

Nov. 18, 1924.

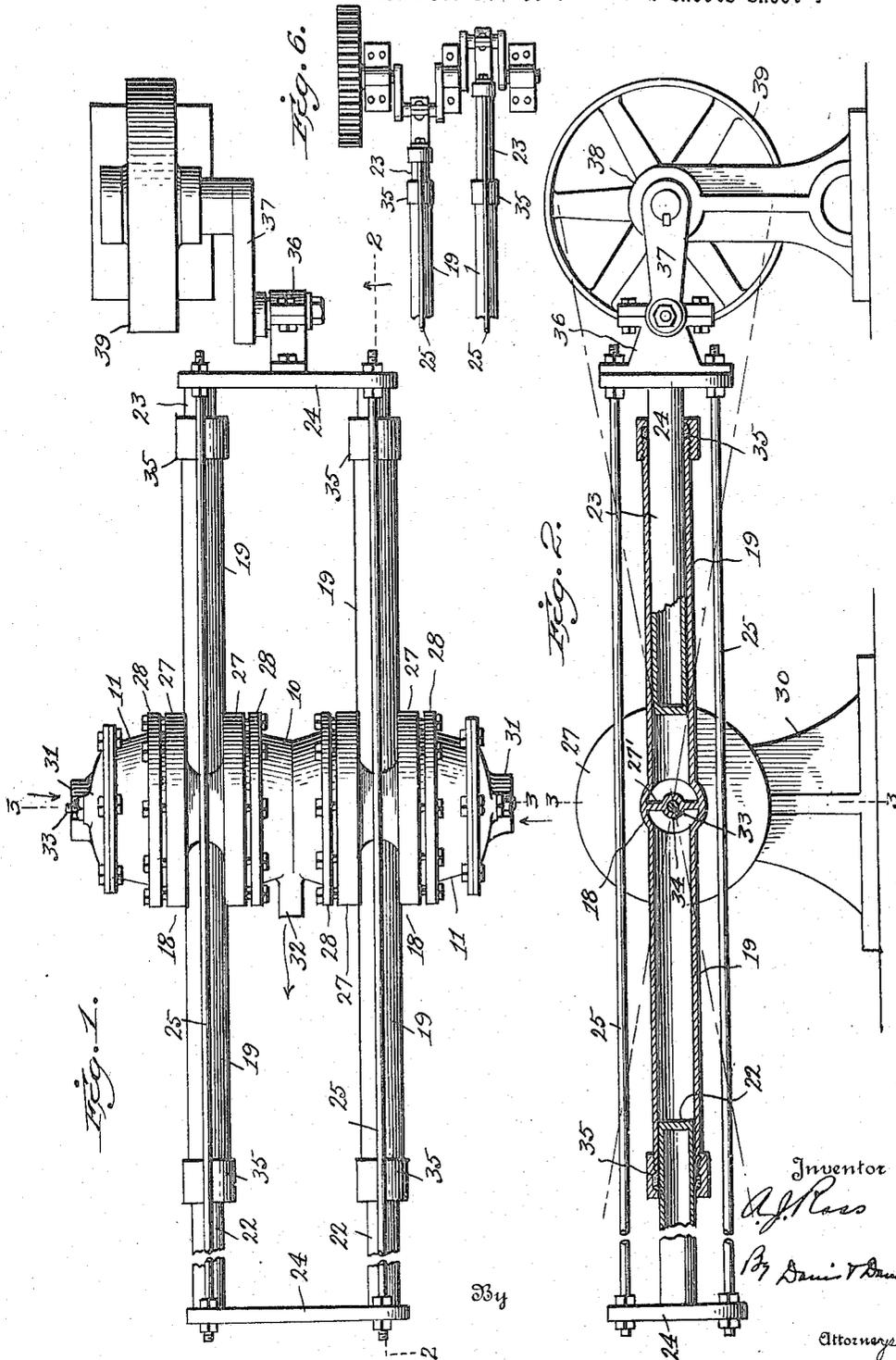
A. J. ROSS

1,515,703

PUMP

Filed Dec. 12, 1923

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Nov. 18, 1924.

