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MECHANISM FOR PRIMING AND OPERATING CENTRIFUGAL PUMPS.

APPLICATION FILED AUG. 9, 1915.

1,201,594. Patented Oct. 17, 1916.

Fig. 1

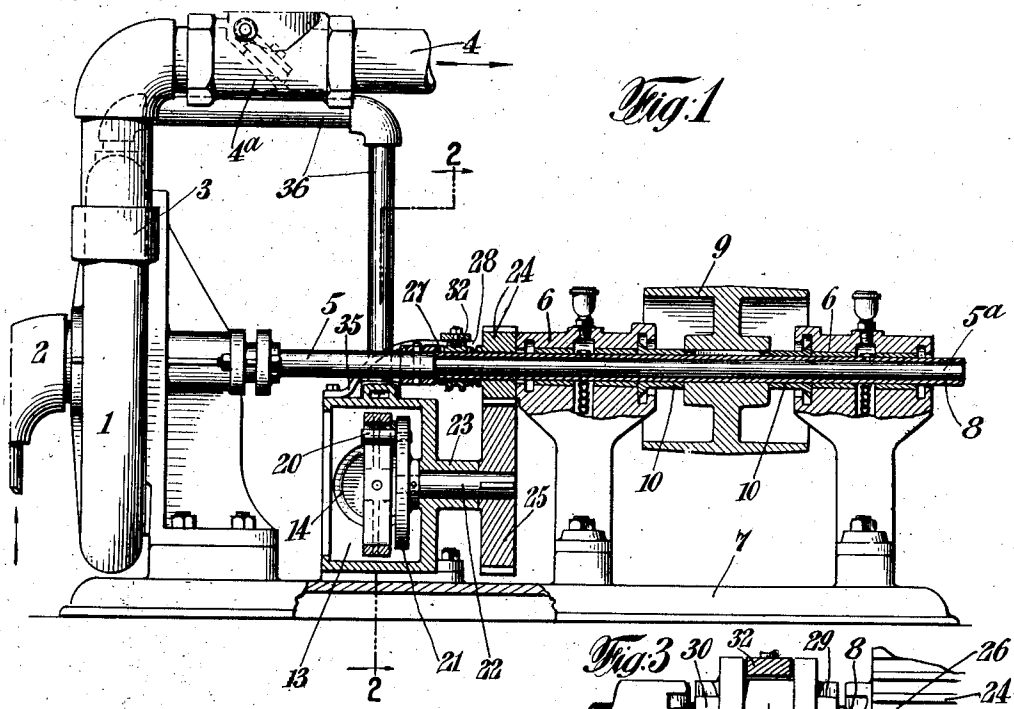


Fig. 3

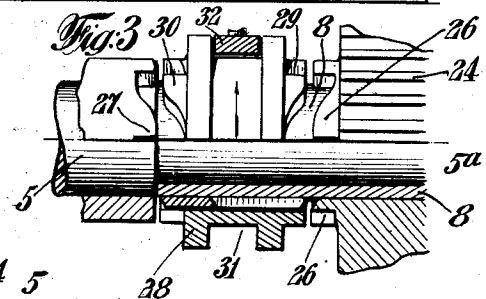
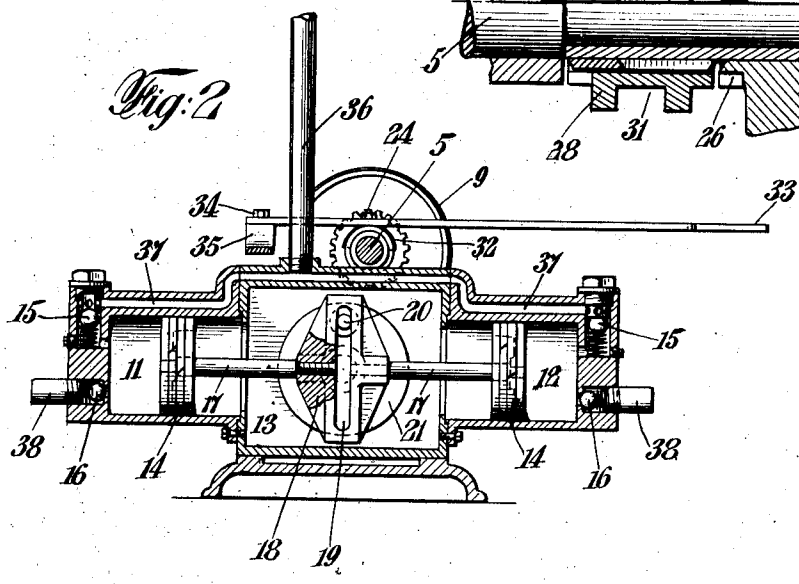


Fig. 2



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MECHANISM FOR PRIMING AND OPERATING CENTRIFUGAL PUMPS.

1,201,594. Specification of Letters Patent. Patented Oct. 17, 1916.

Application filed August 9, 1915. Serial No. 44,515.

