Feb. 23, 1937. C. L. FROHNERT 2,072,033

CENTRIFUGAL PUMP

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Fig. 1.

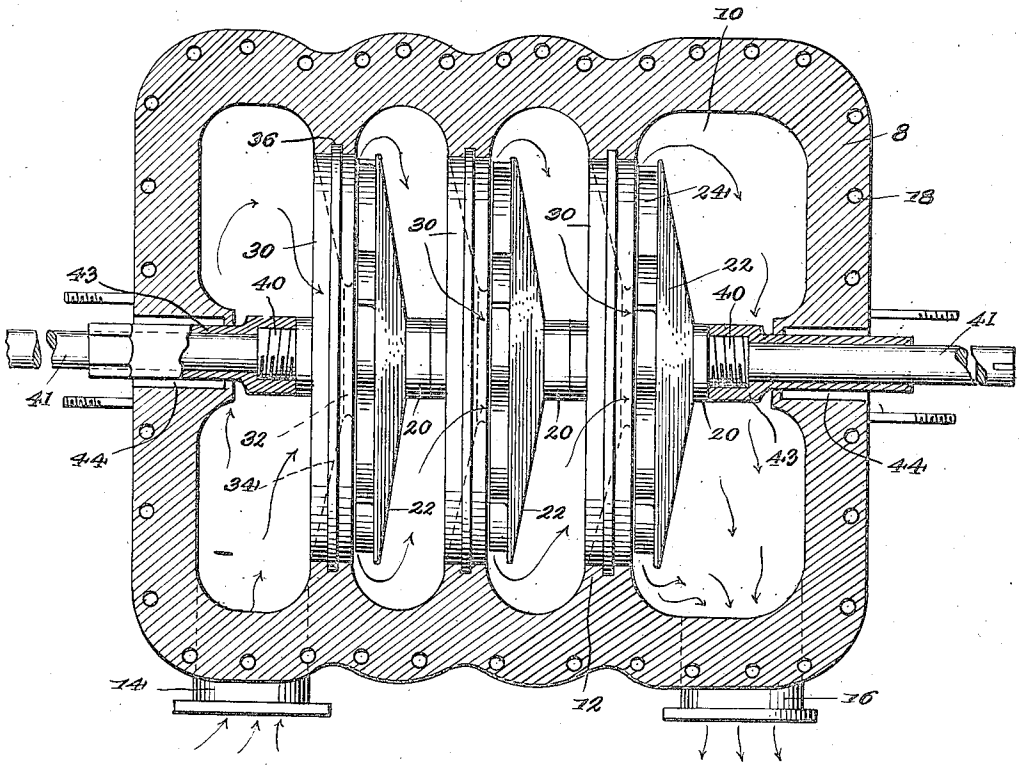
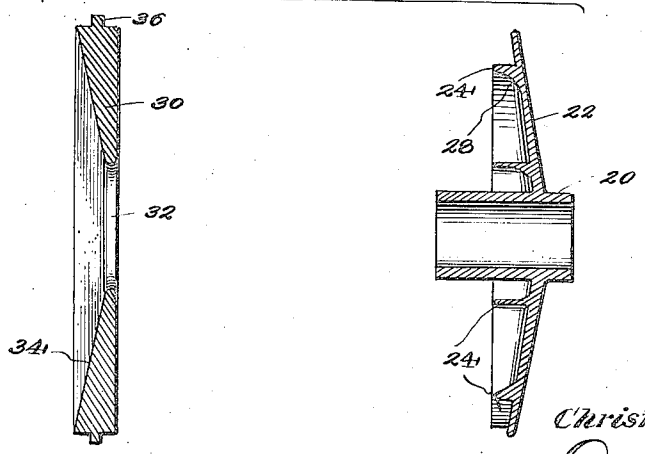


Fig. 2.



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Fig. 3.

