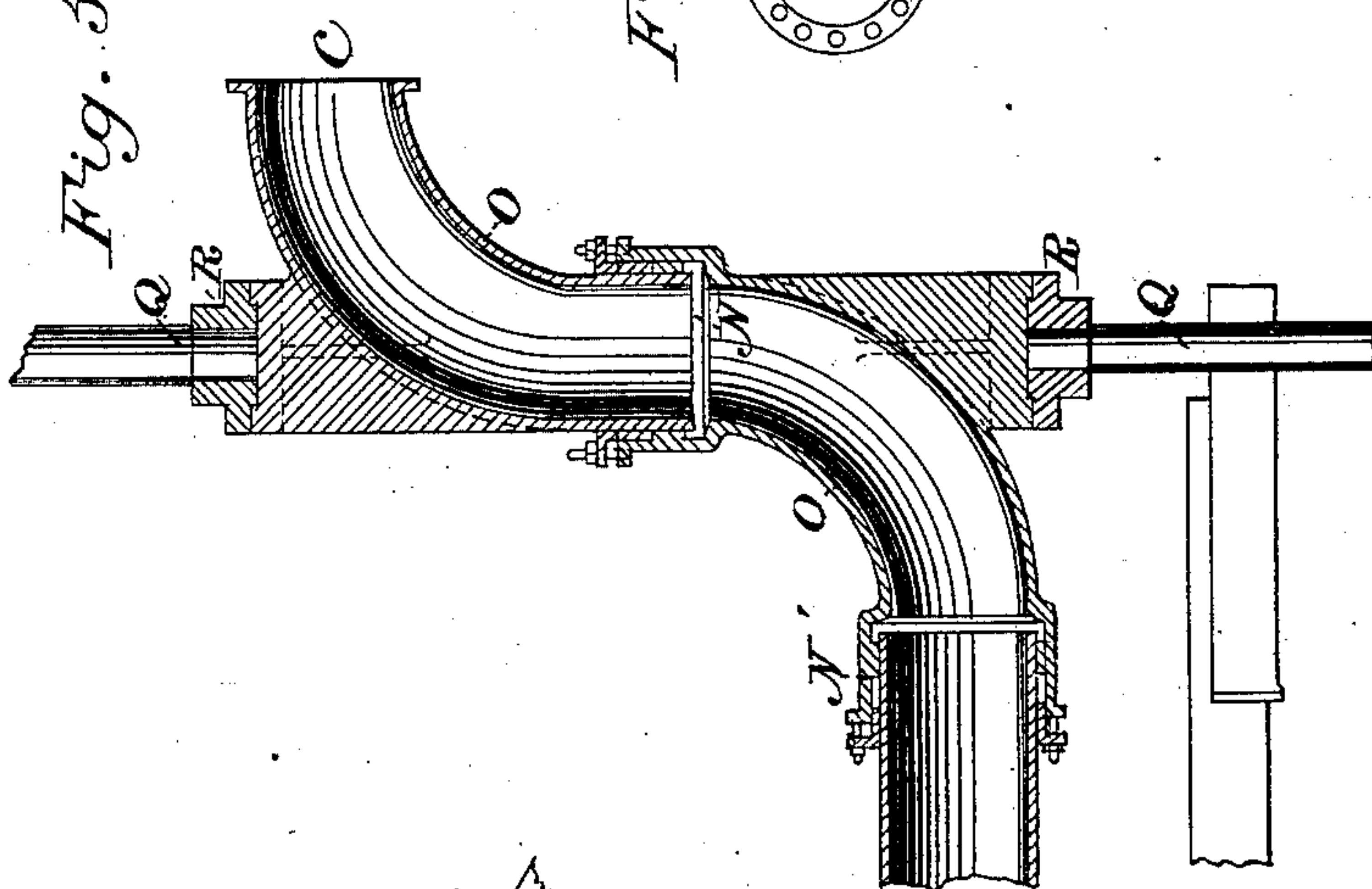


Fig. 6.

