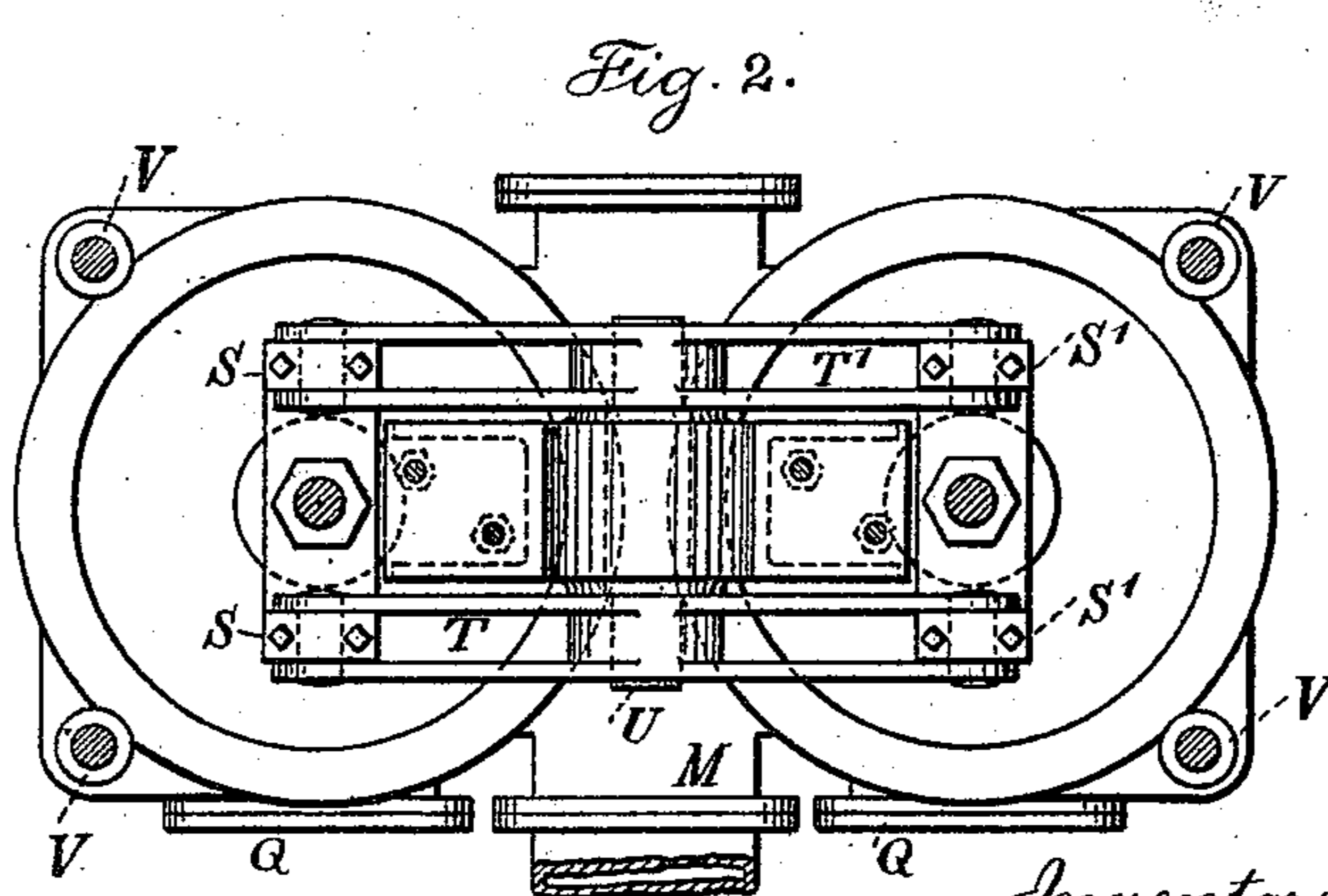
