March 10, 1959 W. A. BAUS 2,876,706

FLUID PUMP

Filed June 8, 1955 2 Sheets-Sheet 1

FIG.1.

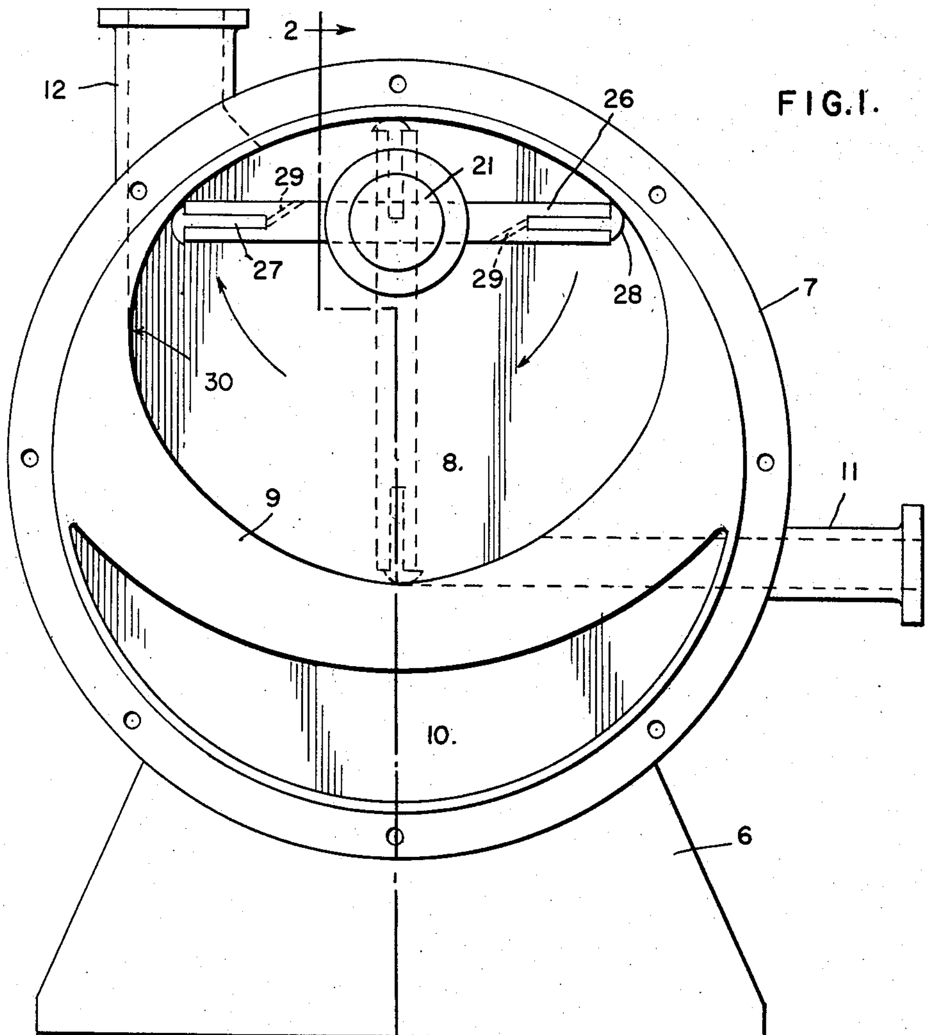



FIG.4.

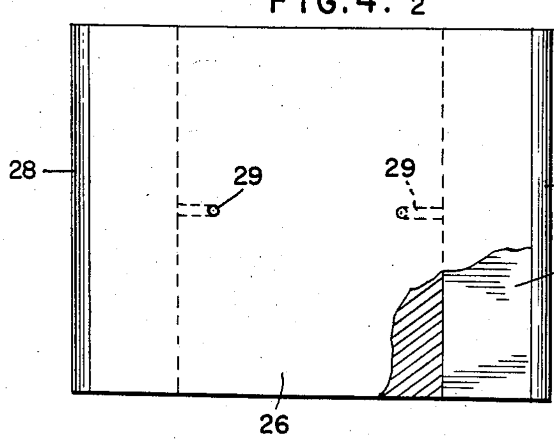
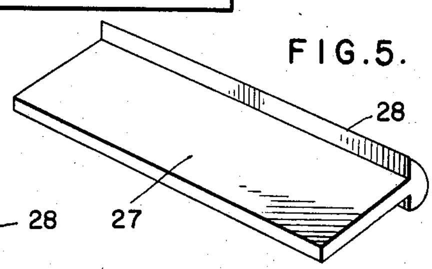



FIG.5.

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Filed June 8, 1955 2 Sheets-Sheet 2

FIG. 2.