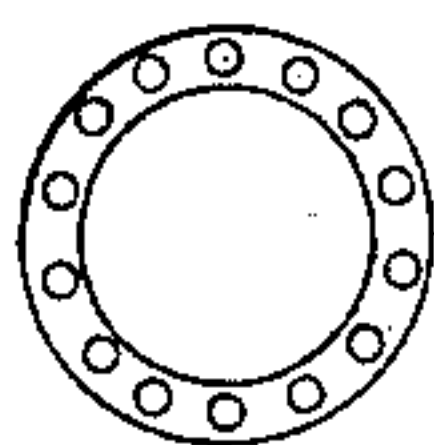


Fig. 8.

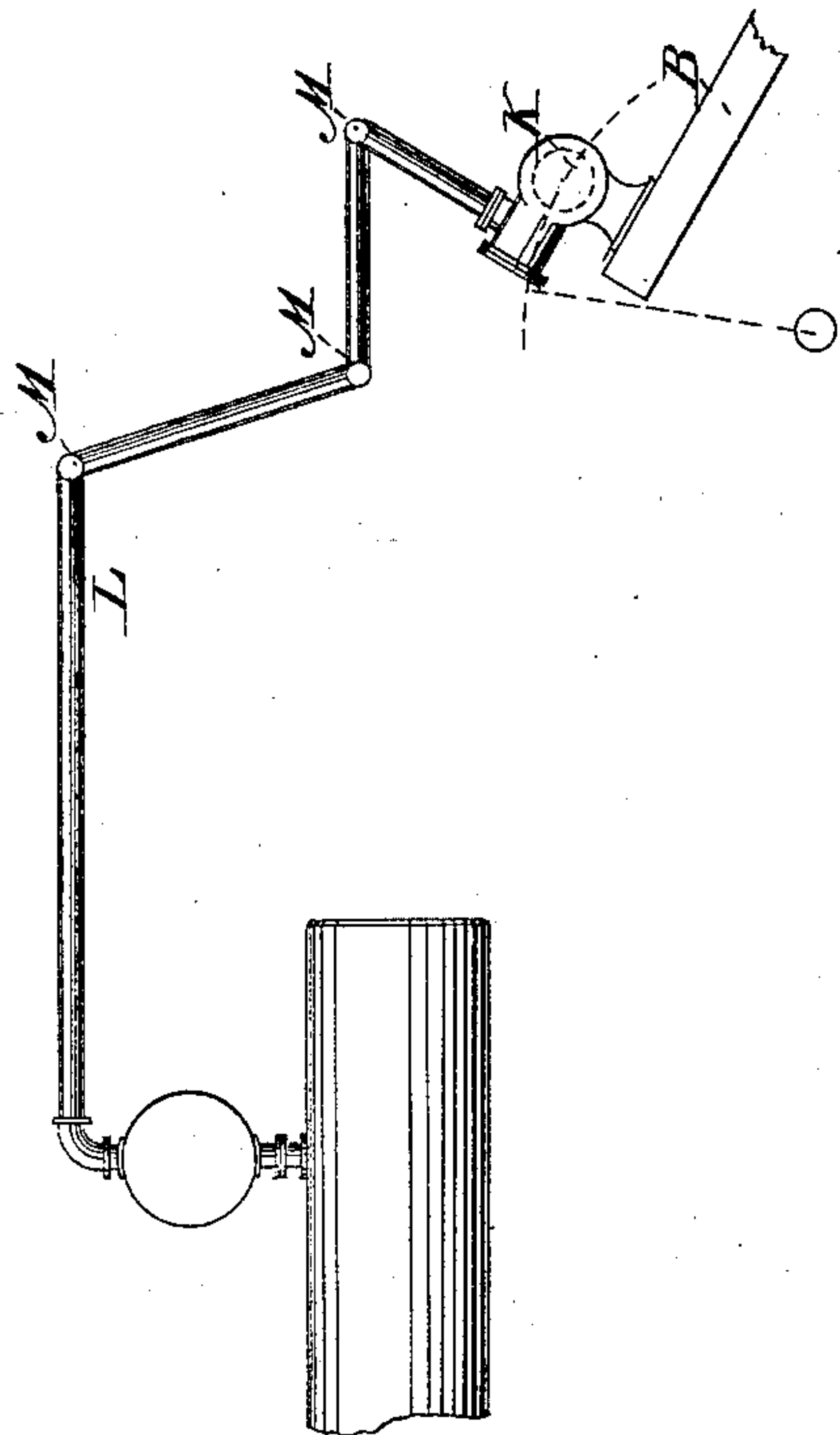