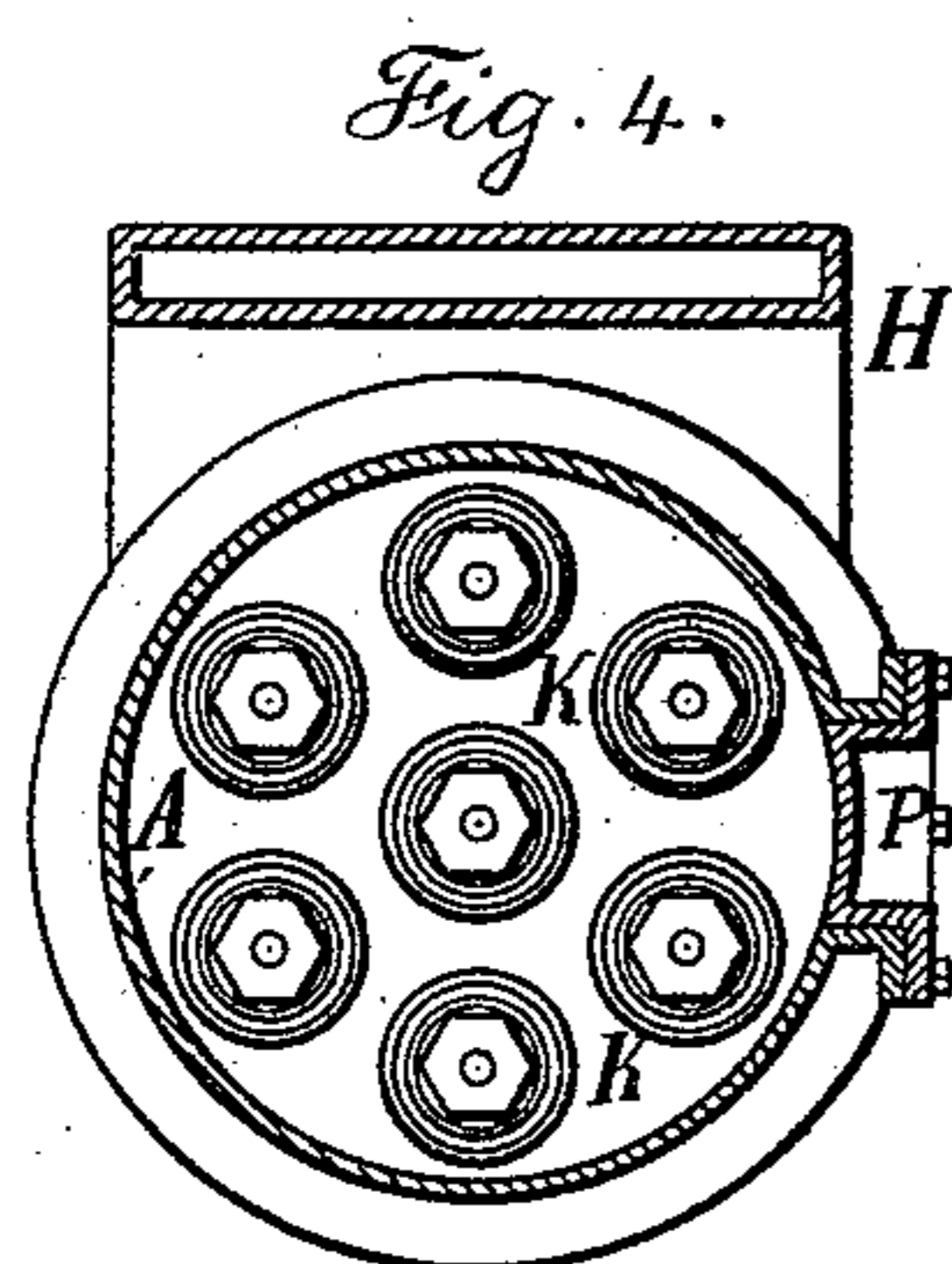
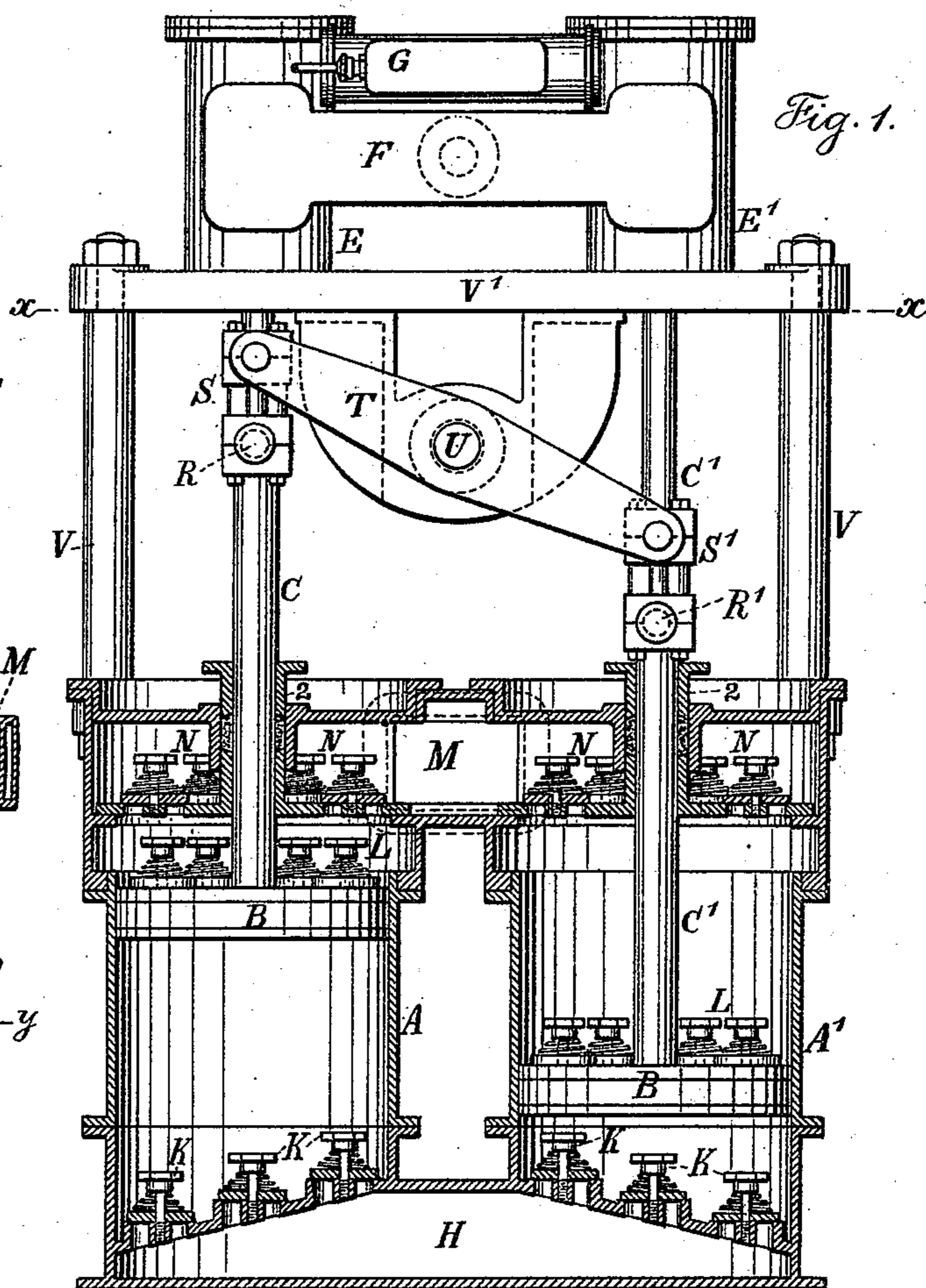
