W. S. HOLDAWAY.

PUMP.

APPLICATION FILED JUNE 2, 1915.

1,218,602.

Patented Mar. 6, 1917.

2 SHEETS—SHEET 1.

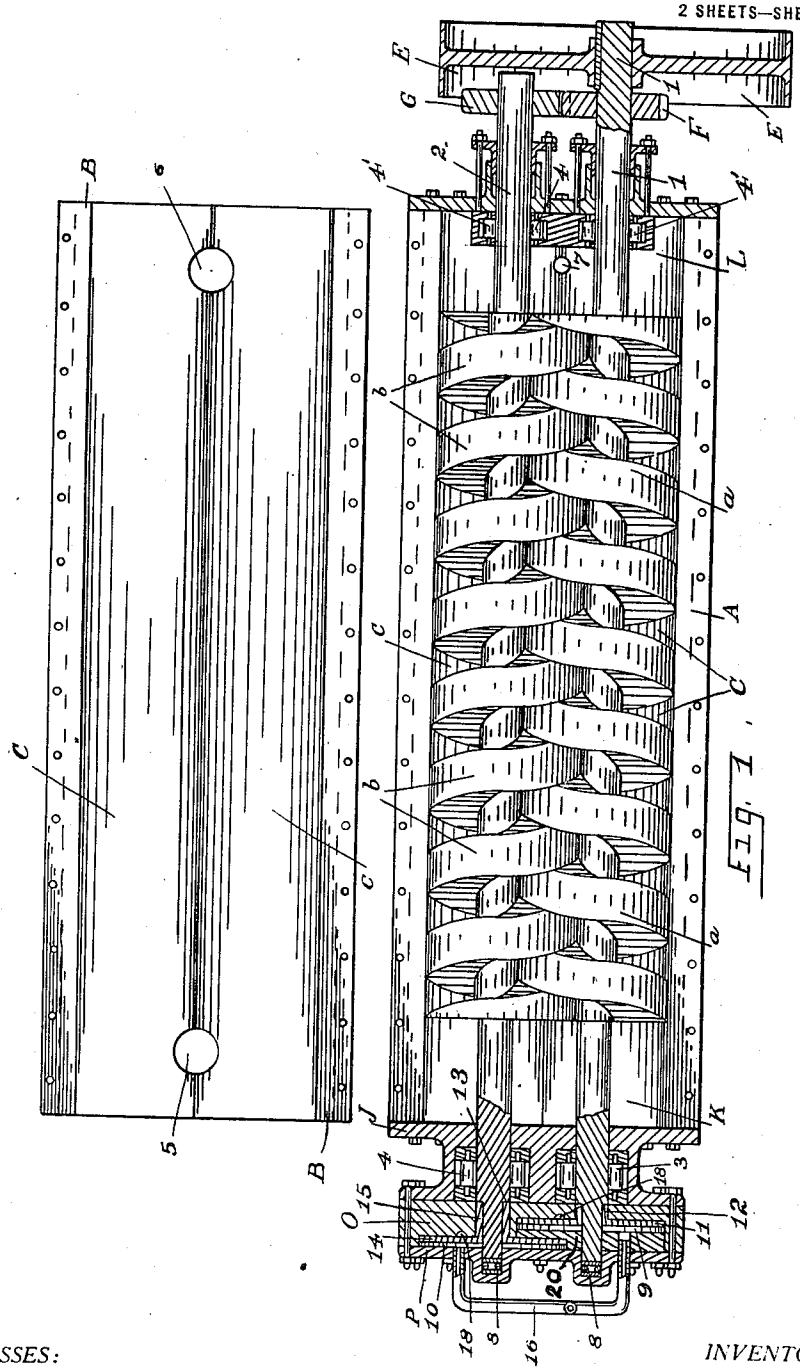


Fig. 1.

WITNESSES:

