M. T. & M. C. CHAPMAN.

PUMP.

APPLICATION FILED APR. 19, 1911.

1,114,230.

Patented Oct. 20, 1914.

2 SHEETS—SHEET 1.

Fig. 1.

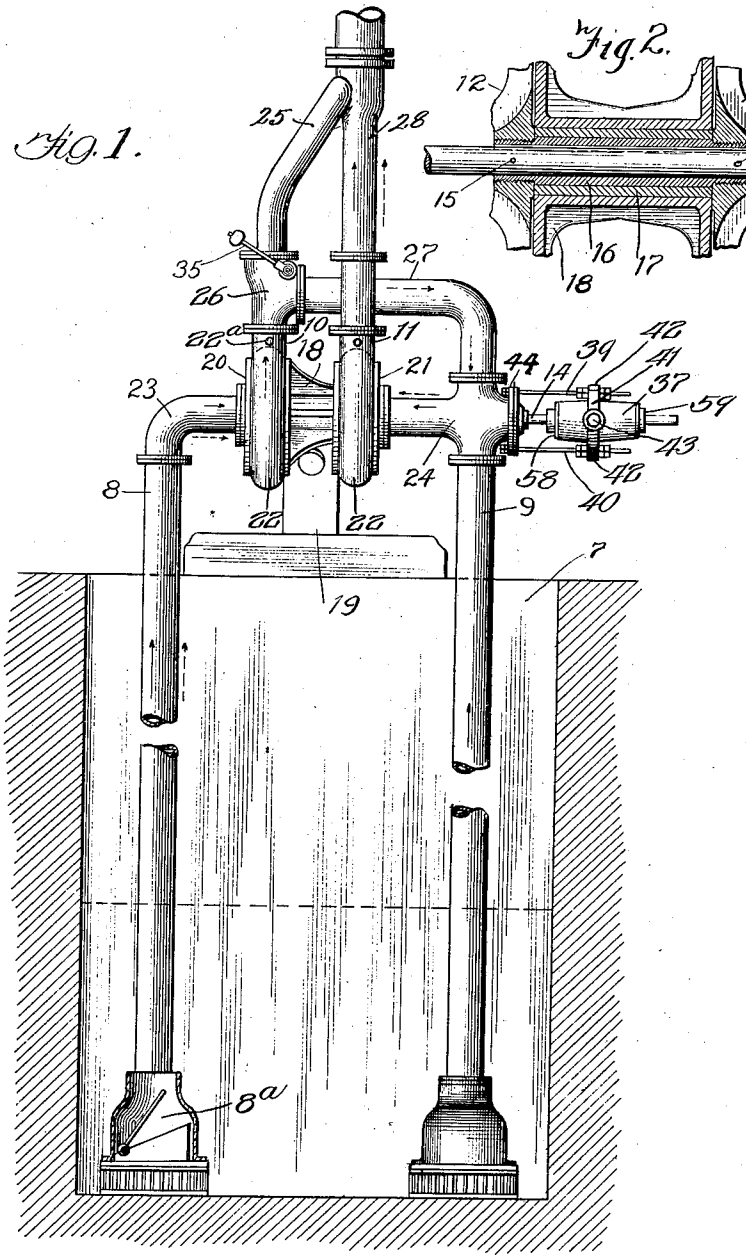


Fig. 2.

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2 SHEETS—SHEET 2.

Fig. 3.

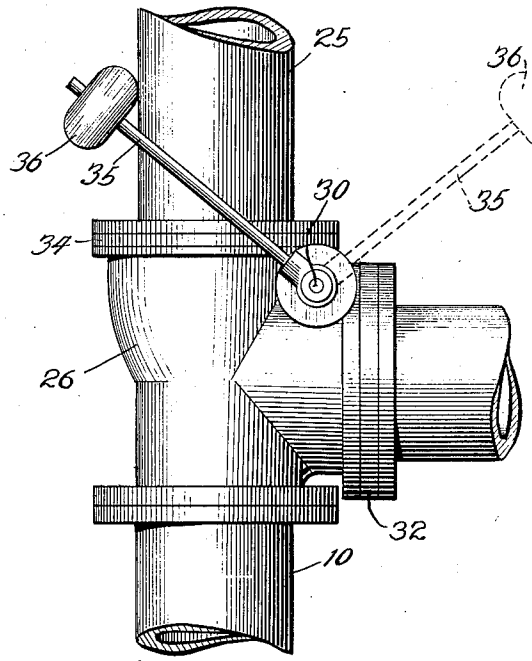


Fig. 4.