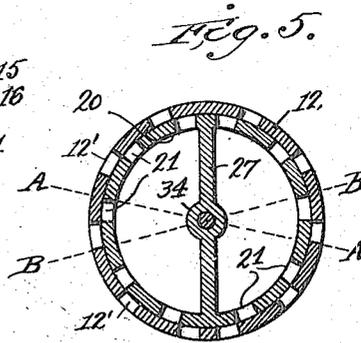
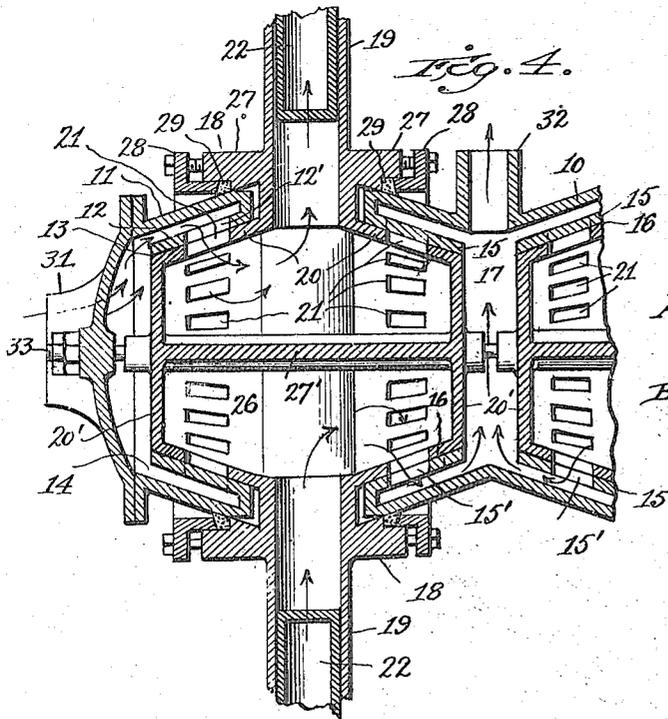
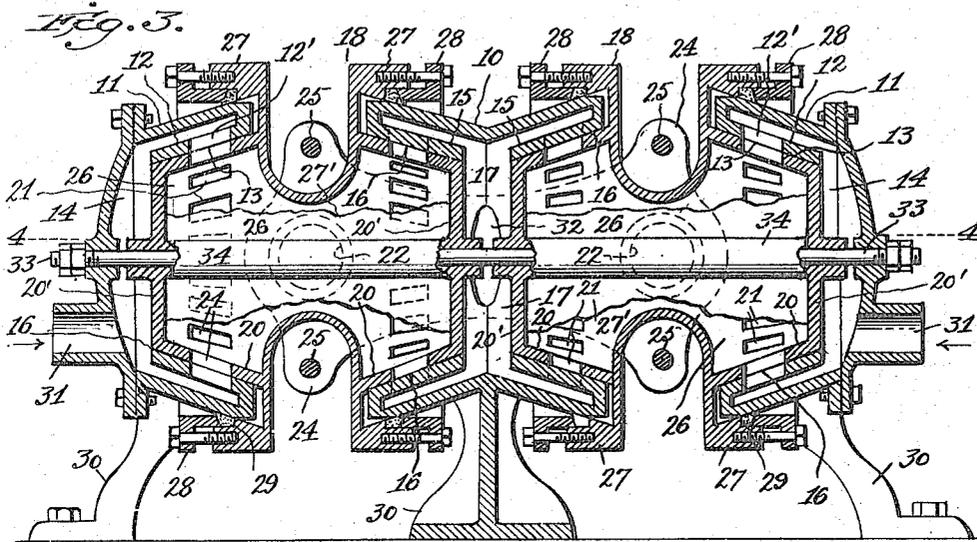
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2 Sheets-Sheet 2



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# UNITED STATES PATENT OFFICE.

ANDREW J. ROSS, OF LOS ANGELES, CALIFORNIA.

## PUMP.

Application filed December 12, 1923. Serial No. 680,226.

