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CENTRIFUGAL PUMP

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2 Sheets-Sheet 2

Fig. 4.

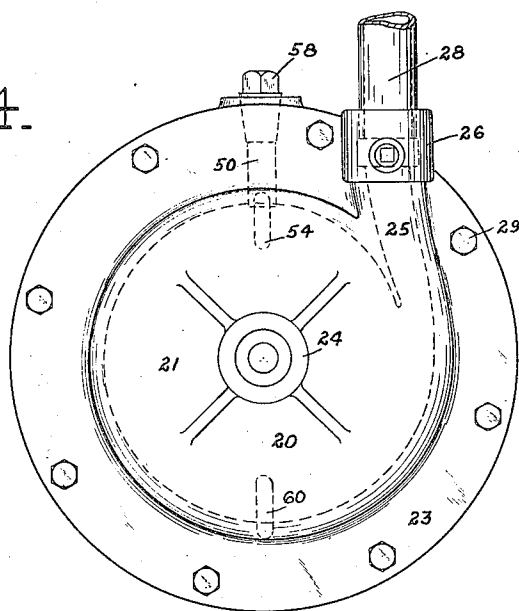
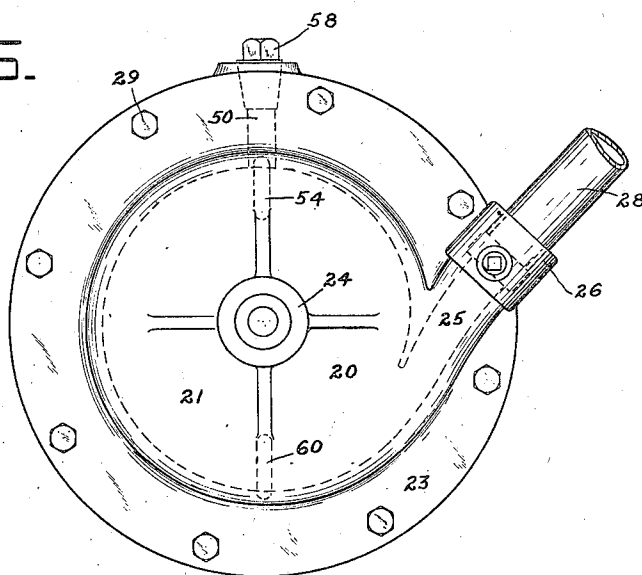


Fig. 5.



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CENTRIFUGAL PUMP

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This invention relates to centrifugal pumps, and particularly to the features of priming the pump, draining it and establishing a water seal about the impeller shaft with-
5 in the stuffing box.

In centrifugal pumps having an impeller on a driving shaft and operating in a suitable chamber with an intake and a tangential discharge, it is highly important to prime the pump, filling the chamber with water, to ex-
10 clude air therefrom for starting, and it is important during operation to prevent leakage of air along the driving shaft to the impeller chamber. It is likewise important to
15 have means for draining the impeller chamber. Such features have been heretofore provided, but it has been customary to make the priming and drainage ports in the impeller casing itself around the outer diameter of
20 the impeller.

Now it is sometimes desirable to have the tangential discharge of the pump extend in one direction and sometimes another, as upwardly or diagonally or horizontally, while it
25 is essential that the priming passageway communicate with the top of the chamber and the drain at the bottom of the chamber. I propose to obtain a constant top entrance for the priming passageway and a constant bottom
30 discharge, while allowing the tangential discharge to be located in any desired position, by making the priming and draining passageways in the stationary head of the pump in-
35 stead of in the impeller casing, such passageways terminating in ports in the pump head but communicating laterally with the impeller chamber outside of the impeller. With
40 such an installation, I can place the impeller casing in any selected position.

Moreover, by locating the priming port in the stationary pump casing, I can effect a permanent connection between it and the stuffing box to provide the water sealing,
45 which is not disturbed by change in the position of the impeller casing.

My invention comprises the novel features mentioned. The invention is hereinafter more fully explained in connection with a
50 preferred embodiment illustrated in the

drawings, and its essential characteristics are summarized in the claims.

In the drawings, Fig. 1 is a vertical longitudinal section through a centrifugal pump embodying my invention, an intermediate
55 portion of the driving shaft being broken away; Fig. 2 is a transverse section through the driving shaft outside of the stuffing box as indicated by the line 2—2 on Fig. 1; Fig. 3 is a vertical section through the drain, in
60 the plane indicated by the line 3—3 on Fig. 1; Figs. 4 and 5 are end views, on a reduced scale, of the pump, with the impeller casing in different positions.

As shown in Fig. 1, 10 designates the pump casing, 20 the impeller casing, and 30 the im-
65 peller mounted on a shaft 35, which has bearings carried by the pump casing. As shown these bearings comprise a sleeve 40, a packing 41 forced inwardly by a gland 42
70 clamped by nuts 43 on a pair of screws 44, and also a suitable ball bearing beyond the stuffing box, designated generally 45.

