Nov. 17, 1953

A. WAHLE

2,659,312

CENTRIFUGAL PUMP

Filed Sept. 8, 1950

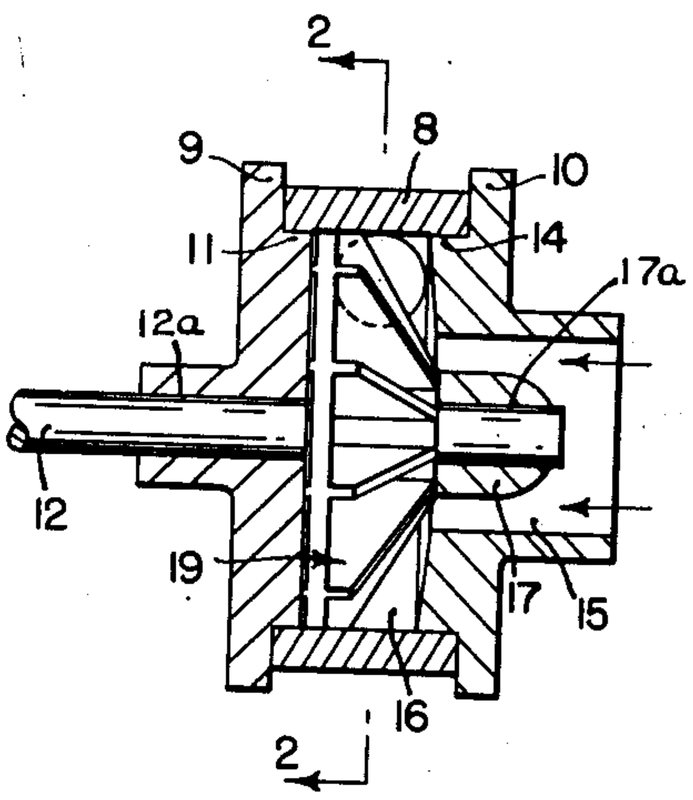

FIG. 1

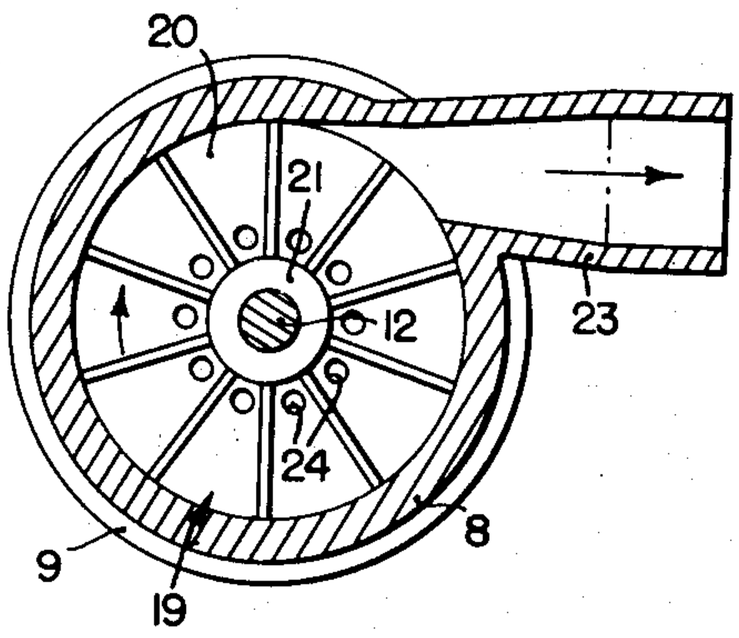

FIG. 2

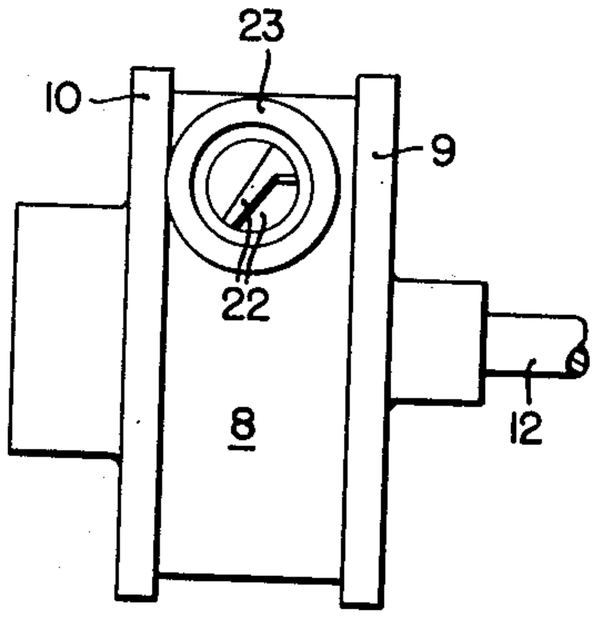

FIG. 3

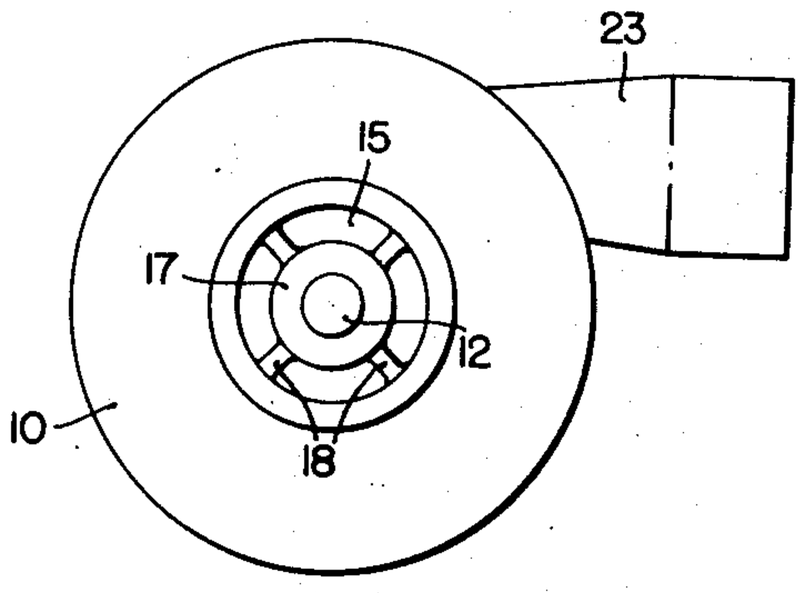

FIG. 4

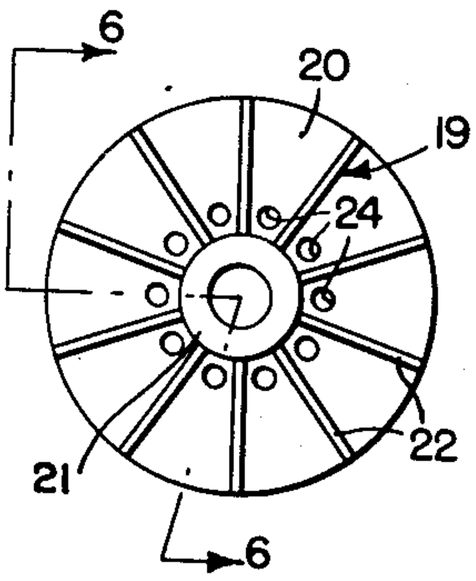

FIG. 5

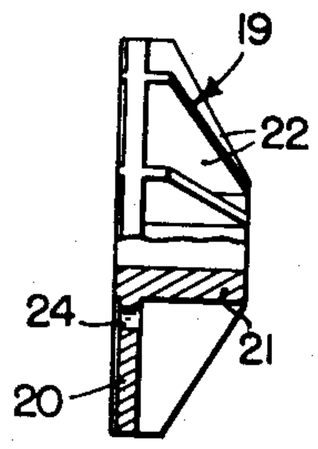

FIG. 6

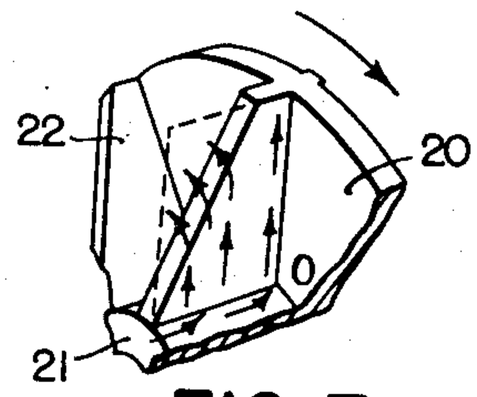

FIG. 7

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CENTRIFUGAL PUMP

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3 Claims. (Cl. 103—103)

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The present invention relates to the art of rotary pumps and more specifically to centrifugal fluid pumps. However, centrifugal pumps having an impeller with curved blades and a volute for discharge of fluid have long been known, but, today, there is a demand for a rotary pump at low cost but with still higher efficiency than has so far been produced.

An object of the present invention is to provide an inexpensive pump, but one which is flexible in operation and simple to construct and maintain in operating condition. It is a further object of this invention to provide in a single pump either high pressure differential between inlet and outlet or high rate of delivery proportionate to the horsepower input, depending upon the delivery taken from the pump. Other objects and advantages will be apparent from the following description and from the subjoined claims.

A preferred form of this invention is shown in the accompanying drawings in which:

Fig. 1 is a section of this preferred pump on a plane through the pump shaft;

Fig. 2 is a section substantially on the line 2—2 in Fig. 1;

Fig. 3 is an elevation from the rear side of the pump as shown in Fig. 1;

Fig. 4 is a right end elevation of the pump as shown in Fig. 1;

Fig. 5 is an elevation of the rotor from the right side as shown in Fig. 1;

Fig. 6 is a partial section on the broken line 6—6 in Fig. 5; and

Fig. 7 is a fragmentary isometric view of the rotor showing flow lines of fluid within the pump.