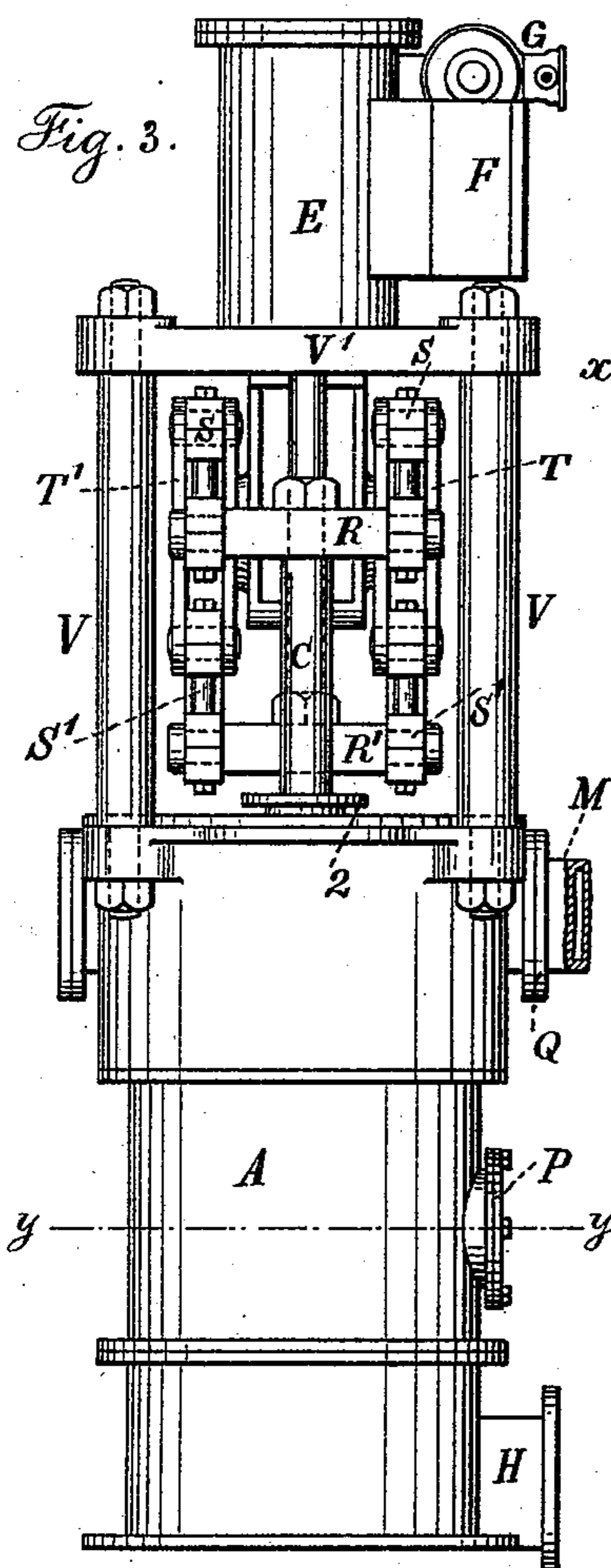


