June 24, 1969

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3,451,343

PUMP MEANS

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Sheet 1 of 2

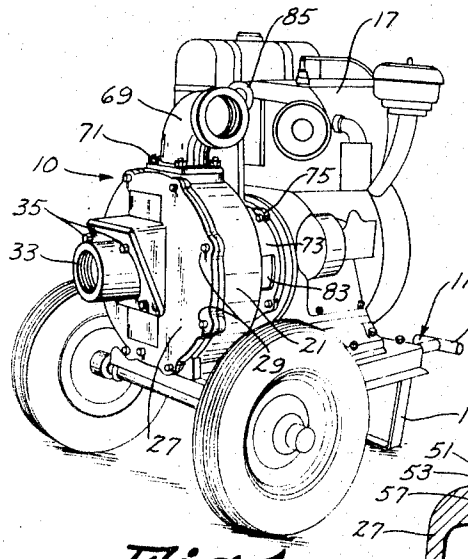


Fig. 1

Fig. 2

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Sheet 2 of 2

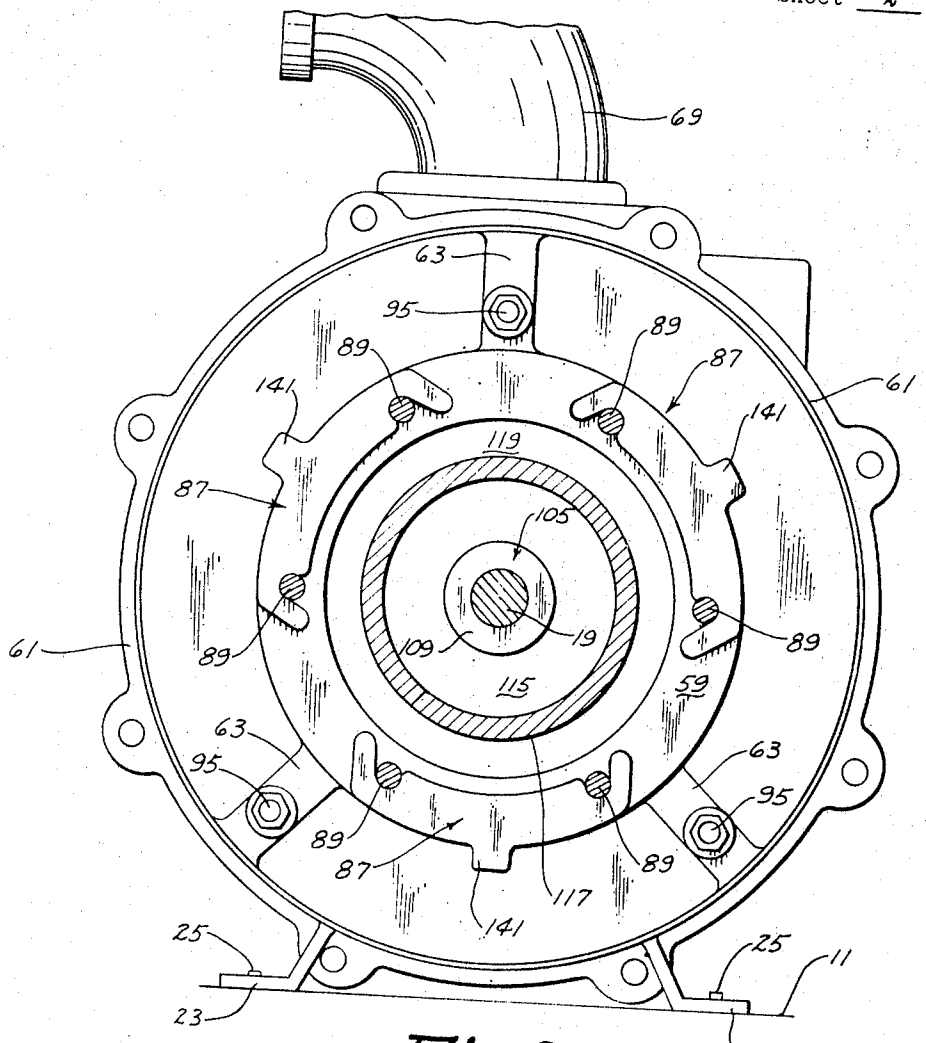


Fig. 3

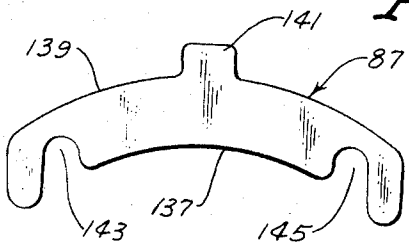


Fig. 4

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PUMP MEANS

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U.S. Cl. 103—103 6 Claims

ABSTRACT OF THE DISCLOSURE

A pump means including a pump case having an impeller means and volute quickly removably mounted therein, a shim means for adjusting the clearance between the impeller means and volute and also includes a seal plate means which is quickly detachably secured to the interior of the pump case.

