Feb. 2, 1943. G. A. WAHLMARK 2,309,683

PUMPING UNIT

Filed Oct. 25, 1940 2 Sheets-Sheet 1

Fig. 1

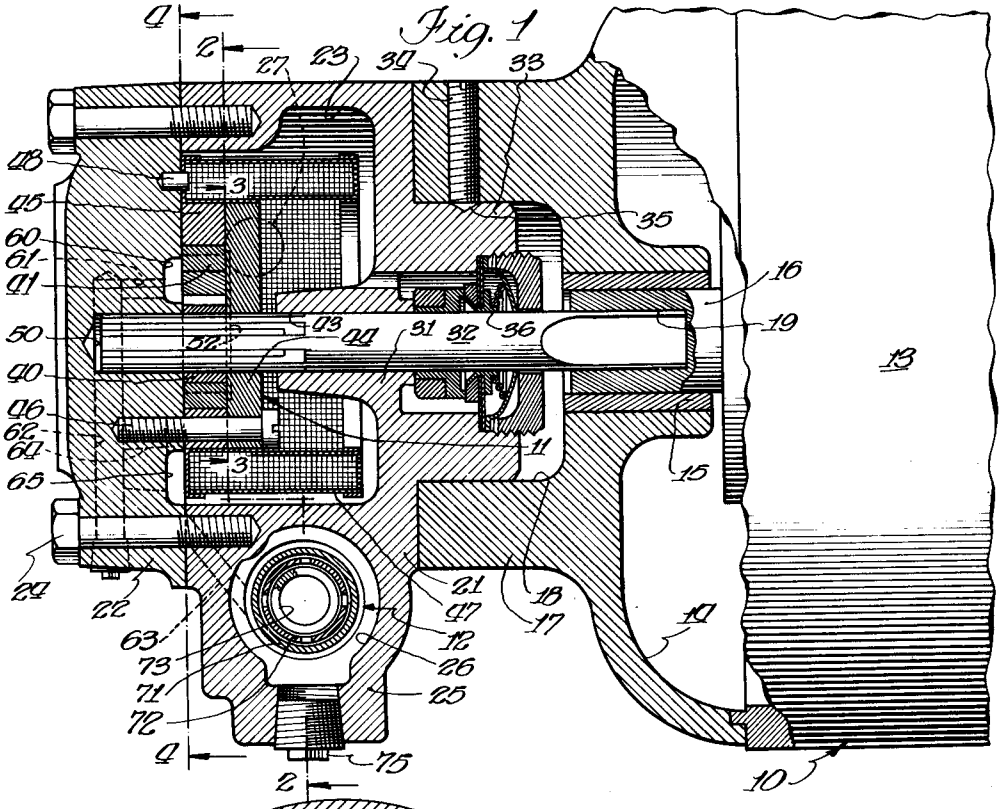


Fig. 2

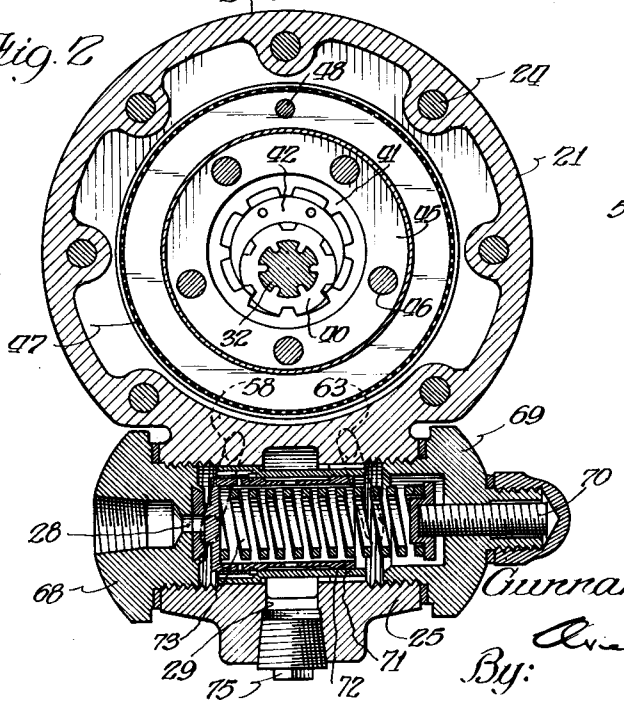
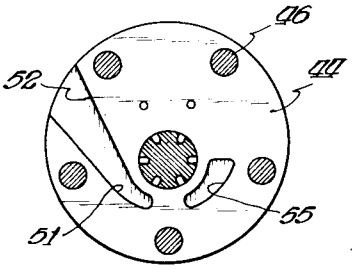


