

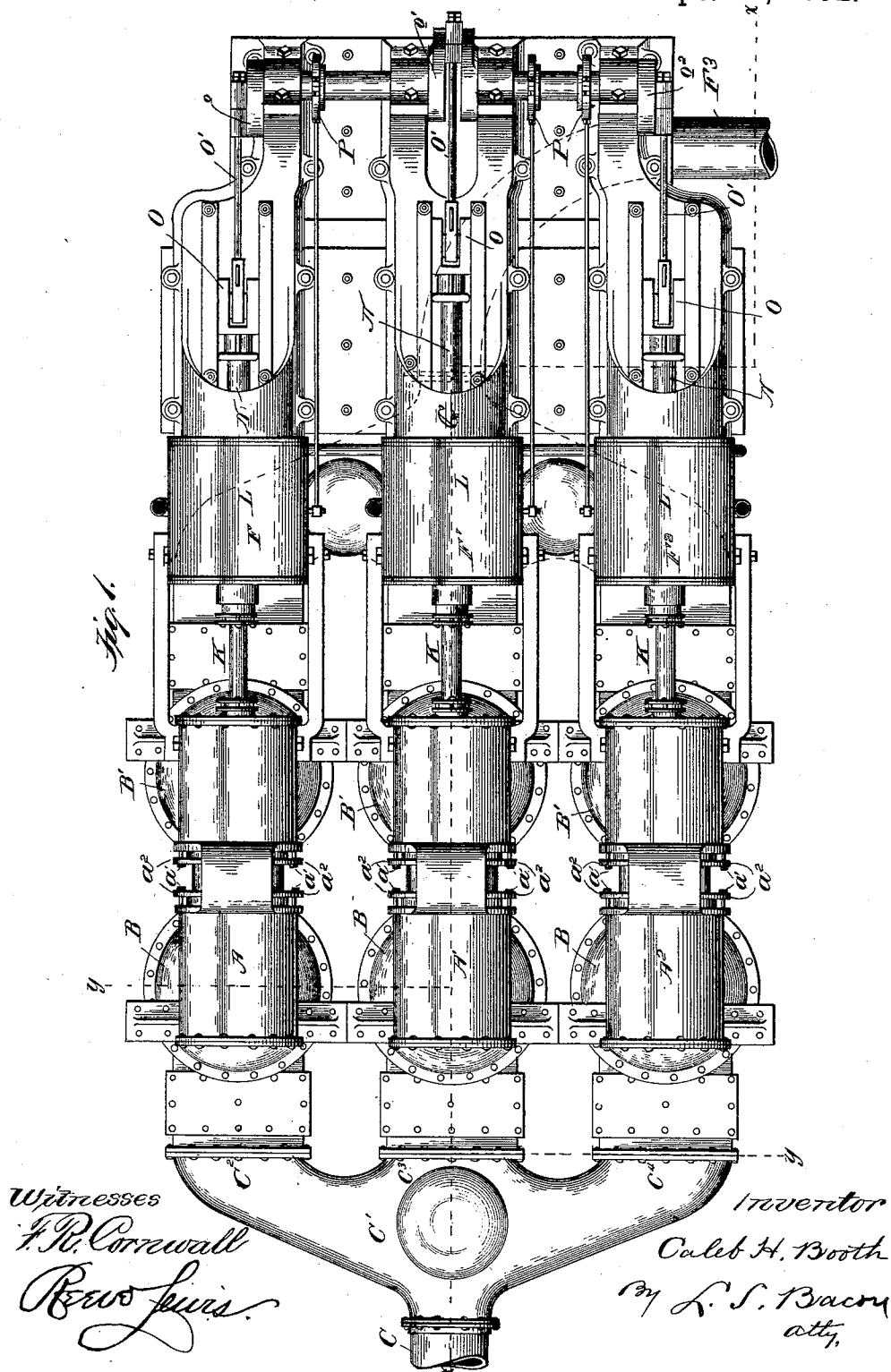
(No Model.)

2 Sheets—Sheet 1.

C. H. BOOTH.
STEAM PUMP.

No. 482,840.

Patented Sept. 20, 1892.