G. B. WHITING & F. M. WHEELER.
PUMPING ENGINE.

Patented Oct. 2, 1894.



Witnesses:
J. Staib
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Inventors:
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per Lemuel W. Perrell atty.

UNITED STATES PATENT OFFICE.

GEORGE B. WHITING, OF WILMINGTON, DELAWARE, AND FREDERICK MERIAM WHEELER, OF MONTCLAIR, NEW JERSEY, ASSIGNORS TO THE GEORGE F. BLAKE MANUFACTURING COMPANY, OF NEW JERSEY.

PUMPING-ENGINE.

SPECIFICATION forming part of Letters Patent No. 526,913, dated October 2, 1894.

Application filed January 18, 1892. Serial No. 418,379. (No model.)

To all whom it may concern:

Be it known that we, GEORGE B. WHITING, of Wilmington, in the county of New Castle and State of Delaware, and FREDERICK MERIAM WHEELER, of Montclair, in the county of Essex and State of New Jersey, both citizens of the United States, have invented an Improvement in Pumping-Engines, of which the following is a specification.

10 With engines employed upon steam vessels it is advantageous to make use of a separate engine to drive the "air pump," in order that the vacuum in the condenser may be maintained independently of the movement of the
15 main engine and in war vessels especially it is of great importance to have the engines and machinery in as compact a space and as light as possible. The circulating water that passes through the condenser can also be advantageously pumped by the same independent engine that operates the air pump.

The object of our invention is to apply a direct acting engine to the air pump or combined air and circulating pump in such a manner that the whole will occupy very little space
25 and at the same time to furnish facility for access to the valves and other parts of the pumping engine. We arrange the engine in such a manner that one steam cylinder assists the other or others in moving the pump buckets that are in operation; or one steam cylinder only may be used.

In the drawings Figure 1 is an elevation partially in section of our improvement applied
35 to a vacuum pump or as it is usually termed in marine engine practice an "air pump." Fig. 2 is a sectional plan at the line x, x . Fig. 3 is an end elevation, and Fig. 4 is a sectional plan at the line y, y , Fig. 3.

40 The pumping engine is provided with air cylinders A A' and within these are buckets B and the rods C C' pass through suitable stuffing boxes 2 upon the respective pump cylinders and are formed with or connected
45 to the piston rods of the steam cylinders E E'.

We have represented a steam chest at F and valve chests at G and we remark that the valves and the devices for actuating the

steam valves may be of any desired character, so long as they are positive in action, *i. e.*,
50 without "dead center," and do not require to be further represented or described.

The inlet passage H is connected with the condenser and there are foot valves K between the same and the respective pump cylinders and there are valves in the pump
55 buckets B as shown at L and there is a discharge passage and head valves N between such discharge passage and the respective cylinders of the vacuum pump. These valves
60 K L N are of any desired character and we provide in the side of each air cylinder an opening with a plug P secured by bolts and the inner face of the plug is bored off true
65 with the interior surface of the air cylinder so that by removing the plug from either cylinder access can be given to the foot valves K below the pump bucket when such pump
70 bucket is in an elevated position, or access can be given to the valves L of the pump bucket when in a depressed position and it is desirable to provide a movable cap Q in a convenient position upon the casting forming the
75 discharge passageway to give access to the valves N.