Fig. 3



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PUMPING UNIT

Filed Oct. 25, 1940 2 Sheets-Sheet 2

Fig. 4

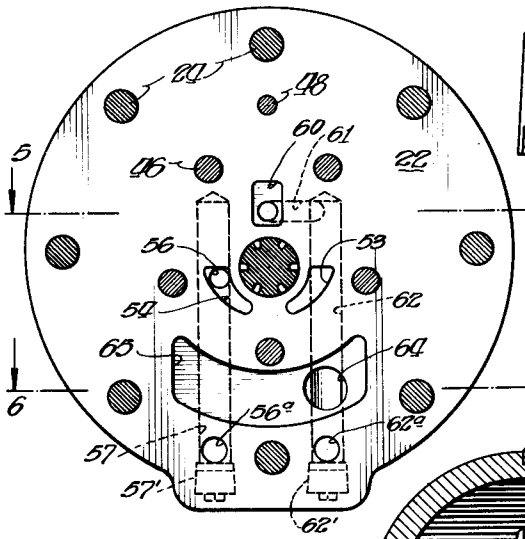


Fig. 5

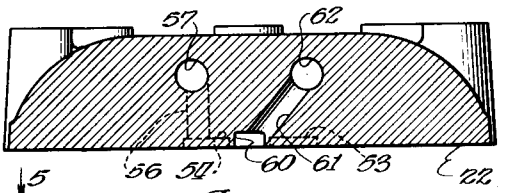
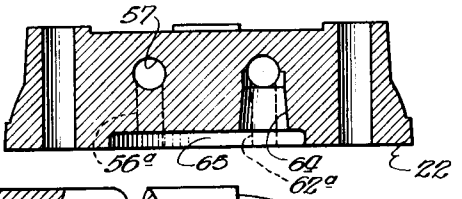


Fig. 6



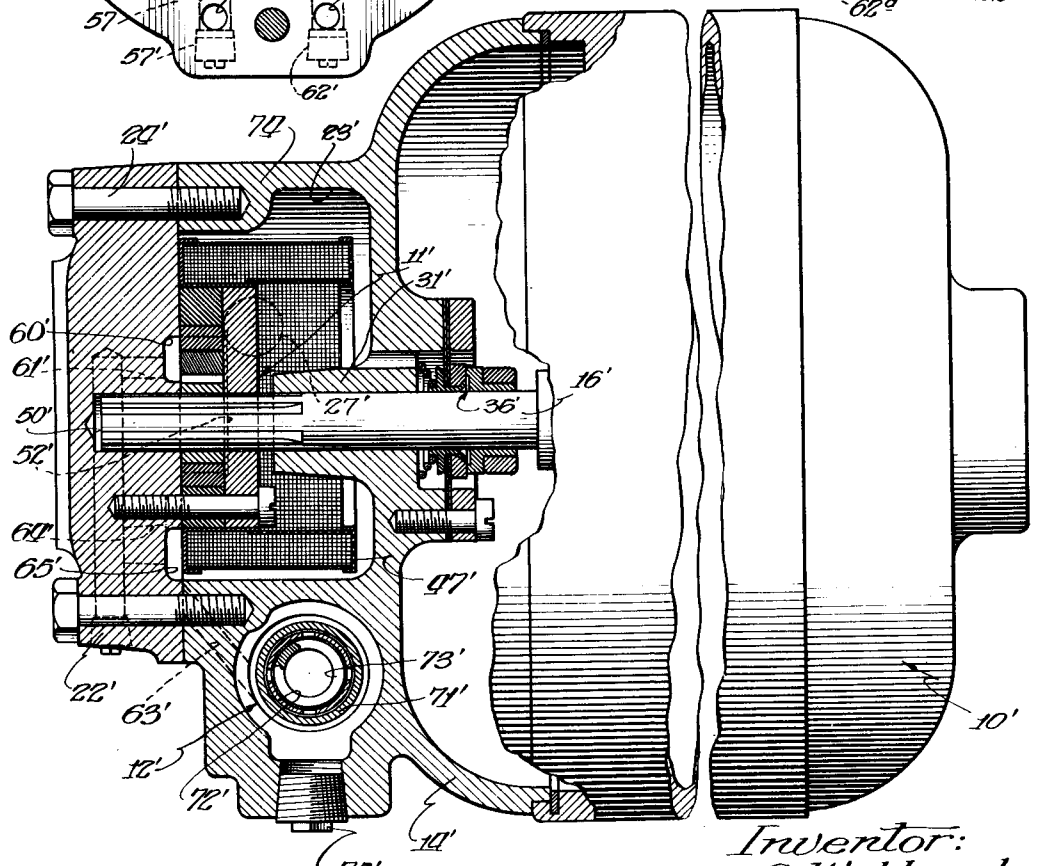


Fig. 7

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Patented Feb. 2, 1943

2,309,683

UNITED STATES PATENT OFFICE

2,309,683

PUMPING UNIT

Gunnar A. Wahlmark, Rockford, Ill.