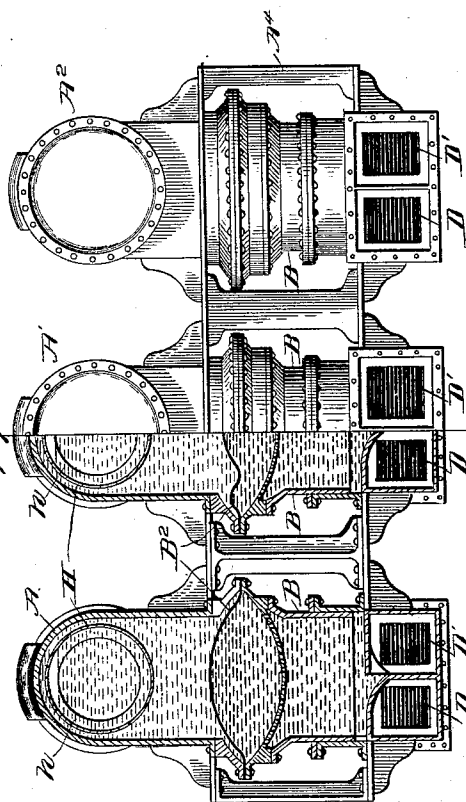
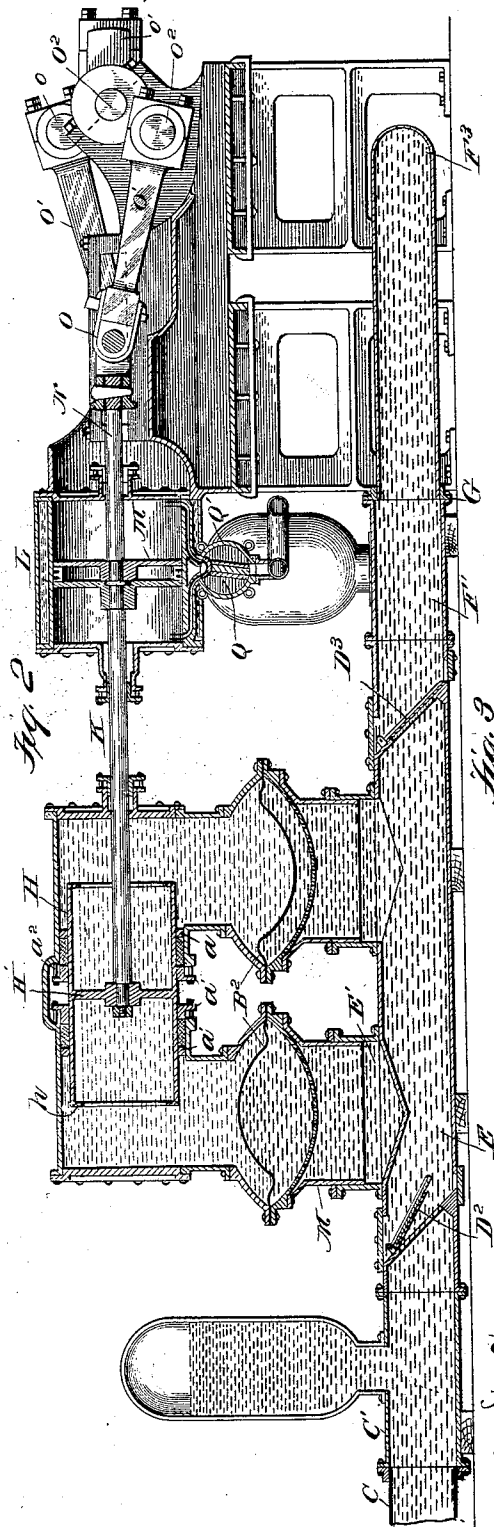
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2 Sheets—Sheet 2.

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STEAM PUMP.

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Witnesses
J. H. Cornwall
Rever Lewis. ^{By} R. S. Bacon
att'y,
Inventor,
Caleb H. Booth

UNITED STATES PATENT OFFICE.

CALEB H. BOOTH, OF DUBUQUE, IOWA.

STEAM-PUMP.