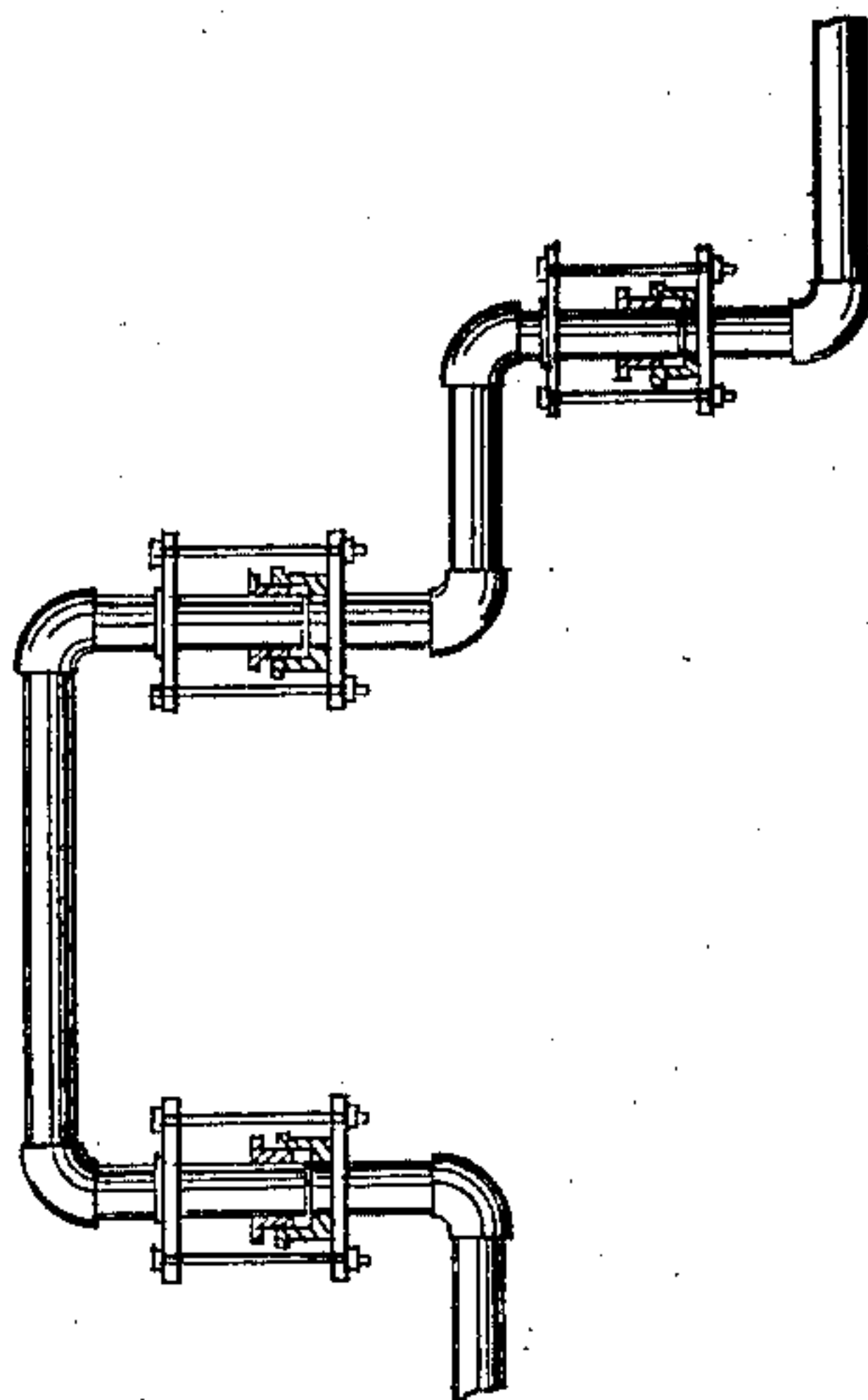


Fig. 9.