Application October 25, 1940, Serial No. 362,814

15 Claims. (Cl. 103—42)

The invention relates generally to a pumping unit and more particularly to a unitary structure composed of motor, pump and control valve particularly adapted for supplying fuel oil to oil burners.

One object of the invention is to provide a pumping unit having fewer parts than prior units, thereby to render the unit more economical of manufacture.

Another object is to provide a pumping unit which is extremely compact and, in particular, has a minimum over-all dimension measured parallel with the motor and pump shafts.

Another object is to provide a new and improved pumping unit especially suited to domestic oil burner applications in that it can readily be serviced in the field.

Another object is to provide a new and improved pumping unit designed to permit ready removal of the pump mechanism for inspection or replacement, without loosening or disconnection of conduits and while the pump shaft remains in place and the mechanical seal on the shaft unbroken.

Another object is to provide a pump of the gear type having a removable closure with fluid passages formed in the closure and the pumping elements mounted to be removed with the removal of the closure.

Still another object is to provide a pumping unit composed of a motor and a pump of the gear type in which an outboard bearing is provided for the pump driving shaft in a removable member on which is mounted the pump driven by the shaft.

Yet another object is to provide a pumping unit composed of a motor, a pump of the gear type and a control valve, the pump and valve being constructed as a unit for attachment to or detachment from the motor and for coupling or uncoupling of the pump and motor shafts by simple axial movement.

It is a further object to provide a pumping unit composed of a motor, a pump of the gear type and a control valve in which one bell of the motor housing has formed integral therewith the valve housing and the major part of the pump housing, and in which the motor shaft extends to form the pump shaft.

Other objects and advantages will become apparent from the following detailed description taken in connection with the accompanying drawings, in which:

Fig. 1 is a view partially in diametrical section and partially in elevation of one form of pumping unit embodying the features of the invention.

Fig. 2 is a transverse sectional view taken approximately along the line 2—2 of Fig. 1.

Fig. 3 is a partial transverse sectional view taken approximately along the line 3—3 of Fig. 1.

Fig. 4 is a transverse sectional view taken approximately along the line 4—4 of Fig. 1 and looking in the direction indicated by the arrows.

Fig. 5 is a sectional view taken approximately along the line 5—5 of Fig. 4.

Fig. 6 is a sectional view similar to Fig. 5 but taken along the line 6—6 of Fig. 4.

Fig. 7 is a view similar to Fig. 1 but of a modified form of invention.

While the invention is herein disclosed in a preferred form and one modification thereof, it is not intended that the invention is to be limited thereby to the specific constructions disclosed. On the contrary, it is intended to cover all modifications and alternative constructions falling within the spirit and scope of the invention as defined in the appended claims.

In the forms shown for purposes of disclosure, the pumping unit comprises generally a motor 10, a pump device or means 11, and a discharge control valve mechanism 12. The motor 10 is preferably an electric motor of generally conventional construction having a casing 13 which includes an end closure or bell 14 having a bushing 15 to provide a bearing for the motor shaft 16. For a purpose which will later become apparent, the bell 14 has formed externally thereof a heavy axially extending annular flange 17 forming a recess 18. Also for a purpose which will later become more apparent the shaft 16 terminates flush with or short of the bottom of the recess 18 and has opening through the end thereof a socket 19 which is squared or formed in some other angular shape to enable the same to serve as one part of a driving coupling.

The pump 11 and the discharge control valve mechanism 12 are of the general type disclosed in my copending application for Fluid pumps, Serial No. 212,475, filed June 8, 1938, but improved, among other respects, to permit the pump and the valve mechanism to be readily attached to or detached from the motor 10 as a unit, so that when attached a complete pumping unit is formed. Accordingly, the pump and the valve mechanism are enclosed in a housing composed of two parts 21 and 22. Part 21 of the housing constitutes a main casing member and is generally cup-shaped to provide within it a fuel intake chamber 23, while part 22

is in the form of an end closure or cap removably secured over the open end of the member 21 through the medium of bolts 24. The part 21, as best seen in Fig. 2, is generally cylindrical, but has a depending portion 25 which has a transverse bore 26 formed therein for the reception of the discharge control valve mechanism 12. It is contemplated that the main casing member 21 will have intake ports 27, a discharge port 28, and a return or by-pass port 29. It is to be understood that these ports will be suitably threaded for the reception of conduits by which the pumping unit is connected to the fuel supply tank and to the fuel burner. It will be seen therefore that the pump device and the discharge control valve mechanism are housed in a common housing and form a subunit of the pumping unit.