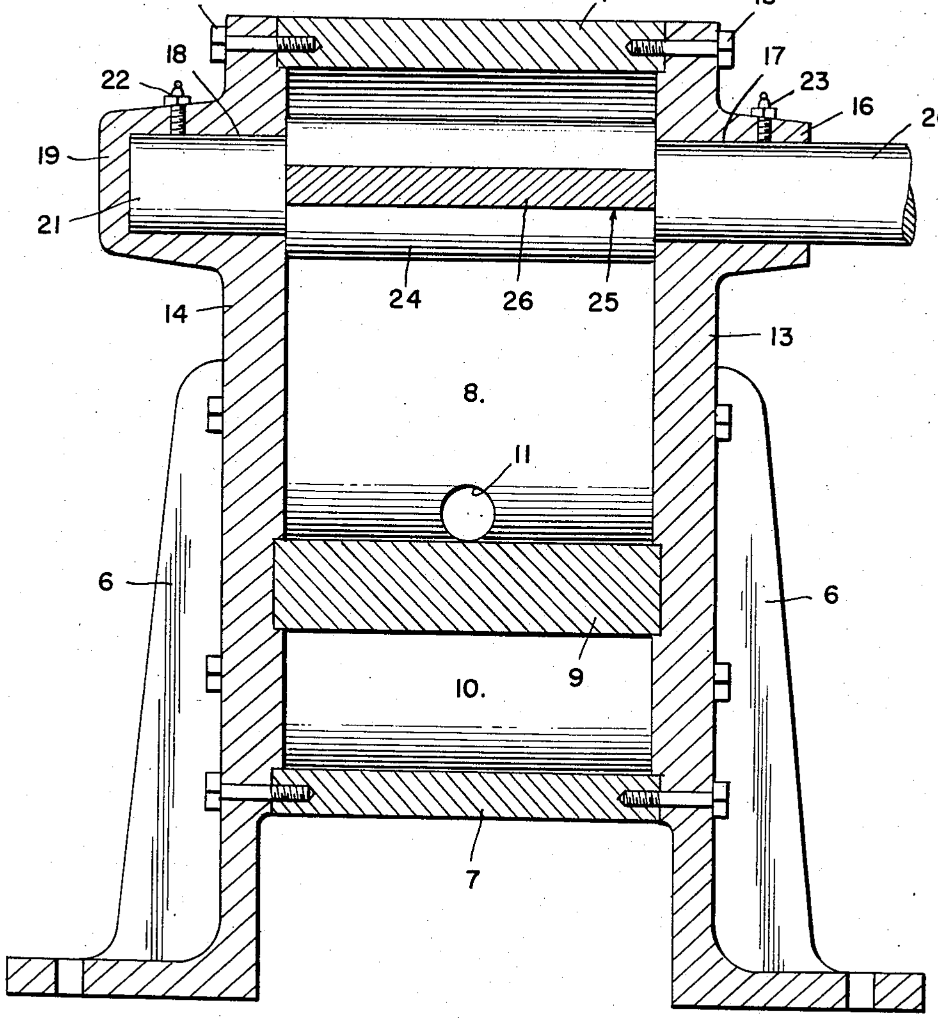
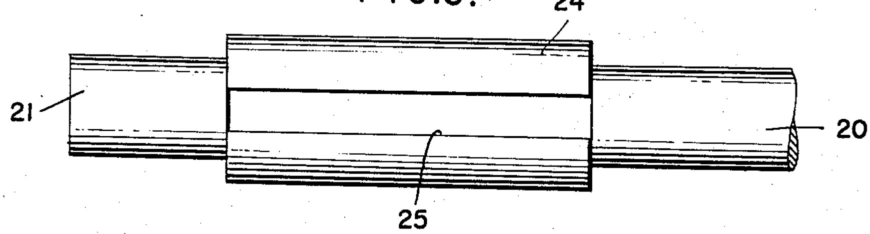



FIG. 3.

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# FLUID PUMP

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Application June 8, 1955, Serial No. 513,981

1 Claim. (Cl. 103—137)

This invention relates to improvements in fluid pumps of the type designed to pump fluids under pressure at an even rate of flow.

Various fluid pumps have been utilized in the past, those most commonly employed basically comprising an impeller mounted for rotation in a cylindrical housing. I have found that these pumps lack efficiency in operation due primarily to the limited force that can be exerted on the fluid by the impeller and the slippage of fluid between the terminals of the impeller and the walls of the fluid chamber. It is within the contemplation of the present invention to provide a pump so designed and constructed to deliver fluids at considerably higher pressures than has heretofore been possible with pumps of comparable size.

Another object is to provide a fluid pump having a single blade impeller which is floatingly mounted within the pump housing in a manner to exert maximum pressure on the fluid, the terminals of the impeller being at all times in contiguous relation with the fluid chamber walls to eliminate slippage.

A further object is to provide a pump having a fluid chamber which is substantially elliptical in cross section, the shape thereof being mathematically determined to correspond to the path of rotation of the floatingly mounted impeller.

A still further object is to provide a pump of the character described in which fluid is drawn into the chamber under a suction force induced by the impeller and then expelled from the pump under a pressure exerted on the fluid by the impeller.

Other objects of the invention will be manifest from the following description of the present preferred form of the invention, taken in connection with the accompanying drawings, wherein:

Fig. 1 is a side elevational view of a fluid pump constructed in accordance with the present invention, one end plate thereof being removed to disclose details of construction;

Fig. 2 is a vertical sectional view taken along the lines 2—2 of Fig. 1, looking in the direction of the arrows;

Fig. 3 is a plan view of the drive shaft forming a part of the present invention;

Fig. 4 is a fragmentary plan view of the impeller forming a part of the present invention; and

Fig. 5 is a perspective view of one of the contact plates forming a part of the present invention.