To all whom it may concern:

Be it known that I, EDWARD W. KING, a citizen of the United States, residing at Seneca Falls, in the county of Seneca and State of New York, have invented certain new and useful Improvements in Mechanism for Priming and Operating Centrifugal 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 consists in the novel features hereinafter described reference being had to the accompanying drawing which shows one embodiment of my invention selected by me for purposes of illustration, and the said invention is fully disclosed in the following description and claims.

Referring to the said drawing: Figure 1 represents an elevation partly in section of an embodiment of my invention, the centrifugal pump being shown in elevation, and portions of the priming pump and driving connections being illustrated in section. Fig. 2 represents a vertical transverse sectional view on line 2—2 of Fig. 1. Fig. 3 is a detail of one form of clutch mechanism which I conveniently employ.

My invention relates to priming mechanism for centrifugal pumps, the casing of which must be filled with water in order to enable the centrifugal pump to start and perform its work, and it has for one of its objects the provision of an auxiliary priming pump for preliminarily filling the casing of the main or centrifugal pump, preferably by exhausting the air therefrom, the driving mechanism for the main pump and the priming pump being so arranged that either pump may be readily connected therewith, and operated without operating the other, thereby enabling the entire apparatus, which is preferably in the form of a unitary construction with the parts mounted on a common base, to be driven with less power than is required where the primer and pump must both be driven by the source of power in starting the pump.

My invention also contemplates certain details of construction and combination of parts hereinafter fully described.

Referring to the embodiment of my invention shown in the drawing, 1 represents the casing of a centrifugal pump, which may be of any usual or well known type, the casing being provided with an inlet pipe, 2, connected with the source of water or other liquid to be pumped and with an outlet, 3, which is connected with a discharge pipe, 4, the latter being provided with a check valve 4^a in the usual manner to prevent the return of water after it has left the pump casing.

The rotary piston of the pump is not shown as the construction of the pump itself forms no part of my invention. 5 represents the rotary pump shaft which is provided with an extended portion, 5^a, which may or may not be integral with the shaft, but in any event is connected to rotate therewith, and which extends through a suitable bearing or bearings, 6, (two of such bearings being shown,) mounted upon the common bed plate or base indicated at 7, which supports the main or centrifugal pump, 1, and the primer or priming pump hereafter described.

The extended portion of the shaft is provided with a separate sleeve, 8, surrounding the same and rotatable freely with respect to the shaft, the said sleeve extending through the bearings, 6, and preferably being held from longitudinal movement. The power to drive both pump and primer is applied to the sleeve, 8, in any desired way from a motor, line shafting or other source of power, as for example, by means of a belt engaging a band wheel, 9, which in this instance is shown as secured to rotate with the sleeve, 8, and held in position between bearings, 6—6, by the collars, 10—10.

As hereinafter described, mechanism is provided for operatively connecting the priming pump with the sleeve so that it can be operated without rotating the shaft, 5, of the centrifugal pump and for disconnecting the priming pump from the sleeve and connecting the sleeve with the shaft, 5—5^a, so that the centrifugal pump may be driven without driving the primer after the main pump has been primed.

In the present instance, I have shown an auxiliary priming pump comprising a pair of opposed pump cylinders, 11—12, secured to and supported by the opposite ends of a box or casing, 13, preferably mounted upon the common base, 7, each of said cylinders being provided with a working piston, 14, and with inlet valves, 15, and outlet valves, 16, in this instance spring actuated ball

valves being shown. The pistons 14—14 are connected by piston rods, 17—17, to a cross head, 18, provided with a vertical slot, 19, engaging a crank pin, 20, on a crank disk, 21, supported by a short shaft, 22, mounted in a bearing, 23, projecting from one side of the box or casing, 13, so that by the revolution of the crank shaft, 22, the pump pistons are reciprocated.

The crank shaft, 22, is operatively connected with a gear member which is loose upon or in relation to the sleeve, 8, and in this instance, I have shown a pinion, 24, loosely mounted on the sleeve, 8, and meshing with a gear, 25, on the crank shaft, 22, of the auxiliary pump. I prefer to provide clutch mechanism controlled by a clutch lever for connecting the sleeve, 8, with the gear, 24, and independently with the shaft, 5, and in the embodiment of my invention herein shown, I have illustrated in the drawing one form of clutch mechanism suitable for this purpose, although I do not limit myself thereto. In this instance I provide the gear, 24, with a clutch member, 26, and opposite to said clutch member I provide the shaft, 5—5ª, with a clutch member, 27, connected to rotate with said shaft. Between these opposing clutch members, I provide a longitudinal double clutch, 28, keyed or otherwise secured to the sleeve, 8, so that it will rotate therewith, but is movable longitudinally thereof. This double clutch is provided with a clutch member, 29, to engage the clutch member, 26, on the pinion, 24, and with a clutch member, 30, to engage the clutch member, 27, on the shaft 5—5ª. The body of the clutch member is provided with a groove, 31, to receive a yoke, 32, see Fig. 2, connected to the shifting lever, 33, which is pivotally supported at 34 on a bracket, 35, which in this instance is secured to a box or casing 13, of the auxiliary pump.