*To all whom it may concern:*

Be it known that I, ANDREW J. ROSS, a citizen of the United States of America, and a resident of Los Angeles, county of Los Angeles, and State of California, have invented certain new and useful Improvements in Pumps, of which the following is a full and clear specification.

The object of this invention is to provide a duplex pump which is simple in construction, efficient and powerful in operation, and which will furnish a continuous stream of water at high pressure, as more fully hereinafter set forth.

These objects and such others as may be hereinafter set forth are attained by the means illustrated in the drawings, and the invention consists in the parts and combinations of parts hereinafter fully described and particularly pointed out in the appended claims, reference being had to the accompanying drawings, forming part of the specification, in which the same reference numerals designate like parts throughout the several views.

In the drawings—

Fig. 1 is a plan view of my improved pump;

Fig. 2 is a vertical longitudinal sectional view on the line 2—2 of Fig. 1;

Fig. 3 is a vertical transverse sectional view on the line 3—3 of Figs. 2 and 3;

Fig. 4 is a horizontal sectional view taken on the line 4—4 of Fig. 3, showing only one end of the pump;

Fig. 5 is a transverse sectional view through the port cones;

Fig. 6 is a plan view on a small scale of a modified form of operating means for the pump.

Referring to the drawings, it will be seen that the pump-casing is formed with a circular central section 10 and two circular end-sections 11, each of said end-sections being provided with an interior wall 12 having ports 12' and which is preferably formed with a conical valve-seat 13 and also spaced from the outer walls to form an end chamber 14. The central section 10 is provided with two interior walls 15 having ports 15', and each wall 15 is formed with a conical valve-seat 13, and these walls 15 are also spaced from the outer wall of the section to form a central chamber 17.

Mounted between each end section and the central section is a pair of oscillating members 18, each of which comprises a double-pump-cylinder 19 connected together by a circular valve-section formed of two valve-rings 20, one on each side of the axial line of the pump-cylinders, and these valve-rings are provided with conical outer faces to engage snugly against correspondingly tapered valve-seats 13 and 16 and provided with radial ports 21 adapted to register with the ports 12' and 15'. These valve-rings are also formed with closed ends 20'.

The double pump-cylinders (two being shown in the present instance) extend outwardly on each side of the central valve-casing and each double cylinder is provided with pistons 22 and 23, one at each end, which are connected together to work in unison by cross-heads 24 and connecting-rods 25; and said cross-heads also connect corresponding pistons at each side of the pump.

The chamber 26 formed between each pair of valve-rings 20 is divided by a vertical wall or partition 27 forming a compartment at each side of the partition, each compartment communicating with the inner end of one member of the double pump-cylinder.

Oscillating members 18 are each provided with annular flanges 27 which are adapted to engage over the adjacent edges of the central and end sections, and packing-glands 28 are adjustably secured to said flanges 27 for retaining suitable packing-rings 29 in place between the flanges 27 and the peripheries of the stationary end and central sections which are preferably supported by suitable legs 30.

Each end section is provided with an inlet-nozzle 31, and the central section is preferably provided with a single discharge-nozzle 32, and all of the sections including the central, end, and valve-sections are retained in operative engagement by tie-rod 33 which extends from one end section 11 to the other through bosses 34 preferably formed on said valve-sections. It is obvious that by adjusting the nuts on the ends of this tie-rod, any wear can be taken up between the tapered surfaces and thereby avoid the use of packing at this point.

The pump-cylinders are provided at each end with suitable stuffing-boxes 35, through which the pistons 22 and 23 operate, and at-

tached to the cross-head 24 at one end of the pistons is a bracket-bearing 36 in which is journaled a crank-pin carried by a crank 37 on a shaft 38 mounted in suitable bearings 5 and carrying a driving-pulley 39.

The arrangement of the ports in the several sections is clearly shown in Fig. 5 of the drawings, wherein it will be observed that the arrangement is such that, when the cylinders are oscillated from axial line A to axial line B, or anti-clockwise, the ports 20 at the left-hand side of the partition 27' will open in register with ports in the outer ring, and the ports 20 on the ring-hand side will remain closed, but, when the oscillation is clockwise, then the ports on the right-hand side are opened and the ones on the opposite side are closed.