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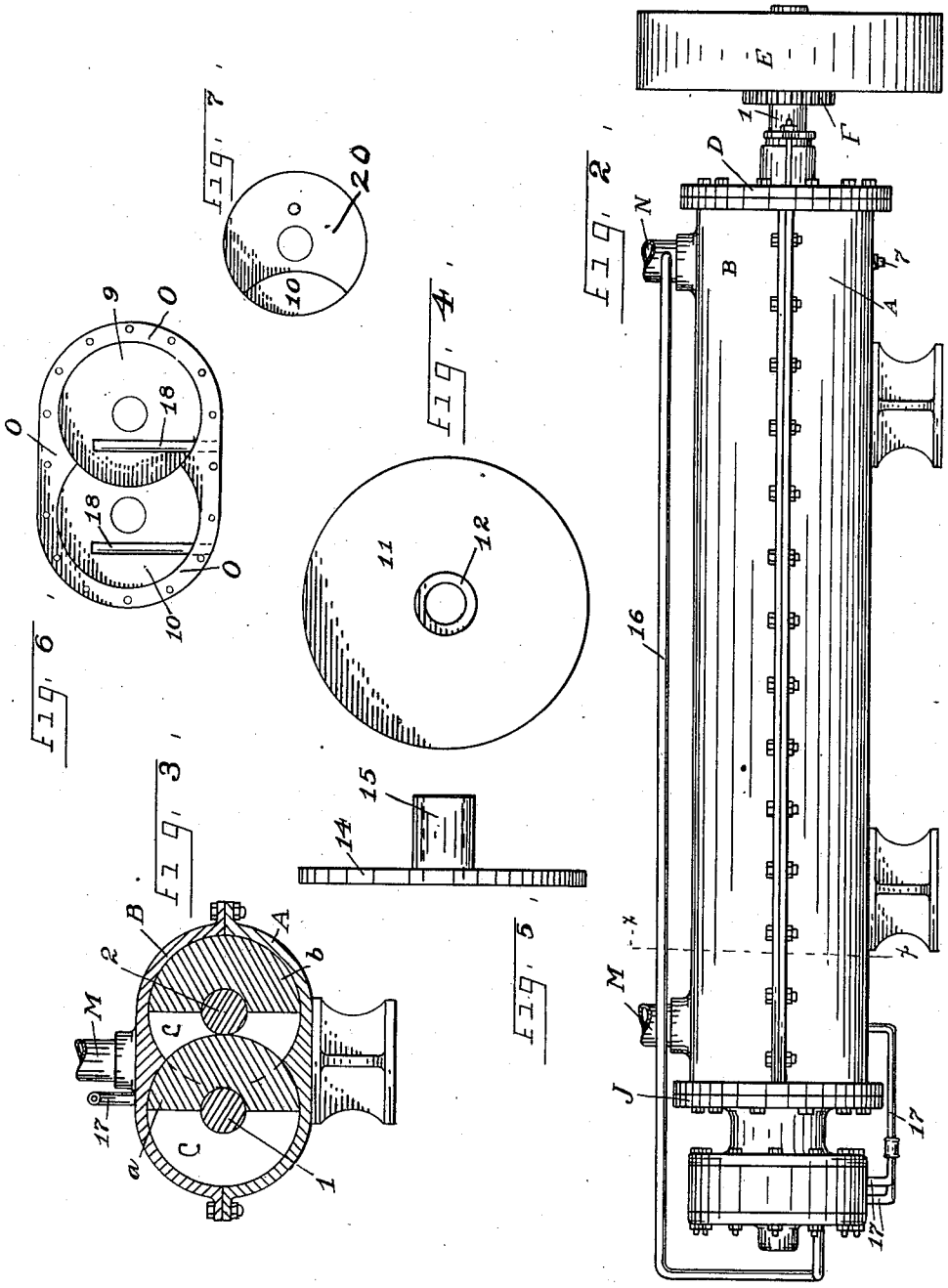
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UNITED STATES PATENT OFFICE.

WILLIAM S. HOLDAWAY, OF SALT LAKE CITY, UTAH, ASSIGNOR TO TWIN SCREW PUMP CO., OF SALT LAKE CITY, UTAH, A CORPORATION.

PUMP.

1,218,602. Specification of Letters Patent. Patented Mar. 6, 1917.

Application filed June 2, 1915. Serial No. 31,774.

To all whom it may concern:

Be it known that I, WILLIAM S. HOLDAWAY, a citizen of the United States, residing at Salt Lake City, in the county of Salt Lake and State of Utah, have invented certain new and useful Improvements in Pumps, of which the following is a specification.

My invention relates to pumps of the screw type and has for its object to provide a pump, for raising fluid a limited distance by suction and then to force the same fluid to any desired height, which is economical in construction, does not require much power to operate, efficient in quantity of water delivered and very durable.

These objects I accomplish with the pump illustrated in the accompanying drawings in which similar letters and numerals of reference indicate like parts throughout the several figures and as described in the specification forming a part of this application and pointed out in the appended claim.

In the drawings in which I have shown a substantial embodiment of my invention, Figure 1 is a top plan view of the pump, with parts shown in section and the upper portion of the case removed and turned back adjacent. Fig. 2 is a side elevation of the pump. Fig. 3 is a transverse vertical section on line *x x* of Fig. 2. Fig. 4 is a rear view of one of the pressure disks, and Fig. 5 is an edge view of the other one. Fig. 6 is an end elevation of the disk casing showing the recesses therein. Fig. 7 is an end elevation of a block of metal which is inserted in one of the recesses shown in Fig. 6 to close said recess except a conduit therein.

My pump is of the screw type in which a pair of screws are employed with intermeshing threads and arranged within a casing having a suction or inlet chamber at one end and an eduction or outlet chamber in the other end. The said screws are on parallel horizontal shafts and one has right turned threads and the other left, with the perimeter of one screw bearing against the shaft of the other screw. The present invention consists of providing screws of greater length and having a greater number of convolutions of threads thereon to prevent any bypass of fluid from the outlet chamber to the inlet chamber which occurs when only a few convolutions are used, say five or six. Also to so cushion said screws in their endwise movement or tendency that there will be no binding of said intermeshing screws and the end thrust of the shafts will be reduced to the minimum of wear and friction, as well as to introduce the fluid from above the screws, to keep them always primed, and to provide means to clean out said chambers without stopping the pump.