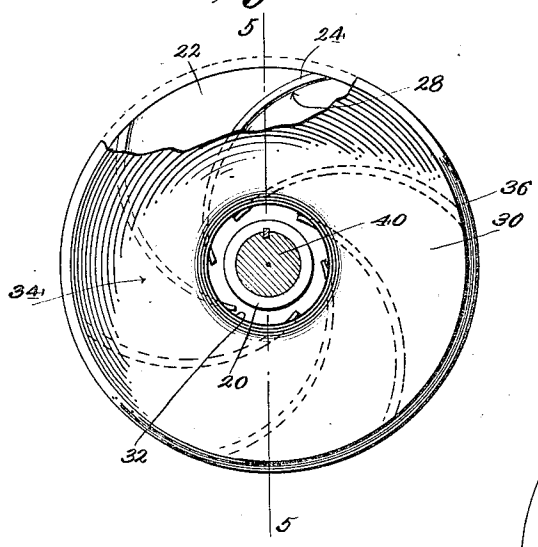


Fig. 6.

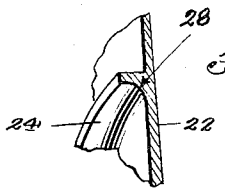


Fig. 4.

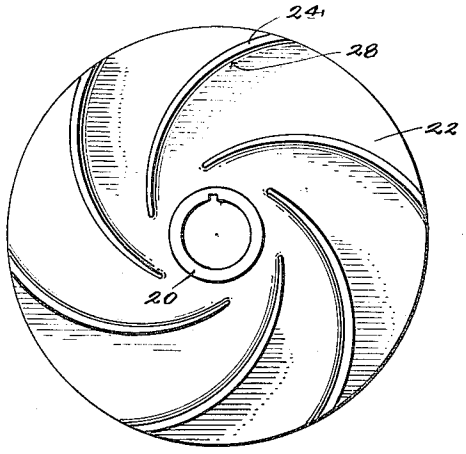


Fig. 5.

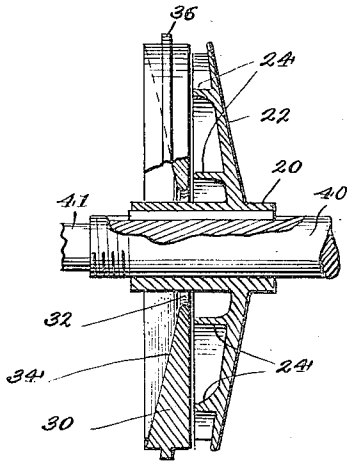
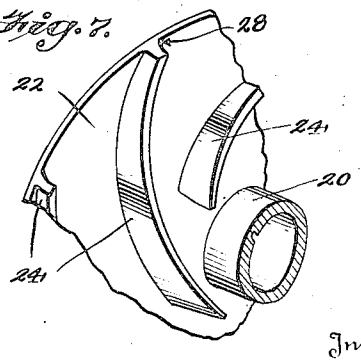


Fig. 7.



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2,072,033

CENTRIFUGAL PUMP

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Application September 15, 1934, Serial No. 744,243

1 Claim. (Cl. 103—108)

The present invention relates to a pump, and more particularly to an improved centrifugal pump.

One of the objects of the present invention is to provide in a centrifugal pump, novelly constructed cooperating disks and impellers which eliminate the necessity of using or employing sealing rings.

A still further important object of the invention is to provide an improved centrifugal pump in which by virtue of the novelly constructed disks and impellers, the casing may be constructed shorter, and without the usual openings therein for the flow of water from impeller to impeller.

A still further important object of the invention is to provide a centrifugal pump of few parts, at a lower manufacturing cost and operating cost.

In the accompanying drawings, forming a part of this application and in which like numerals are employed to designate corresponding parts throughout the same,

Figure 1 is a view partly in section of the centrifugal pump,

Figure 2 is a vertical sectional view of the disk and improved impeller,

Figure 3 is a front elevational view of the assembled disk and impeller,

Figure 4 is a front elevational view of the impeller, illustrating the manner in which the arcuate ribs are arranged thereon,

Figure 5 is a vertical sectional view of Figure 3, taken on line 5—5 thereof,

Figure 6 is a fragmentary perspective view of the impeller, illustrating the manner in which the arcuate ribs are constructed, and

Figure 7 is a fragmentary perspective of the impeller illustrating the manner in which the arcuate shaped ribs increase in width toward the center thereof.

In the accompanying drawings, wherein for the purpose of illustration there is shown a preferred embodiment of the invention, the reference numeral 8 generally designates one section of the casing of the pump, which is of the usual shape, and is divided into a plurality of compartments 10 by means of the inwardly disposed spaced circular ribs 12.