In operation, when the pistons are reciprocated, they will be alternately forced in and drawn out of the opposite ends of the cylinder, as shown in Fig. 4. When the pistons 22 are being drawn out in the direction of the arrow D, the suction is drawing liquid through the nozzles 31 on both sides of the pump, into the end chambers 14 and through registering ports 12' and 13 into the pump-cylinders and the chambers adjacent thereto on one side of the partitions 27, and at the same time the pistons 23 on the opposite side of the pump, moving in the direction of the arrow E, are forcing the liquid previously drawn through ports 21 and 15', central chamber 17, and out through nozzles 32. It will be observed that the liquid is drawn into the pump at both ends simultaneously through the two inlet-nozzles 31, and discharged through the one nozzle 32.

This pump is an improvement over the construction shown in my Patent No. 837,342, and is especially adapted for use where a large supply of liquid under a powerful head is desired.

It will be apparent to those skilled in the art that various mechanical embodiments of the invention are possible, and I therefore do not wish to be limited to the exact arrangement and construction shown.

In the modified form shown in Fig. 6, a crank is provided for each plunger 23 which are adapted to operate the said plungers 23 alternately with respect to each other and, consequently, the plungers 22 in the same manner by means of the connecting-rods 25. Thus, instead of creating suction simultaneously in both cylinders 19 on one side of the central casings and simultaneously forcing water to the outlet in both cylinders on opposite side of the casings, as in the Fig. 1 construction, the action in the cylinders 19 on the same side of the casings is opposite; that is, one is creating suction while the other is forcing water to the outlet 32. In this manner, one cylinder on the opposite sides of the casing is forcing and the remain-

ing cylinders are sucking, thereby balancing the pressures during the pumping operation and securing a more continuous flow.

What I claim is:

1. A pump comprising a central and end stationary sections, each having tapered annular interior walls provided with ports, pump-cylinder sections mounted to oscillate between said central and end sections, each of said pump-cylinder sections embodying valve-sections formed with tapered valve-rings having ports adapted to alternately register with and close the ports of the end and central stationary sections, a pump-cylinder at each side of said valve-section, means for clamping said central, end and pump-cylinder sections together in operative relation, a piston in each of said pump-cylinders, means for connecting the outer end of all of said pistons together to operate in unison, and means for reciprocating said pistons to and fro in said pump-cylinders and also oscillate the pump-cylinder sections to close and open the ports therein.

2. A pump comprising a central and end stationary sections each having tapered annular interior walls provided with radial ports, pump-cylinder sections mounted to oscillate between said central and end sections, each pump-cylinder section embodying a double-ended cylinder having an imperforate partition midway its ends and valve-rings tapered in opposite directions and formed with closed ends, means for adjustably clamping said tapered parts in operative relation, pistons adapted to reciprocate in both ends of each double-ended cylinder, means connecting all of the pistons together, means for reciprocating the pistons and for operating those on one side of the pump in an opposite direction to those on the other from the center of the pump and also simultaneously oscillating the cylinders and valve-rings to open and close the ports.

3. A pump comprising a central and end stationary sections each having tapered annular interior walls, said central section having interior walls at each side thereof and tapered in opposite directions to each other, said interior walls of the end sections being tapered in opposite direction to the interior walls of the central section lying opposite thereto, all of said interior walls being spaced from the outer walls of the sections and provided with radial ports, each of said end sections being provided with an outlet opening and said central section being provided with a discharge opening, pump-cylinder sections mounted to oscillate between each end section and the central section, each of said pump-cylinder sections embodying a double-ended cylinder having an imperforate partition midway its ends and oppositely tapered valve-members adapted to engage the tapered inner walls of the end and

central sections, said valve-members having closed ends and also being provided with radial ports to register with the ports in said interior walls, means for clamping the tapered valve-members and interior walls in operative position, pistons in both ends of each double cylinder, means connecting all of the pistons together, and means for reciprocating the pistons and oscillating the pump-cylinder. 10

In testimony whereof I hereunto affix my signature.

ANDREW J. ROSS.