The impeller comprises suitable blades indicated at 31 mounted on a circular head 32
75 which has a boss 33 occupied by a diametric pin 34 passing through the shaft 33. The pump casing head 14 has a cylindrical recess 12 occupied by the impeller head 32 and an additional recess 13 occupied by the boss 33.
80 In general however, the pump casing terminates in a vertical plane designated 15.

The impeller casing 20 has a dish-shaped intermediate portion 21, an annular flange 23,
85 a central outwardly extending hollow boss 24 and a tangentially arranged discharge passageway 25 terminating in a socket 26. All of these parts are preferably made of one integral casting. The hollow boss 23 constitutes the central intake passageway, being in-
90 ternally threaded for the reception of the intake pipe. The dish-shaped intermediate portions house a volute chamber 22 surrounding the impeller blades 31, and the discharge passageway 25 leads from this pas-
95 sageway tangentially. The discharge pipe 28 seats in the socket 26 of this discharge passageway.

In my pump, the priming passageway 50 is located in a boss 51 formed on the back 100

of the end plate 14 of the casing, this passageway being drilled or otherwise formed vertically into this boss. From the lower end of the passageway a horizontal passageway 52 leads to a vertical admission port 54 in the end plate 14. This port ends at the vertical plane 15 and is partly opposed by the impeller casing, but has its lower portion discharging freely into the upper portion of the volute chamber 22.

Diametrically opposite the priming port 54, that is, in the lower portion of the end plate 14, is a draining port 60 which is vertically located and is always in constant communication with the impeller space 22. This port leads by a lateral passageway 61 to a discharge vent 62 in a suitable boss 63 carried on the back of the plate 14, this boss carrying a suitable pet cock 64 (Fig. 3) controlling the discharge.

It will be seen that the priming port 54 and the draining port 60 communicate with the impeller chamber irrespective of the position of the impeller casing. Fig. 4 shows the impeller casing with the discharge pipe 28 vertical, while Fig. 5 shows the same impeller casing with the discharge pipe extending at an upward angle. The impeller casing is secured to the pump casing by a number of equidistant cap screws 29. The removal of these screws enables the casing to be shifted to any other of the positions where the screw holes in the impeller casing will mate with the screw holes in the pump casing, thus enabling the discharge to be in any desired direction without disturbing the priming or the draining.

The water seal about the driving shaft is effected by a conduit 70 leading from the priming cavity 50 to a passageway 48 in the bearing sleeve 40. This conduit may readily comprise a bent pipe joined by screw couplings 71 and 72 to nipples 73 and 74 screwed into the priming boss 51 and the casing sleeve 16 about the shaft bearing 40, 41. By making this water seal lead from the priming chamber 50, it is entirely independent of the position of the impeller casing 20, and not disturbed when that casing is changed.

The priming receptacle 50 in use is closed by a screw plug 58. The removal of this plug enables the filling of the impeller chamber 22 and the water seal passageway 70 with water to effect the priming and sealing, and then the plug is screwed into place. In use the impelled water forces water under pressure through the priming port 54 into the priming receptacle 50 and through the passageway 70 so as to keep water under pressure about the shaft and thus establishing a water seal preventing leakage of air along such shaft. My provision of priming and draining ports within the pump casing itself provides a construction which may be

economically manufactured and enables the installation for testing of the water seal at the factory, irrespective of the position which the impeller casing may occupy when the pump is installed.

I claim:

1. In a centrifugal pump, the combination of a pump casing, an impeller casing removably secured thereto and having an internal chamber, a shaft in the pump casing, an impeller on the shaft and located in the impeller casing, a priming passageway in the pump casing leading to a port in the pump casing communicating with the impeller chamber, a draining passageway in the pump casing leading from a port in the pump casing communicating with the impeller chamber, and a conduit leading from the priming passageway to the bearing for the shaft.

2. In a centrifugal pump, the combination of a pump casing terminating in a substantially vertical plane, a shaft mounted in said casing, an impeller on said shaft, an impeller casing having an internal volute chamber and a surrounding flange, said flange terminating in a substantially vertical face and abutting the vertical plane of the pump casing, there being a central admission passageway and a tangential discharge passageway to and from the impeller chamber, means for holding the impeller casing in various angular positions on the pump casing, a downwardly extending receptacle on the upper portion of the pump casing in communication with a port in the pump casing terminating at said vertical plane, a tubular conduit leading from said receptacle to the bearing for the shaft, a draining passageway located in the lower portion of the pump casing and terminating in a port at said vertical plane, the priming and draining ports being substantially diametrically opposite each other and elongated in a vertical direction and overlapping the impeller chamber.

In testimony whereof, I hereunto affix my signature.

ALEXANDER V. MUELLER.