Upon the respective piston rods C C' there are cross heads R R' with links S S' connecting such cross heads to the double walking
80 beams or levers T T' which are pivoted centrally at U and there are connecting columns V between the bed plate or entablature V' of the engine and the top part of the pump cylinders so that the engine and pumps are permanently and rigidly connected and the
85 levers or walking beams being between the bed plate V' and the top part of the pump cylinders, access is readily given to the respective parts and to the stuffing boxes of the engine cylinders and pump cylinders; and the pistons
90 and rods of the respective steam cylinders not only act directly upon the respective pump buckets, but the walking beams unify the action of the respective parts, so that the steam engine acts with the necessary power in moving the pump buckets, regardless of which
95 pump bucket may be under the greatest strain

in moving against the vacuum action. Hence we are able to make this pumping engine very compact and uniform in its operation and entirely independent of the main engine.

5 It will be observed that when the respective pistons and buckets are at the ends of the stroke, the links SS' are in the same plane as the piston rods, and this is of importance, especially with vacuum pumps, because the
10 heaviest load and consequently the greatest strain is at and near the end of the stroke, and in consequence of the parts being in alignment at this time, there is little or no lateral strain upon the piston rods to bend
15 the same and wear the stuffing box packings unevenly.

Single and compound engines being well known are available with the present improvements, and in instances where only a
20 vacuum is required, both cylinders A and A' are fitted with the proper buckets and valves for maintaining the proper vacuum, and in cases where a water circulating pump is required, both cylinders A and A' may be used
25 for pumping water, and where it is desired to combine in one engine an air pump and a water circulating pump, one cylinder A' may be for water and the other cylinder A for air.

In pumps that have heretofore been made
30 with an engine elevated above the walking-beam and pump, the piston or plunger has been adapted to forcing water. In pumps that are used with a condenser, especially those fitted into vessels, it is important to
35 have the buckets move vertically, and there is usually but little head room for the engine.

By our present improvements the lifting buckets and valves work vertically, and the inlet water way being below and between the
40 pumps, but little space is occupied and the engine piston rods being coupled direct to the rods of the lifting buckets, the vacuum pump and engine are brought into the smallest possible space, and the walking-beam being be-
45 tween the engine and pump, renders the action uniform because the buckets are hung by tension from the ends of the beam and their actions balanced as nearly as possible by the two engines acting simultaneously and
50 directly on the rods of the buckets, but at the two ends of the beam and controlled by it. Hence the operations of the vacuum pump are more reliable than heretofore and the condi-

tions of use are the reverse of those in the ordinary direct acting force pump. 55

We claim as our invention—

1. The combination with the two vertical pump cylinders and their lifting buckets and valves, of direct acting steam cylinders and pistons with their piston rods in line and con- 60 nected to the rods of the buckets, a frame and columns connecting with the pump cylinders and on which frame the steam cylinders are directly connected, a walking beam between the pump and the engine and a pivot for the 65 same upon a bearing extending down from the frame, and link connections at the respective ends of the walking beam to the cross heads of the piston rods for unifying the action of the engine directly upon the 70 lifting buckets substantially as set forth.

2. In a direct acting pumping engine, the combination with a pair of pump cylinders having lifting buckets and valves and valves in the lower part of the pump cylinders, of 75 steam cylinders and piston rods connecting the buckets of the pump and the pistons of the engine, a walking-beam between the pump cylinders and the steam cylinders, links connecting the ends of the walking-beam with 80 the piston rods, and a frame extending up from the pumps and to which the steam cylinders are directly connected and which frame also supports the pivots of the walk- 85 ing-beam substantially as set forth.

3. The combination in a pumping engine of two vertical pumping cylinders, buckets and rods for the same, a frame upon the pump cylinders, and steam cylinders directly con- 90 nected to and supported by the frame, the piston rods of the engine being in line with and directly connected to the rods of the pumps, a walking beam between the pump and the engine and links connecting the walk- 95 ing-beam and the cross heads of the piston rods, the parts being arranged so that the links are in the same plane or nearly so as the piston rods at the termination of the respective strokes substantially as set forth.

Signed by us this 10th day of April, 1891.

GEORGE B. WHITING.

FREDK. MERIAM WHEELER.

Witnesses:

THOMAS R. LALLY,

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