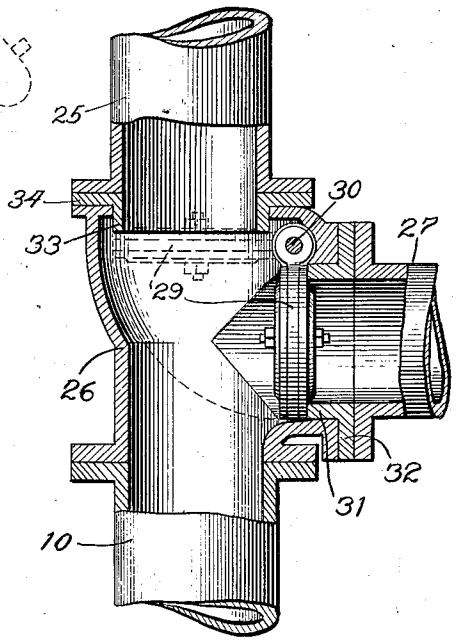


Fig. 6.

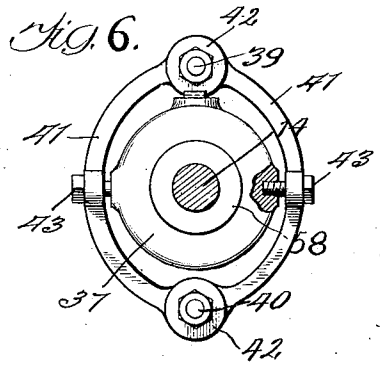
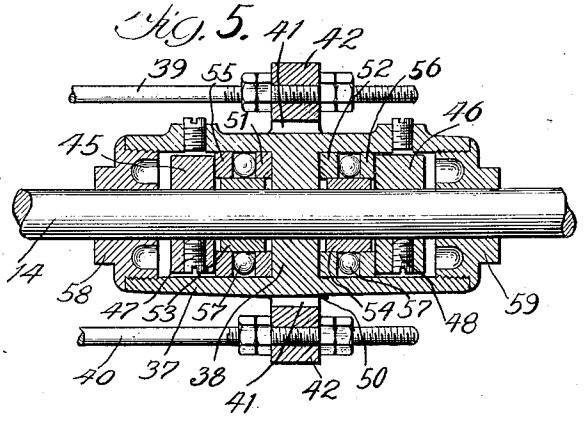


Fig. 5.



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UNITED STATES PATENT OFFICE.

MATTHEW T. CHAPMAN AND MARK C. CHAPMAN, OF AURORA, ILLINOIS, ASSIGNORS TO THE AMERICAN WELL WORKS, OF AURORA, ILLINOIS, A CORPORATION OF ILLINOIS.

PUMP.

1,114,230. Specification of Letters Patent. Patented Oct. 20, 1914.

Application filed April 19, 1911. Serial No. 622,010.

To all whom it may concern:

Be it known that we, MATTHEW T. CHAPMAN and MARK C. CHAPMAN, citizens of the United States, residing at Aurora, in the county of Kane and State of Illinois, have invented certain new and useful Improvements in Pumps, of which the following is a specification, reference being had to the accompanying drawings.

Our invention relates to pumps, and has to do more particularly with pumps of the centrifugal type.

It has for its object to provide certain improvements by which side friction of the runners or pistons may be avoided, and also to provide a multiple centrifugal pump in which the power of the several pumping units may conveniently be applied to the discharge from a single outlet and thereby the pressure be multiplied, or the several pumping units may be employed in connection with separate discharges so as to furnish a greater volume of water at less pressure. Also to provide a construction in which, when the several units are connected to a common discharge, the lateral pressure upon the pistons or runners will be automatically equalized, thereby preventing friction and increasing the efficiency of the pump.

We accomplish our object as illustrated in the drawings and as hereinafter described. What we regard as new is set forth in the claims.

In the accompanying drawings,—Figure 1 is an elevation illustrating our improved pump, some parts being broken away; Fig. 2 is a sectional view illustrating the construction of the pump units; Fig. 3 is an enlarged detail, showing some of the pipe connections and the valve-operating lever; Fig. 4 is a sectional view of the parts shown in Fig. 3; Fig. 5 is a longitudinal vertical section illustrating the devices for adjusting the pistons to avoid lateral friction; and Fig. 6 is an end view of the parts shown in Fig. 5, some parts being in section.