SPECIFICATION forming part of Letters Patent No. 482,840, dated September 20, 1892.

Application filed January 8, 1892. Serial No. 417,413. (No model.)

To all whom it may concern:

Be it known that I, CALEB H. BOOTH, a citizen of the United States, residing at Dubuque, in the county of Dubuque and State of Iowa, have invented certain new and useful Improvements in Steam-Pumps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in steam-pumps; and it consists in the construction and arrangement of parts more fully hereinafter described, and definitely pointed out in the claims.

The invention further consists in an improvement on the apparatus shown and described in Letters Patent No. 313,649, dated March 10, 1885, granted to myself.

The object and design of my present improvements are to so formulate the parts that the friction of the water and other material is greatly reduced and a more complete, powerful, and satisfactory working of the pump obtained, and, further, to construct and arrange the details in a manner to simplify and strengthen the apparatus and at the same time add materially to its efficiency. I attain these objects by the construction illustrated in the accompanying drawings, wherein like letters of reference indicate corresponding parts in the several views, and in which—

Figure 1 is a top plan view of the improvement. Fig. 2 is a longitudinal section taken through the line *x x*, Fig. 1, showing the discharge-pipe in section; and Fig. 3 is a cross-section through the line *y y*, Fig. 1.

In the drawings, A, A', and A² represent the respective pump-cylinders, arranged parallel with each other and horizontally on the frame A⁴. These cylinders are alike in construction and constitute the cylinders for the suction-pumps B B', arranged directly below at opposite ends.

C represents the suction-pipe, terminating in a head C', out of which the branch pipes C² C³ C⁴ lead, which constitute the leaders or supply-pipes for the pumps, they entering the valve-chambers D D' and terminating in the parallel suction-channels E E', leading to the pumps B B', respectively.

D² D³ represent the valves, and B² the dia-

phragms, which are fully described in the patent above mentioned. From the valve-chambers D' the discharge-pipes F F' F² lead and unite at G, as shown in dotted lines, into a discharge F³, common to all.

The construction shown and described in my former patent limited the number of pumping-cylinders to two, which necessarily created a pulsatory movement of the material passing through the pipes, and, further, the discharge-pipes were arranged at right angles to the pump, which greatly increased the friction. In my present form of pump I am enabled to employ three or more cylinders or pumps and substitute for the abrupt turns in the discharge-pipe an easy and gradual curve practically offering no resistance to the moving material.

It has been found by experimenting that the employment of three or more pumps is essential to the perfect operation of a hydraulic dredge, for which this invention is employed, so that a steady and uniform stream may be moved through the pipes, which is especially necessary in removing sand or other heavy material.

In the use of a solid piston in the pump-cylinders carrying their own packing it frequently happens that the packing becomes worn or displaced, allowing the water to pass from one side to the other of the piston-head, causing an unequal distribution of the water or other fluid within the cylinder, which results in injury to the diaphragms and undue strain on the machinery as the piston is moved back and forth, and, further, in the use of such a piston an incessant pounding and hammering of the valves is caused, ultimately damaging the same, and should an obstruction enter the discharge-pipe the unyielding nature of the piston-head and water causes a sudden and often damaging interruption of the pumps and the actuating means, which latter usually includes a fly-wheel. To overcome these defects, I form a plunger of a hollow metal casing H, cylindrical in form and of a length sufficient to prevent of its entire movement without completely passing the center of the cylinder. Around the edges of this plunger is an annular inwardly-extending flange *h*, and across the center is formed the dividing wall or head H', formed with a

suitable bearing, in which the plunger-rod K is secured. The cylinder is divided centrally and has inwardly-extending flanges a and movable collars a' , secured thereto by adjusting-bolts a^2 , and between the collars and flanges suitable packing is placed, so that the plunger has an adjustable exterior packing, the length of the plunger preventing the ends from going beyond the flanges to the packing during its strokes.

In forming the flanges at the end of the plunger an air-chamber is provided, so that as the water, oil, or other material is filled into the cylinder above the diaphragm the air is confined in the upper part of the plunger, and as the plunger is drawn back and forth this confined air acts as a cushion for the valves D^2 D^3 as they are forced up and down, and, further, by this means a large amount of vibration of the pumps is overcome.