Suitable means are provided for connecting the auxiliary pumps and cylinders with the casing, 1, of the centrifugal pump. In this instance, a pipe, 36, extends from the centrifugal pump casing, to the priming pump which is provided with branch passages, 37—37, leading to the cylinder inlet valves, 15—15. The cylinder outlets may be provided with discharge pipes, 38—38, in order to carry any waste water away from the apparatus, if desired, and as shown in the drawing.

When it is desired to start the rotary pump, power is applied to the driving sleeve, 8, in any desired manner, and it is to be noted that this sleeve may be driven without driving any other part, if desired, which is sometimes an advantage, especially in operating pump mechanism by means of internal combustion engines or electric motors connected therewith, as it enables the motor to obtain running speed before any load is applied to it.

The operator, by throwing the lever, 33, so as to bring the clutch members 29 and 26 into engagement, will connect the pinion, 24, with the driving sleeve, 8, and start the auxiliary pump or primer, which will withdraw air from the casing, 1, of the centrifugal pump, creating a partial vacuum therein, and causing the water to run up the supply pipe and fill the casing, 1. In most instances the water will be drawn through the pipe, 36, after completely filling the pump casing, 1, and will pass into the pump cylinders and be expelled past the outlet valves, 16, and as soon as it commences to flow past said valves, the operator will know that the centrifugal pump is completely primed. The operator will then shift the clutch lever so as to throw the clutch member, 29, out of engagement with the clutch member, 26, and will throw the clutch member, 30, into engagement with the clutch member, 27, thereby applying the power to the shaft, 5—5ª, of the centrifugal pump, and immediately starting the centrifugal pump.

It will be noted that the maximum power required at any time from the motor or other source of power is that required to drive the centrifugal pump, and the priming pump makes no extra demand on the source of power as it is operated at a time that the pump is inoperative. Hence the full power may be applied to the priming pump, and the main or centrifugal pump will be quickly primed.

It will also be noted that according to my invention the centrifugal pump can be started without stopping the engine as soon as it is primed by throwing the clutch from one operative position into the other operative position. By my invention I am also able to dispense with the use of a foot valve in the inlet pipe for the centrifugal pump, which effects a saving in the installation of the apparatus.

What I claim and desire to secure by Letters Patent is:

1. The combination with a main rotary pump, of a priming pump operatively connected therewith for priming the main pump, driving mechanism for the main pump disconnected therefrom, and means for independently connecting each of said pumps with the driving mechanism, and simultaneously insuring the disconnection of the other pump therefrom.

2. The combination with a main rotary pump, of a priming pump operatively connected therewith, a common driving mechanism for said pump and priming pump, and connecting means movable in one direction to disconnect the rotary pump from and to connect the priming pump with the driving mechanism and movable in the other direc-

tion to disconnect the priming pump from and connect the rotary pump with said driving means.

3. The combination with a rotary pump, having an extended driving shaft, a sleeve surrounding said shaft and rotatable with respect thereto, a priming pump operatively connected with said rotary pump, driving means for both pumps operatively connected with said sleeve, and clutch mechanism for connecting said sleeve with said driving gearing for the priming pump and for independently connecting the said sleeve with the driving shaft of the rotary pump.

4. The combination with a rotary pump, having an extended driving shaft, a sleeve surrounding said shaft and rotatable with respect thereto, a priming pump operatively connected with said rotary pump, driving means for both pumps including a loosely mounted gear, provided with a clutch member, a clutch member secured to said shaft, and a longitudinally movable double clutch member secured to rotate with said sleeve, and capable of being moved to a position out of engagement with both of the other of said clutch members, and an actuating device for said double clutch member for throwing either of said pumps into operation without the other, and means for driving said rotary sleeve.

5. The combination with a rotary pump provided with an extended driving shaft, of a sleeve surrounding a portion of said shaft, and rotatable with respect thereto, a priming pump comprising a pair of pump cylinders provided each with an inlet and outlet, pistons in said cylinders, valves for controlling said inlets and outlets, connections from said cylinder inlets to the casing of the rotary pump, driving mechanism for said pistons including a gear loosely mounted with respect to said sleeve, and provided with a clutch member, a clutch member connected to rotate with said driving shaft, movable clutch members movable into and out of operative engagement with said first mentioned clutch members, and driving means for said rotatable sleeve.

6. The combination with a rotary pump provided with an extended driving shaft, of a sleeve surrounding a portion of said shaft, and rotatable with respect thereto, a priming pump comprising a pair of pump cylinders provided each with an inlet and outlet, pistons in said cylinders, valves for controlling said inlets, and outlets, connections from said cylinder inlets to the casing of the rotary pump, driving mechanism for said pistons, including a cross head connected to said pistons and having a slot disposed transversely thereto, a crank shaft provided with a crank pin for engaging said slot, and a driving pinion loosely mounted with respect to said sleeve and operatively connected with said crank shaft, clutch mechanism for independently connecting said sleeve with said pinion and with said driving shaft, and means for driving said rotatable sleeve.

In testimony whereof I affix my signature.

EDWARD W. KING.