The casing consists of a bottom portion A, and the top or upper portion B each of which has two screw channels C therein within which the screws *a* and *b*, one right and the other left hand thread, are operated. Said casings are bolted together through flanges thereon. An end or head D is provided on the outlet end on which is mounted the ordinary stuffing boxes. Roller bearings 4′ are mounted within a casing at the outlet end which act as bearings for one end of the screw shafts 1 and 2. On the said shaft 1 is keyed the driving pulley E and a gear wheel F, which meshes with the gear wheel G, that is secured on the end of the said shaft 2. On the opposite end of said casings is secured the head J, and in which is mounted the roller bearings 3 and 4 within which is supported the other ends of the said shafts 1 and 2. The interior of said casings A and B when thus bolted together has the appearance of two intersecting cylinders with the screws so positioned therein as to leave an inlet chamber K, at one end and an outlet chamber L, at the other end. The suction pipe M, enters the said inlet chamber K at the upper side through an opening 5 and the outlet pipe N enters the outlet chamber L on the upper side through an opening 6. A clean-out tap or valve 7 is provided in the bottom of said outlet chamber L through which any sand, grit, or other debris may be removed. The perimeters of said screws, *a* and *b* contact with the interior of said intersecting cylinders and the threads of one screw intermesh with the threads of the other screw thus forming a plurality of fluid chambers by which when the screws are operated a given quantity of fluid is advanced from the inlet chamber to the outlet chamber and from the outlet chamber is forced out through the outlet pipe N to any desired height. In order to prevent endwise movement or thrust of the said screws and the shafts 1 and 2 on which they are secured or formed, an end casing O is bolted to said head J by bolts

passing through another head piece P and through the rim of said casing O into the said head J, and ball bearings 8 are mounted in said head piece P against which the ends of said shafts bear. The said ball bearings are carried in recesses formed in the end of said head piece P, and are intended to prevent any tendency of said shafts to move endwise by reason of the load of said pump. The friction on said ball bearings varying as the lift of water may increase or decrease. The forcing load of said screws would cause a great end thrust or movement unless counter balanced and for that purpose and to prevent the end thrust due to the forcing load, I provide two pressure chambers within said casing O shown at 9 and 10. Within said chamber 9 is operated a disk 11 which is secured on the end portion of said shaft 1 by having a sleeve hub 12 secured thereon and bearing against a shoulder 13 cut on said shaft. A similar disk 14 is secured on the end portion of said shaft 2, the only difference in said disks being that the sleeve hub 15 is longer than the sleeve hub 12. The said disk 14 is operated in the other pressure chamber 10. A pressure pipe 16 connects the outlet pipe N with said pressure chambers 9 and 10, and the pressure of the fluid carried in said pipe N bears against the said disks 11 and 14 with a force equal to that bearing against the screws *a* and *b* respectively. The face of each disk being of such size that its pressure face is equal to the pressure face of the screw carried on its respective shaft. A leakage pipe 17 connects a leak recess 18, which is cut in the rear face wall of each of said pressure chambers 9 and 10, with the inlet pipe in order that any fluid that may pass said disks will not accumulate in the chamber but will be drawn off as fast as it settles. For convenience in construction the said pressure chamber 9 is bored into said casing O and an opening is concentrically bored from the bottom of said pressure chamber 9 through said casing to receive the sleeve hub 12. A block of metal 20 is then closely fitted and secured in and filling the upper portion of the hole thus bored in forming the said pressure chamber 9. The pressure chamber 10 is then bored, with the concentric opening within which said sleeve hub 14 is operated. It will be obvious that the endwise thrust on the said screws *a* and *b* will be equalized by the pressure on the said disks 11 and 14 whether the fluid in the pipe N is 5 feet above the pump or one hundred and fifty feet. The pressure on either end being the same regardless of the height to which the fluid is raised.

Having thus described my invention, and shown a novel screw and casing therefor and a novel means of preventing endwise thrust of the screws and of the shafts 1 and 2 and of constructing bearings for said shafts, I desire to secure by Letters Patent and claim:—

A pump comprising a separable casing having a bearing chamber in each end portion; roller bearings in said chambers; parallel shafts mounted on said bearings; intermeshing screws on said shafts and revoluble therewith and with their ends spaced from the ends of the interior of said casings to form an outlet chamber at one end and an inlet chamber at the other end intermeshing gears on said shafts; a suction pipe connected with the inlet chamber and an outlet pipe connected with the outlet chamber; another casing secured on the end of the first mentioned casing and provided with pressure chambers each of which is connected with said outlet pipe; pressure disks secured on said shafts and operable in said pressure chambers; and ball bearings carried in sockets in said pressure chambers against which the ends of said shafts may bear.

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

WILLIAM S. HOLDAWAY.

Witnesses:
MARION A. SMITH,
WILLIAM C. SMITH.