Heretofore, pumps were necessarily core casted due to the design thereof which resulted in an expensive method of manufacture. Additionally, the existing pumps do not permit the interchanging of the impeller and volute means therein to permit the repair of the pump or to permit the specifications thereof to be altered. Also, the existing pumps do not provide a convenient means for adjusting the clearance between the impeller blades and the volute wear plate surface without the necessity of completely dismantling the pump.

Therefore, it is a principal object of this invention to provide a pump means including a pump case having an impeller means and volute quickly removably mounted therein.

A further object of this invention is to provide a pump means which has an impeller means and volute detachably mounted therein which may be conveniently replaced with impellers and volutes of different construction.

A further object of this invention is to provide a pump means which may be quickly and easily dismantled.

A further object of this invention is to provide a pump means which eliminates the need for core casting thereof.

A further object of this invention is to provide a shim means for a pump means which may be easily inserted to adjust the clearance between the impeller blade and the volute wear plate surface.

A further object of this invention is to provide a pump means which is economical of manufacture, durable in use and refined in appearance.

These and other features and advantages of this invention will become readily apparent to those skilled in the art upon reference to the following description when taken into consideration with the accompanying drawings, wherein:

FIG. 1 is a perspective view of the pump means mounted on a wheel frame means and operatively secured to an engine means;

FIG. 2 is a side view of the pump with portions thereof cutaway to more fully illustrate the invention;

FIG. 3 is a sectional view as would be seen on line 3—3 of FIG. 2; and

FIG. 4 is a side view of the shim element.

The pump of this invention is of the self priming, centrifugal type and is generally designated by the reference numeral **10**. Pump **10** is mounted on a frame means **11** which is wheel supported as seen in FIG. 1. A support member **13** is secured to frame means **11** (FIG. 1) and a towing bar **15** extends from frame means **11** as also seen in FIG. 1. A conventional gasoline engine **17** is mounted on frame means **11** and has a drive shaft **19** extending therefrom.

Pump **10** includes a pump case **21** having at least one tab portion **23** extending therefrom which is adapted to receive a bolt **25** extending therethrough to facilitate the attachment of case **21** to frame means **11** (FIG. 2). The rearward end of case **21** is open and is adapted to receive a case cover **27** in the manner illustrated in FIG. 2. Cover **27** is secured to case **21** by a plurality of bolts **29** (FIG. 1). Cover **27** has a tapered portion **31** extending therefrom which is adapted to have a suction flange **33** secured thereto by bolts **35**. Seal **37** is positioned between flange **33** and tapered portion **31** (FIG. 2) and a hinge type check valve means **39** is mounted within flange **33**. Check valve means **39** is hinged at its upper end and is adapted to open inwardly with respect to the interior of the pump upon activation thereof and is adapted to close to the position of FIG. 2 when the pump is inoperative. As seen in FIG. 2, the lower end of check valve means **39** abuts against flange **33** to limit the movement thereof in an outward direction with respect to the interior of pump **10**.

Case cover **27** has an inwardly extending throat portion **41** which is in communication with the interior of such flange **33** when check valve means **39** is open. The inner end of throat portion **41** is open, is cylindrical in shape and has a recess **43** formed therein thereby defining a shoulder **45**. A seal **47** of the O-ring type is mounted in throat portion **41** as seen in FIG. 2. The inner end of throat portion **41** extends inwardly beyond the inner end **49** of case cover **27** (FIG. 2). Inner end **49** of case cover **27** is provided with a recess portion **51** thereby defining a shoulder **53**. Recess portion **51** is adapted to receive the outer end **55** of pump case **21** and a seal **57** is positioned therebtween. As previously stated, case cover **27** is secured to case **21** by means of bolts **29**.

The inner end of case **21** is provided with a smooth, flat surface **59** which is ring shaped as illustrated in FIG. 3 and which extends around the open inner end thereof. FIGS. 2 and 3 illustrate the configuration of the inner end of case **21** and is seen to include a main body portion **61** having three raised rib portions **63** extending therefrom to surface **59**. The upper end of main body portion **61** of case **21** is provided with a discharge opening **67** and a discharge flange **69** is secured to case **21** by bolts **71** so that the interior of flange **69** is in communication with opening **67**.