Referring now in greater detail to the drawings, there is illustrated in Figs. 1 and 2 a fluid pump comprising a supporting frame **6** on which is mounted a cylindrical pump housing **7**. Within housing **7** is a fluid chamber **8** of substantially elliptical shape in cross section, the limits of which are defined by a curvilinear wall insert **9** mounted within housing **7** and extending from one side thereof to the other. Numeral **10** designates a void between the outer surface of wall **9** and the lower extremity of pump housing **7**. A conventional inlet **11** in the side of housing **7** admits liquid to the lower part of liquid



chamber **8**. An outlet **12** is located near the upper limit of the pump housing through which the liquid is forced under pressure. The outlet opening is considerably larger than the inlet opening in order to prevent the water under pressure from damaging pump housing **7**. Inlet **11** and outlet **12** are provided with conventional check valves.

The open ends of housing **7** are covered by end plates **13** and **14** secured to the cylindrical housing by bolts **15**. Plate **13** is enlarged near its upper terminal to form a collar **16**, in which collar and plate is an opening or bore **17**. In opposed relation to collar **16** and opening **17** is an opening **18** formed in end plate **14**, and a bearing housing axially aligned with opening **18** and formed integrally with the upper portion of end plate **14**. A drive shaft **20** connected at one end to a motor (not shown) extends through collar **16**, opening **17** and liquid chamber **8** and has its terminal **21** journaled in bearing housing **19**. Grease fittings for drive shaft **20** are provided at **22** and **23**. As shown to advantage in Figs. 2 and 3, the body portion **24** of drive shaft **20** lies within the confines of the plates **13** and **14**, and is of greater diameter than the shaft terminals to prevent axial movement of the drive shaft within the pump housing **7**. A slot **25** extends through the body portion **24** of the drive shaft **20** and is adapted for the reception of a single blade impeller **26**.

Impeller **26** is floatingly mounted in slot **25** and is of rectangular conformation, each terminal thereof being transversely slotted at **26'** to receive a contact plate **27**. Plate **27** includes a curved terminal flange **28** adapted to be in constant contiguous relation with the elliptical shaped walls of liquid chamber **8**. In order to insure this contiguous relationship impeller **26** is provided with conduits **29** through which fluid is forced upon rotation of impeller **26**. The force of the fluid on the inner edge of contact plate **27** constantly urges the plate into sealing engagement with the chamber wall. The curved design of terminal flange **28** also tends to bring it into continuous relationship with the walls of fluid chamber **8**.

The conformation of fluid chamber **8** is mathematically computed so that at all points along the inner periphery thereof, the distance between opposed sides of the chamber wall taken along a line drawn through shaft **20**, equals the distance between the tips of terminal flanges **28**. This shape of fluid chamber **8** therefore corresponds to the rotational path of impeller **26** and contact plates **27** in the cycle of operation. For this reason very little outward movement of contact plates **27** is required to effect sealing engagement with the fluid chamber wall to avoid slippage.

In use, floating impeller **26** initiates the operational cycle in the position shown in dotted lines in Fig. 1. As it rotates clockwise, the volume in fluid chamber **8** on the inlet side of impeller **26** increases, creating a suction force which is exerted on the fluid in inlet **11**. Fluid is drawn through inlet **11** into chamber **8** under this force until the leading contact plate **27** of impeller **26** reaches a point designated **30** at outlet **12**. Once this point has been passed, the volume on the outlet side of chamber **8** begins to decrease, forcing fluid through outlet **12**. This completes the pumping cycle.

It should be noted that contrary to the theory and method of operation of conventional pumps this pump operates on a principle of variable volume on two sides of an impeller blade floatingly mounted on a shaft within a fluid chamber essentially elliptical in cross-sectional shape. The floating impeller blade is mounted on a shaft which in turn is mounted near the upper limit of the fluid chamber. During rotation of the shaft the impeller is moved transversely with respect to the longitudinal axis of the shaft by the camming action of the fluid chamber walls on the contact plates of the impeller.

By this arrangement of parts, a larger volume of fluid may be expelled from the pump under greater force than has heretofore been possible with other pumps of comparable size.

While I have herein described a preferred embodiment of my invention, it is nevertheless to be understood that various changes may be made therein, within the scope of the appended claim.

What I claim is:

In a fluid pump, a housing including a fluid chamber of substantially elliptical shape having inlet and outlet openings located in the lower and upper part of the fluid chamber respectively, a drive shaft in the housing extending through the fluid chamber adjacent the upper limit, a single blade impeller slidably mounted in a slot in said drive shaft and rotated therewith, a contact plate movably mounted in a slot in each terminal of said impeller, a conduit, inclined relative to said blade, between the inner end of each slot and said fluid chamber, and opening in said chamber toward said drive shaft, each plate being urged in contact with the pump housing by fluid pressure created within said fluid chamber and exerted through said conduit, and means for rotating said drive shaft and impeller.




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