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UNITED STATES PATENT OFFICE.

HORACE B. ANGELL, OF SAN FRANCISCO, CALIFORNIA.

DREDGER.

SPECIFICATION forming part of Letters Patent No. 341,539, dated May 11, 1886.

Application filed February 21, 1883. Serial No. 85,800. (No model.)

To all whom it may concern:

Be it known that I, HORACE B. ANGELL, of the city and county of San Francisco, State of California, have invented an Improved Dredger; and I hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to certain improvements in apparatus for excavating or dredging; and it consists, mainly, of an excavating drum or cylinder with suitable driving mechanism by which it is rotated, a stationary suction tube or pipe in suitable relation with the excavating-drum to receive the material, and engines by which the excavator is driven, an inclined ladder hinged to one end of a float or dredge-boat, and supporting these devices, and a means for connecting this movable mechanism with the stationary boilers and pumping apparatus upon the boat, all of which, together with details of construction, will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of my machine with section of the boat. Fig. 2 is a plan or top view. Fig. 3 is an enlarged longitudinal section of the excavator and suction-pipe. Fig. 4 is an enlarged transverse section of the same. Fig. 5 is an enlarged section of the suction-pipe joint and ladder-trunnions. Fig. 6 is an end view of a flange of a joint-section. Fig. 7 is an end view of flange at R. Fig. 8 is a side view showing section of main boilers and jointed pipe-connections to engine on the ladder. Fig. 9 is a plan view of the joints of the pipe.

In excavating or dredging various devices are employed, among which is an endless chain of buckets moving over an inclined ladder or frame, one end of which is hinged to a boat, upon which suitable driving machinery is placed, while the other sinks to the bottom or rests upon the spot to be excavated, so that each bucket may be filled as it reaches the bottom and pass up the inclined ladder to discharge at the top. Another form consists of a rotary digger driven by a central shaft and having a vertical telescopic tube extending upward from it to a pump, by which the excavated material is drawn up to the surface, the telescopic pipe allowing the cutter or excavator to work at different depths.

In my invention I have combined an exca-

vating-drum rotating upon its own axis with an inclined supporting-frame or ladder hinged at its upper end to a dredge-boat and having a suction-pipe of fixed length supported upon it and leading from the excavator to a pump and discharge. This enables me to move the excavating-cutter in a vertical arc about the trunnions of the ladder, while the side movement is obtained by swinging the dredge-boat about suitable spuds or anchors.

A is a dredge-boat, of any suitable construction, carrying boilers and other necessary apparatus, and having the frame or ladder B hinged to one end, so that the opposite end of the ladder may move in a vertical arc of a circle from the surface of the cut to the lowest point. The suction-pipe C is supported upon this ladder, and its lower end passes through one side of a stationary cast-iron disk, D, which is fixed to the bottom or lower end of the ladder. A short shaft, E, passes through the center of this disk and supports a hollow drum or cylinder, F, of which it serves as the axis. A stuffing-box forms a tight joint where it passes through the disk. This shaft is provided with thrust-boxes G G, by which it is kept in place as it rotates, and the drum F is keyed to it. This drum is made of boiler-iron, and has holes in its sides and bottom with flaring scoop-shaped buckets *f* projecting, so that when the drum is rotated in contact with a deposit of mud or earth they will cut it away and force it into the interior of the drum, where it is stirred and broken up by the teeth or spikes *g*, projecting inward from its sides. The suction-pipe C passes through the lower side of the disk D, and extends nearly to the lower head of the drum F, while its side nearest the lower side of the drum is made open, as at *e*. I prefer to make this opening flaring, as shown in Fig. 4, so that the mud which is excavated by the scoops and brought into the cylinder will be drawn into the pipe freely by the action of the pump.