An adapter **73** is secured to engine **17** by bolts **75** (FIG. 1) and includes an inner end **77**, a smooth, flat vertically disposed outer surface **79** and a housing **81** extending therebetween which is provided with a plurality of openings or windows **83**. A lifting bolt **85** is threadably secured to housing **81** to facilitate the transportation of the pump and engine. As seen in FIG. 2, drive shaft **19** extends from engine **17** into the interior of adapter **73**. A plurality of horseshoe shaped shims **87** are positioned between surface **59** of case **21** and surface **79** of adapter **73** and are held in place by bolts **89** which secure adapter **73** and case **21** together. Obviously, any even number of bolts **89** can be utilized but six are preferred with three groups of shims (FIG. 3) being used in conjunction therewith.

A volute **91** with its intake end **93** being received by recess **43** of throat portion **41** is positioned within case **21** and is secured thereto by means of three bolts **95** extending through spaced apart flanges **97** of volute **91** and arm members **63** of case **21**. A flat ring-shaped seal plate **99** is positioned between the end of volute **91** and the inner end of case **21** in the manner illustrated in FIG. 2. As also seen in FIG. 2, volute **91** has a wear plate surface **101** in the interior theerof and also is provided with a priming opening **103** and dischrage opening **104**. An impeller **105** is threadably mounted on the inner end of

drive shaft **19** and is maintained thereon by a locking screw means **107** threadably extending through impeller **105** and engaging the end of shaft **19**. Impeller **105** is provided with a central hub portion **109** having a plurality of impeller vanes **111** radially extending therefrom, each of which have a wear or bearing surface **113** which are closely positioned adjacent wear plate surface **101** of volute **91**. The peripheral surface **117** is positioned closely adjacent the inner end of seal plate **99** and the inner end of case **21** as seen in FIG. 2. A bearing and seal housing **119** embraces shaft **19** laterally of impeller **105** and has a mechanical seal means **121** including rotating portion **123** and stationary portion **125**, bushing **127** and seal **129** embracing shaft **19** as clearly seen in FIG. 2. The periphery **131** of housing **119** is provided with a seal **133** mounted therein which sealably engages case **21** (FIG. 2). Housing **119** is provided with a tapped bore **135** which is adapted to receive a suitable oil or grease fitting (not shown).

Shim **87** has an inner end **137**, an outer end **139** and opposite sides. Shim **87** has a central tab portion **141** extending therefrom at its outer end **139** and is provided with a pair of elongated openings **143** and **145** formed therein and extending into its inner end **137** adjacent its opposite ends. Openings **143** and **145** are adapted to receive adjacent pairs of bolts **89** (FIG. 3) and when so positioned, tab **141** extends outwardly of the inner end of pump case **21** as illustrated in FIGS. 2 and 3.

In operation, suction flange **33** would be threadably secured to a suitable hose or the like which would extend into the fluid to be pumped. Discharge flange **69** would be threadably secured to a suitable hose or the like. The activation of engine **17** will cause drive shaft **19** to be rotated which in turn causes the rotation of impeller means **105** within volute **91**. The wear surfaces **115** on the impeller blades pass in close proximity to the wear plate surfaces **101** on the volute **91** as previously described. The rotation of impeller means **105** causes fluid to be drawn into the interior of suction flange **33**, past check valve means **39**, into the interior of throat portion **41** and then into the interior of volute **91**. The fluid is discharged from volute **91** by means of opening **104** formed therein and the fluid is then dischraged from the pump through a discharge flange **69**. The engagement of the outer end of volute **91** with the recess portion on throat **41** together with the seal **47** positioned therebetween prevents any undesirable communication between the interior of throat portion **41** and chamber **147** in pump case **21**. Seal plate **99** and its relationship to volute **91** prevents leakage between the inner portion of the volute and chamber **147**. The periphery of impeller means **105** through a close clearance to seal plate **99** reduces leakage from the interior of the pump case **21** thus reducing pressure in the seal cavity area behind the impeller. Bolts **95** detachably maintain seal plate **99** in position to prevent any undesirable movement thereof. Seal **133** on housing **119** also aids in preventing leakage from the interior of volute **91** to the exterior of the case **21**. The rotating and stationary seal means on shaft **19** within housing **119** function in conventional fashion to provide a sealing means and to prevent leakage of fluid from the interior of the case **21**. Lock screw **107** is provided to prevent undesirable movement of the impeller means **105** with respect to the drive shaft **19**. Drain plug **149** is threadably secured to the lower end of case cover **31** to permit the fluid within the pump case to be drained if so desired.