In the lower left hand portion of the casing 11 there is provided an inlet or suction orifice 14 communicating with the extreme left hand compartment 10. Similarly, on the lower right hand side of the casing there is provided an outlet 16 which communicates with the extreme right hand compartment 10. As clearly illustrated in the usual manner, the casing consists of a pair of sections 8 provided with spaced apertures adjacent the edge portion thereof, in which there is inserted screw bolts for securing the sections together.

Attention is now particularly invited to Figures 2 and 4, wherein there is shown the novelly constructed disk and impeller forming the subject matter of the present application. As clearly illustrated in Figures 2 and 4, the impellers are provided with a centrally disposed hub 20, having an integral concavo-convex disk portion 22. On the concave side of the disk portion 22 there is provided integral arcuate shaped spaced ribs 24. The outer edges of the ribs 24 terminate in a plane perpendicular to the hub portion 22 and gradually increase in width from the periphery of the disk portion 22 toward the hub 20.

As clearly illustrated in Figure 2, the upper sides of the ribs 24 are substantially flat or straight while the inner side is beveled and depends downwardly as at 28 for the purpose of reinforcing. It is also important to note, as shown in Figure 4, that the ribs 24 decrease in thickness from the periphery toward the hub of the impeller thereof. Also, the inner ends of the ribs terminate short of the hub 20.

The reference numeral 30 designates the disk which cooperates with each impeller and is provided with a centrally disposed aperture 32 having a diameter greater than the diameter of the hub 20 of the impeller and is flat on one side and concave on the opposite side, as at 34. The disk 30 is provided with an upstanding rib 36 on the periphery thereof.

In assembling the centriugal pump, the disks 30 as clearly shown in Figure 1, are positioned between the sections 10 and firmly secured therein by means of the radially disposed ribs 36 which are seated in corresponding grooves in the circular projections 12.

On the shaft 40 there are keyed the impellers 20, the ribs 24 of the impellers as illustrated in Figure 1 being disposed adjacent the flat surfaces of the disks and spaced a slight distance therefrom. The ends of the shaft 40 are provided with reduced end portions 41 which extend through the casing. Adjacent the reduced portions the shaft 40 is provided with right and left hand threads respectively to which there are screw threaded the sleeves 43 which surround the reduced ends of the shaft for a portion of the length thereof and extend through the packing glands 44 in the casing. The space between the

outer edges of the ribs **24** and the flat surface of the disk is controlled by means of a thrust bearing which is not shown.

In operation, it will be seen that upon rotation of the shaft **40** and consequently rotation of the impellers, the liquid will be sucked into the inlet orifice **14**, into the first compartment, through the space between the hubs of the disk and impellers and transmitted as shown by the arrows, through the medium of the ribs on the impeller adjacent thereto into the second compartment and in the same manner to the other compartments whence it finally reaches the outlet orifice **16**.

It will thus be seen that by virtue of the novel construction of the disk **30** and the cooperating novelty constructed impeller **22**, the necessity of using the troublesome sealing ring is eliminated and there is provided a centrifugal pump of few parts, of simple construction and one which is cheap to manufacture and efficient in operation.

While there is shown for the purpose of illustration a preferred embodiment of the invention it is to be specifically understood that it is capable of various changes and modifications without departing from the spirit and scope thereof, and it is intended therefore, that only such limitations shall be imposed thereon as are indicated in the prior art or in the appended claim.

What is claimed is:

In a centrifugal pump including a hollow casing, a plurality of spaced disks in said casing dividing said casing into a plurality of compartments, each of said disks having one side thereof concave and the other side substantially flat and being provided with a centrally disposed aperture therein, a shaft extending through the aperture of said disks and being rotatably mounted in said casing, a plurality of impellers fixedly secured to said shaft, each impeller cooperating with one of said disks, said impellers being of concavo-convex shape and having on the concave side thereof integral arcuate shaped spaced ribs, said ribs having one lateral edge free and terminating in a plane perpendicular to the shaft on which the impellers are secured, said free edges of each impeller being spacedly disposed adjacent the corresponding cooperating disk, the thickness of said ribs decreasing from the periphery of said impellers gradually toward the center thereof, the upper surface of said ribs being substantially flat and the lower portion thereof arcuate in axial section.

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