Referring to the drawings,—7 indicates a well, and 8—9 well-tubes which extend down thereinto and form suction pipes through which the water is drawn up by the action of the pumping mechanism. These suction-pipes are provided at or near their lower ends with inclined check-valves 8ª, as shown at the left in Fig. 1. The purpose of these check-valves is hereinafter set forth.

10—11 indicate what may be termed the units of a multiple centrifugal pump, each of said units comprising an annular shell or casing in which are mounted rotary runners 12—13, respectively. As best shown in Fig. 2, said runners are oppositely-disposed upon a shaft 14 which extends axially through the pump chambers and are non-rotatably secured thereto by pins 15, or other suitable means. Preferably the runners are not mounted directly upon the shaft 14, but are screwed upon the end portions of a sleeve 16 which fits upon the shaft and is journaled in a bushing 17 fitted in a frame 18 which rises from a suitable base 19. Heads 20—21 are fitted over the outer faces of the runners 12—13 and are connected with the frame 18 by rings 22, thus forming chambers for the runners 12—13. The head 20 is connected with the pipe 8 by an elbow 23, and the head 21 is connected with the pipe 9 by a T-coupling 24, as best shown in Fig. 1. As therein shown, the shaft 14 extends out through the coupling 24 and its outer portion is journaled in a bearing which will be hereinafter described.

22ª indicates a priming opening for priming pumping unit 10 when starting the pump.

25 indicates an outlet pipe connected with the pumping unit 10 by a T-coupling 26 which also serves as a valve-chamber, as will presently be described.

27 indicates a pipe which connects the T-coupling 24 with the coupling 26, as shown in Fig. 1.

28 indicates an outlet pipe connected with the pumping unit 11. As shown in Fig. 1, the pipe 25 also connects at its upper end with the outlet pipe 28.

As shown in Fig. 4, the coupling 26 is provided with a disk-valve 29 which is pivoted at 30 and is adapted to be swung from the vertical position shown in Fig. 4 to the horizontal position indicated by dotted lines in said figure. When in the former position, the valve 29 is seated against the flange 31 of a collar 32, and when in the latter position is seated against the flange 33 of a collar 34. It will be obvious that by means of the valve 29 the pumping unit 10 may be connected either with the outlet 25 or with pumping unit 11 through pipe 27 and cou-

pling 24, and that when water is admitted from pumping unit 10 to pumping unit 11 in the manner described it will enter the pumping unit 11 at the side opposite that at which it enters the pumping unit 10 from pipe 23. In the latter case the lateral pressure upon the two pumping units will be in opposite directions so that they will be balanced. When pumping unit 10 is connected with pumping unit 11, the check-valve 8ª in the suction pipe 9 will close, thereby preventing the water from passing down into the well. The check-valves in both pipes also enable the pipes 8—9 to retain water for priming purposes in starting the pumps, as, for example, when pump 10 is to be started the pipe 8 is filled with water, the check-valve 8ª in said pipe being in closed position. After the pump 10 is started, pump 11 may be primed by water supplied to it from pump 10.

As shown in Fig. 3, the pivot 30 projects beyond the coupling 26 and carries a lever 35 provided near its outer end with a weight 36. When the lever 35 is in the position shown in Fig. 3, the valve 29 will be held in the position shown in full lines in Fig. 4, whereas, when the lever 35 is in the position shown in dotted lines in Fig. 3 the valve 29 will occupy the position shown in dotted lines in Fig. 4. The function of the weight 36 is to assist in holding the lever 35 in its different positions of adjustment, but more particularly for holding it in the position shown in dotted lines in Fig. 3.

It will be apparent from the foregoing description that with the lever 35 in the position shown in Figs. 1 and 3 each pumping unit will deliver its output directly to outlet pipe 28. When greater pressure is required, as for fire service, by throwing the lever 35 over to the position shown in dotted lines in Fig. 3, the discharge of pumping unit 10 is connected with the inlet of unit 11 so that the discharge from both units will be delivered through pipe 28 at double the pressure of a single unit.