After prolonged use, the wear surface **115** on the impeller blades and the wear surface **101** on volute **91** will become worn thereby creating an undesirable clearance therebetween which reduces the efficiency of the pump. This undesirable clearance may be eliminated by simply loosening the nuts on bolt **89** and removing the proper number of shims **87** from each of the three groups of shims which are positioned between case **21** and adapter **73**. Usually, the same number of shims **87** will be removed from each group of shims inasmuch as the wear just described will be substantially even. It can be appreciated that the shims **87** are easily removable inasmuch as tab portions **141** protrude outwardly to facilitate the grasping of the same. The shim **87** is simply moved outwardly with respect to bolts **89** which causes the bolts **89** to disengage with the openings **143** and **145**. Bolts **89** are then retightened and the undesirable clearance is eliminated due to the fact that the tightening of the bolts **89** will draw the pump case **21** towards the impeller means **105**. It may be necessary to loosen bolts **25** to facilitate the slight movement of case **21**.

From time to time it may also be desirable to completely replace the volute **91**, seal plate **99** and the impeller means **105** upon sufficient wear thereof or if the specifications of the pump are to be changed for any reason. The volute seal plate and impeller means may be easily removed due to the unique construction of the pump. Bolts **29** are first removed which permits the the case cover **27** to be removed from the pump thereby providing access to the interior of the pump case **21**. The bolts **95** are then removed which permits the volute **91** and seal plate **99** to be removed from the interior of pump case **21**. Locking screw **107** is removed and the impeller means **105** is threadably removed from the end of drive shaft **19** and removed from the pump case **21**. A new or different impeller means is then secured to shaft **19** and a new or different volute **91** and seal plate **99** is secured to case **21** by re-insertion of the bolts **95**. The case cover **27** is again installed on the pump case **21** by means of bolts **29**. It may be necessary to add more shims **87** so that the impeller means and volute will be properly positioned with respect to each other. The shims are added by simply loosening the nuts on bolts **89** and the shims are simply slidably inserted between case **21** and adapter **73** so that the openings **143** and **145** are received by adjacent bolt members **89** as illustrated in FIG. 3. When the proper number of shims have been inserted, bolts **89** are retightened. Thus, it can be seen that the unique construction of the pump permits easy and rapid disassembly thereof to repair or replace the various components thereof. The unique construction of the pump eliminates the need for core casting of the components which greatly reduces the cost of manufacture thereof. The construction of the pump permits the volute and impeller means therein to be interchanged to replace worn parts or to permit the specifications of the pump to be changed.

The design of the shim elements **87** are extremely important since they permit the insertion without full dismantling of the pump. Heretofore, the pumps utilized gaskets which required the full dismantling of the pump to change the same. Preferably, the shims **87** should be constructed of a suitable steel material. Preferably, impeller means **105**, volute **91**, pump case **21**, case cover **31**, housing **109** and adapter **73** are constructed of a cast iron material. The seal plate **99** is preferably constructed of "core-ten" steel.

Housing **119** is sometimes termed a pump side and it is possible to remove this part by removing the nuts on the four bolts **90** without dismantling the case or discharge piping. The advantage in being able to remove housing **119** is that seal **129** can be replaced without dismantling the pump.

Thus it can be seen that the pump accomplishes at least all of its stated objectives.

Some changes may be made in the construction and arrangement of my pump means without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims, any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

I claim:

1. In a pump,

a first hollow housing having a flange portion,

a hollow case detachably secured to said housing and having first and second open ends and a body portion, a flange portion at said first end positioned adjacent said flange portion on said first housing, said open first end defining a circular wall portion,

said case having a discharge opening formed in its body portion,

a cover secured to said case at its second end and having an intake opening formed therein and a throat portion extending inwardly therefrom towards said second end,

a volute detachably secured to said case in the interior thereof having an intake end in communication with the inner end of said throat portion and having a discharge opening in communication with said discharge opening in said case,

a drive shaft rotatably extending through said first housing into said case from said one end,

an impeller means mounted on said drive shaft in said volute,

a seal plate between said volute and said case first end having a central opening which receives the periphery of said impeller means,

a second housing embracing said drive shaft in said first housing and having a peripheral portion sealably engaging said circular wall portion.

2. The pump of claim **1** wherein said impeller means includes a plurality of blades having a wear surface adapted to rotate closely adjacent a wear surface in said volute and wherein a plurality of shim elements are removably mounted between said flange portion of said first housing and said flange portion on said case to permit the selective adjustment of the clearance between the wear surfaces of said volute and said impeller blades.

3. The pump of claim **2** wherein said case is detachably secured to said first housing by a plurality of bolt members extending therebetween and wherein said shim elements have slots formed therein which are adapted to receive adjacent bolt members therein.

4. The pump of claim **3** wherein said shim elements are each substantially crescent shaped having inner and outer ends, said slots extending inwardly into said shim elements from the inner end thereof, said shim elements each have a tab portion extending from the outer end thereof to facilitate the insertion and removal of said shim elements from between said flanges.

5. The pump of claim **4** wherein said shim elements have a slot formed therein adjacent its opposite ends.

6. The pump of claim **1** wherein a check valve means is operatively secured to said case cover at said intake opening.

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