In pumps of this nature, which, as stated, are usually used for hydraulic dredging, the driving power generally consists of gearing, fly-wheels, and other mechanism, and the plungers are usually actuated by pitmen connected to and driven by the gearing, all of which causes considerable vibration, and owing to the unyielding nature and lack of sensitiveness of the operating-gears and intervening mechanism any irregular movement or changed condition of the pump resulting from undue pressure caused by obstructions will immediately damage or eventually weaken the entire apparatus and materially affects the working. In my present form I dispense with this mechanism and carry the power directly to the plunger-rod by forming at the ends of the respective pump-cylinders steam-cylinders L, one for each pump-cylinder. The plunger-rods pass through suitable stuffing-boxes and are secured to the steam piston-heads M, located within the steam-cylinders. The pistons M have the piston-rods N attached thereto, which extend out through the heads of the steam-cylinders and are keyed to suitable head-blocks O, carrying pitmen O' , connected to cranks o o' o^2 on the shaft O^2 . These cranks are arranged so that the action of the pumps will be alternate or in regular rank to create a constant stream or suction, which is acquired by the arrangement of the eccentrics P on the shaft in a manner to actuate the valves Q in the valve-chests Q' at specified periods. The valves Q are preferably of the oscillating type; but any desired form may be employed.

The shaft O^2 is designed to actuate other mechanism connected with the dredging apparatus in addition to the purpose above stated.

In my present form I have shown the pumps in triplex; but it is evident that they may be increased in number, if desired, the triplex form being preferable, however.

By the above-described construction it will be seen that I transmit the power of the en-

gined directly to the plunger-rods of the pumps, thereby overcoming a large amount of friction and vibration. The operation of the pump is the same in principle as that described in my patent above referred to.

I am aware that many minor changes in the construction and arrangement of the parts of my invention can be made and substituted for those herein shown and described without in the least departing from the nature and principle of my invention.

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

1. In a steam-actuated dredging-pump, the combination, with valved supply and discharge pipes, of three or more pump-cylinders arranged parallel and divided centrally and having pumping-chambers connected to their undersides at opposite ends, diaphragms in the pumping-chambers, forming closed chambers above, in which a suitable liquid is placed, plungers in the cylinders, exterior packing for the plungers located on the respective sections of the cylinders, and steam-actuated pistons connected directly with the plungers, substantially as described.

2. In a steam-actuated dredging-pump, the combination, with valved supply and discharge pipes, of a series of three or more pump-cylinders divided centrally and arranged parallel and having pumping-chambers at opposite ends, diaphragms secured across the pumping-chambers, plungers in the cylinders above the diaphragms, formed with air-storage compartments communicating with the interior of the cylinders, packing for the plungers, engaging the outer faces thereof and carried by the respective sections of the cylinders, and means for actuating the plungers, substantially as described.

3. In a steam-actuated dredging-pump, the combination, with the inlet and discharge pipes and valves in the pipes, of a horizontally-disposed pump-cylinder having pumping-chambers at opposite ends thereof, diaphragms across the pumping-chambers, and a plunger in the cylinder, having an air-storage compartment communicating with the interior of the cylinder above the diaphragm, substantially as described.

4. In a dredging-pump, the combination, with the suction and discharge pipes, of a pump-cylinder having pumping-chambers at opposite ends thereof, flexible diaphragms across the pumping-chambers, a plunger in the cylinder, and an air-storage compartment communicating with the interior thereof above the diaphragm, substantially as described.

5. In a dredging-pump, the combination, with a series of three or more pumping-cylinders, each having pumping-chambers at opposite ends, of diaphragms across the pumping-chambers, valved suction and discharge pipes leading into the chambers below the diaphragms, plungers in the cylinder, air-storage compartments communicating directly

with the interior of the cylinders above the diaphragm, steam-cylinders for each pump-cylinder, connections between the pistons thereof and the plungers, a crank-shaft, and
5 pitmen connecting the cranks of the shaft with the steam-pistons, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

CALEB H. BOOTH.

Witnesses:

F. HARNELY,
C. H. SIGHUREY.