In order to drive the cylinder F, which may be six or more feet in diameter and length, a strong gearing, H, is fixed to its upper rim, and a pinion, I, which is driven by the shaft J, meshes with it, so that while supported and rotating upon the central shaft, E, it is driven from the exterior of its rim, and thus has the power applied to the greatest advantage and

with the least danger of breakage. The shaft J extends upward along the ladder B, and is connected with the engines K, by which it is driven. These engines are mounted upon the upper end of the ladder, so as to partake of its motion as it is moved up and down, and the relative position of the engine and the driving-shaft J and excavator are thus always maintained the same.

In order to connect the engines upon the ladder with the stationary boilers upon the boat, I employ the movable-jointed pipes L, having the steam-tight rotating joints M, which allow the pipes to extend or shorten with the movements of the ladder and the engines upon it. The suction-pipe C has a horizontal joint at N, and two elbows, O O, connecting with that part upon the boat, and through this with the pump P, which is driven by power derived from the engines T. The horizontal joint of the pipe has its axis in an exact line with the shafts or trunnions Q of the ladder, and these outer sockets, R, formed on the elbows O, so that the shafts and pipe-joint have the same axis about which the ladder is turned as it is raised or lowered, and whatever may be the movement of the ladder the pipe is always kept tight, while accommodating itself to the movement, and the rotary joints are easily kept in order. It will be seen that the ladder is thus hinged and the pipe jointed, so that they may swing in a vertical plane to any angle from a horizontal position to a vertical; but the length of the ladder is such that in practice it will rarely be necessary to drop its lower end to more than forty-five or fifty degrees to make a cut as deep as desired.

That portion of the pipe C which is upon the boat has a joint and stuffing-box at N', so that connection is readily made with the pump, and any settling out of line of the ladder is compensated by a slight motion or turning of the joint, so that the pipe will not be strained.

The weight of the ladder and its appurtenances is so great that it is desirable to give it some buoyancy, and I therefore attach an air-tight hollow float, S, of any suitable dimensions near the lower end of the ladder, so that its buoyancy may assist in raising it, when desired, or prevent too great weight upon the excavator or the suspending-chains.

The ladder is raised or lowered by ma-

chinery upon the deck of the boat, having chains *u*, leading over the pulleys V, and connecting with the bails W upon the ladder.

The suction-pipe C is secured to the ladder or frame so as to pass through the disk D and into the drum F, close to the side which is lowest, so that the buckets or scoops *f*, which will do the most of the excavating upon that side, will deliver the material into the drum close to the pipe, and its flaring mouth or opening allows the suction of the pump to draw it in with sufficient water to maintain the proper consistency without any other special construction. The spikes *g* will stir the mass and break up any hard masses, so that they may be drawn into the suction-pipe.

The driving-shaft J and the pinion I are at the opposite or upper side of the drum F, and as the engines K are mounted upon the upper end of the ladder it will be seen that the shaft J is driven by the direct action of the engine-shaft pinion X, upon the gear-wheel Y, which is secured to the upper end of the shaft J. I thus obtain the simplest and most direct mechanism for the purpose.

The speed of the pump and that of the excavator may be varied and regulated independent of each other, to suit the relative work to be done, because of the independent engines upon the boat and ladder.

I am aware that it has been proposed to excavate dredged material by means of an excavator composed of two concentric drums fitting closely together and having peripheral openings adapted to register at certain intervals, in connection with a suction-pipe which enters a short distance into the inner drum and is connected with the pump on the scow; and I desire to disclaim this.

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

In a dredging apparatus, a single drum having excavating buckets or openings upon or in its periphery, in combination with a stationary suction-pipe which opens into such drum and has an opening in its lower side.

In witness whereof I hereunto set my hand.

HORACE B. ANGELL.

Witnesses:

ISRAEL W. KNOX,
O. B. ANGELL.