The pump shown has a body 8 which is provided with heads 9 and 10. The head 9 has a circular shoulder 11 with a flat face, which shoulder is of a size to fit into the body 8 and center the same. The head 9 has a central bearing opening 12*a* through which a shaft 12 extends. The head 10, also, has a similar shoulder 14 of a size to fit into the body 8 and center the same. The inner face of said shoulder 14 is slightly dished inwardly. The bore of the pump body 8, enclosed by heads 9 and 10, forms a cylindrical chamber 16.

An impeller 19, consisting of a circular flange 20 with a central hub 21, and radial blades 22, is provided with an opening for the reception of the shaft 12 on which it is non-rotatably mounted. The impeller is provided with openings 24 through the flange, adjacent to and between the blades to balance the pressure on both

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sides of the flange. However, with a double type of impeller, as shown in Patent No. 2,419,924 this is not necessary because, in the double type, the impeller is balanced.

The blades 22 are secured to the flange 20 and to the hub 21 in positions radially of the shaft 12, and they extend outwardly from the hub 21. The blades are narrow at the tip and much wider at the hub. Thus the edges of the blades 22 are at an angle to the face of the flange 20.

With the impeller 19 in place in the chamber 16, and in motion, an unobstructed V-channel is formed adjacent the edges of the blades 22. The widest part of this channel is, naturally, at the tip of the blades, where the blades are the narrowest.

The head 10 has an opening 15 positioned centrally thereof to provide an inlet into the cylindrical chamber 16. The water, thus taken in at the eye, flows radially between the blades of the impeller and over the forward edge of each blade, as indicated by arrows in Fig. 7, into the V-channel. This equalizes the pressure of the impeller 19 and the V-channel. The discharge of the water from the V-channel is through a tangential outlet 23. The tangential discharge avoids the necessity for a volute discharge.

Within the opening 15 to the chamber 16 there is provided a central hub 17 for supporting the shaft 12 axially of the body 8. The hub 17 is supported by arms 18 secured at their inner ends to the hub and at their outer ends to the head 10 about the inlet or eye 15. The hub 17, furnishing a bearing 17*a* for the shaft 12, acts as a deflector for water entering the eye 15, since it has its end, toward the flow of water, rounded, as shown in Fig. 1, to streamline the flow of intake water.

It is of course understood that the specific description of structure set forth above may be departed from without departing from the spirit of this invention as disclosed in this specification and as defined by the appended claims.

Having now described my invention, I claim:

1. A centrifugal pump comprising a body, a head closing one end of said body and having an opening therethrough centrally located therein, a hub positioned in said opening and supported by said head, said opening being larger than said hub whereby to provide an annuluar inlet about said hub, a second head closing the other end of said body and having a bearing located centrally therein, said body and said heads forming an

approximately cylindrical chamber therein, a shaft rotatably supported by said bearing and by said hub, an impeller affixed to said shaft within said chamber, said impeller having a circular flange adjacent to the head having the bearing, the chamber in the body being divided by the flange into two compartments, one compartment being much larger than the other, and the impeller having radial blades which extend at their inner ends from said flange to the opposite end of said chamber and at said flange outwardly into running engagement with said body, said flanges having holes therethrough between the blades adjacent the hub, said blades terminating short of engagement with said body and the first mentioned head at the juncture thereof, whereby to provide in said chamber an unobstructed passage entirely therearound, and said body having an outlet opening therethrough to the outer portion of said chamber and extending between the facing surfaces of said flange and of the first mentioned head.

2. A centrifugal pump comprising a body open at the ends with a pair of heads closing the ends thereof and forming a cylindrical chamber therein, an impeller rotatably supported in said chamber, said impeller having a flange dividing the space between the heads into unequal parts and having radial blades secured to said flange, said flanges having holes therethrough between the blades adjacent the hub, said blades extending outwardly only a part of the length of said impeller, whereby to provide an unobstructed channel for the flow of liquid about said chamber, one of said heads being flat and the second head being somewhat dished to provide a restricted flow of liquid, an outlet located tangentially of said chamber, extending between said flange and said second head, whereby, upon supply of liquid to said inlet and rotation of said impeller, the liquid in said chamber is rotated and is expelled through said outlet, and replacement liquid is free to flow simultaneously from said inlet radially between the impeller blades.

3. A centrifugal pump comprising a body having, internally, a cylindrical chamber, a first head provided with a shoulder closing one end of said body, said head having a bearing opening, a second head for the second end of the body opening, said second head having an axial opening, a first hub in the second head having an opening therethrough and connected thereto by a plurality of arms extending radially from the said hub to the second head, the openings in the two heads being in alignment, a shaft in the openings, an impeller in the body mounted on said shaft, said impeller having a flange mounted at a right angle to the shaft and close to the first head but being much farther from the second head than from the first head, said flanges having holes therethrough between the blades adjacent the hub, a second hub in said chamber, blades connected to said second hub and arranged parallel to said shaft, said second hub connecting said blades and said shaft, the blades being wider where connected to the hub and narrower at their outer ends, whereby there is formed between the blades and the second head an unobstructed V-channel in the body, the inlet for the pump being at the eye and there being a tangential discharge opening.

ADOLPH WAHLE.

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