In order to adjust the runners and to avoid lateral friction, the outer end of the shaft 14 is fitted in a bearing constructed to prevent endwise movement of the shaft and having ball bearings for preventing friction due to end thrust thereof in either direction. In the construction shown this bearing comprises a cylindrical member 37 having a transverse intermediate partition 38 perforated for the passage of the pump-shaft 14, as shown in Fig. 5. The cylinder 37 is connected with the coupling 24 by rods 39—40 and an annular yoke 41 having bosses 42 through which said rods pass, as shown in Figs. 5 and 6. The yoke 41 is pivotally connected with the cylinder 37 at opposite sides by trunnions or pivots 43, so that it may rock independently of said cylinder. Thus the cylinder 37 is maintained properly in alinement with the shaft 14. For conveniently connecting the rods 39—40 with the coupling 24, the latter is provided with a flange 44, as shown in Fig. 1.

51—52 indicate annular disks, which are fitted tightly in the cylinder 37 adjacent to and at opposite sides of the partition, and 53—54 indicate annular bands which fit tightly within the disks 51—52. The shaft 14 rotates freely within the bands 53—54, which are held non-rotatably by reason of their engagement with the disks 51—52.

55—56 indicate disks similar to the disks 51—52, which are fitted loosely between the bands 53—54 and the inner wall of the cylinder 37.

57 indicates anti-friction balls fitted between the disks 51—55 and 52—56, respectively, thus forming anti-friction bearings for supporting the disks 55—56. The collars 45—46 bear against the disks 55—56, which thus form anti-friction end bearings for receiving the end thrust in either direction of the shaft 14. By adjusting the position of the cylinder 37 by means of the rods 39—40 the shaft 14 may be moved endwise and consequently the position of the runners 12—13 carried thereby may be accurately controlled. By this construction the anti-friction bearings act to assist in adjusting the runners to prevent lateral friction thereof and also hold them properly centered in their respective housings.

58—59 indicate caps which screw into the ends of the cylinder 37 and tightly close the same so that the compartments thus provided therein may be used to contain a supply of any suitable lubricant.

We do not herein claim separately the incorporation in a centrifugal pump of oppositely-disposed runners or pistons arranged in connection with inlet pipes so as to equalize or balance the lateral pressure upon the runners and thereby balance the same so that lateral friction is substantially avoided, as that invention forms the subject of a separate application filed by us on April 3, 1911, Serial No. 618,646.

While our improved pumping apparatus is designed more particularly for pumping water, it may be used for pumping any other suitable liquid.

That which we claim as our invention, and desire to secure by Letters Patent, is,—

1. A pumping-apparatus, comprising a pair of pumping units having an axially-disposed shaft, runners mounted on said shaft, supply pipes communicating with opposite sides of said pumping units, respectively, discharge pipes connected with said units, respectively, an outlet pipe separately connected with each of said discharge pipes, a pipe connecting the discharge of one of said units with the supply of the other unit,

a clapper-valve arranged to close either said connecting pipe or the discharge pipe of one of said units, and means adapted to hold said clapper-valve in either of its two operative positions.

2. A pumping-apparatus, comprising a pair of pumping units having an axially-disposed shaft, runners mounted on said shaft, supply pipes communicating with opposite sides of said pumping units, respectively, discharge pipes connected with said units, respectively, and separately communicating with a common outlet, a pipe connecting the discharge of one of said units with the supply of the other unit, a clapper-valve arranged to close either said connecting pipe or the discharge pipe of one of said units, and a weighted lever connected with said clapper-valve adapted to assist in holding said valve in either of its two operative positions.

3. A pumping-apparatus, comprising a plurality of rotary pumping units, supply pipes connected with said units, respectively, an outlet pipe separately connected with each of said units, means connecting the discharge of one of said units with the inlet of another unit, a valve for controlling the flow of water through said connecting means, and back-pressure valves in said supply pipes.

4. A pumping-apparatus, comprising a pair of pumping units having an axially-disposed shaft, runners mounted on said shaft, supply pipes communicating with opposite sides of said pumping units, discharge pipes connected with said units, respectively, an outlet pipe separately connected with each of said discharge pipes, a pipe connecting the discharge of one of said units with the supply of the other unit, a valve for controlling the flow of water through said connecting pipe, and back-pressure valves in said supply pipes.

5. A pumping-apparatus, comprising a pair of pumping units having an axially-disposed shaft, runners mounted on said shaft, supply pipes communicating with opposite sides of said pumping units, discharge pipes connected with said units, respectively, an outlet pipe separately connected with each of said discharge pipes, a pipe connecting the discharge of one of said units with the supply of the other unit, a valve for controlling the flow of water through said connecting pipe, and anti-friction bearings arranged to sustain said runners against end thrust in either direction.

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