The closed end of the main casing member 21 has an inwardly extending annular flange 31 forming a bearing in which is rotatably journaled a drive shaft 32 for the pump device 11. At one end this shaft 32 extends outwardly of the main casing member 21 and has its projecting end squared or otherwise angularly shaped to conform with the shaping of the socket 19 so that it may be received axially within the socket 19 and form a driving coupling between the shaft 32 and the shaft 16. Extending outwardly from the closed end of the main casing member 21 is a heavy annular boss 33 of an outer diameter just slightly smaller than the inner diameter of the annular flange 17. The boss 33 may thus be received within the recess 18 in the same axial movement that couples the shaft 32 and the shaft 16. To retain the boss in the recess, there extend radially of the flange 17 a plurality of set screws 34 which engage with notches 35 formed in the outer periphery of the boss 33. Leakage of fluid along the shaft 32 is prevented by a rotary mechanical seal 36 enclosed within the boss 33. The seal is more particularly shown and claimed in my Patent No. 2,216,218, dated October 1, 1940.

The pump device 11 is of the rotary element type with the pumping elements composed of an inner gear 40, an outer internally toothed gear 41 which is mounted eccentrically with respect to the gear 40, and a crescent-shaped guard 42. The inner gear 40 constitutes the driving element and to that end is splined to cooperate with splines 43 formed on the inner end of the shaft 32, the gear thus being held against rotation relative to the shaft but being shiftable axially of the shaft. To reduce the number of parts needed, but primarily to make possible easy and convenient removal of the entire pump device 11 for inspection or repair without disturbing the pipe connections to the main casing member 21, the elements defining the pump chamber in which the pumping elements operate are mounted upon the end closure 22 with the end closure itself forming one end wall of the pump chamber. The opposite end wall is formed by a circular plate 44 which is spaced from the inner face of the end closure 22 by means of an annular ring 45. The circular plate 44 and the annular ring 45 are secured to the end closure by a plurality of bolts 46. Also carried by the end closure 22 is a strainer or screen 47 through which the fuel in the intake chamber 23 must pass before going to the pump device 11. Herein this strainer is shown as annular and is mounted with a tight fit over the ring 45 and the circular plate 44. In order further to secure the strainer, pegs or dowels 48 extending into the end closure 22 may be provided. With the above construction the pump device 11 may be removed as a unit with the closure 22 without disturbing the pipe connections and without disturbing the mechanical seal 36.

In addition to forming one end wall of the pump chamber and a support for the pump device 11 as a whole, the end closure 22 also serves to provide an outboard bearing for the shaft 32 and passages for the supply or discharge of fluid to and from the pump chamber. Accordingly, the closure 22 is formed with a recess 50 in which the splined end of the shaft 32 is received and journaled, the shaft being purposely made of a length to extend completely through the pump chamber and into the end closure 22.

Suitable ports and passages are provided in order that the pump device 11 may draw fluid from the intake chamber 23 and discharge the same under pressure to the discharge control valve mechanism 12 from where it is either discharged through the discharge port 28 or all or a portion by-passed either by direct return to the source through the port 29 or by return to the intake chamber 23. An intake port 51 for the pump device 11 is, as best seen in Figs. 1 and 3, formed in the inner face of the circular plate 44 and comprises a diverging and outwardly extending groove 52 approximately one thirty-second of an inch in depth. This groove opens through the periphery of the plate 44 to the interior of the strainer 47. Supplementing the port 51 is a pocket 53 formed opposite the port 51 in the end closure 22 (see Fig. 4). A discharge port 54 is, as best seen in Fig. 4, formed in the end closure 22 with a supplementary pocket 55 formed opposite it in the circular plate 44. Port 54 communicates with the bore 26 of the valve mechanism through a short horizontal passage 56, a vertical passage 57 and second horizontal passage 56a formed in the end closure 22, and a diagonal passage 58 (see Figs. 1 and 2) formed in the main casing member 21.

Also formed in the end closure 22 is an auxiliary port 60 disposed opposite the crescent-shaped guard 42, in order further to fill the spaces between the teeth of the gears 40 and 41 and render operation of the pump more quiet. This port is also connected to the bore 26 of the valve mechanism, but to a different part thereof, through a diagonal passage 61 (see Figs. 4 and 5), a vertical passage 62 and a horizontal passage 62a in the end closure 22, and a diagonal passage 63 (see Fig. 2). The passages 57 and 62 are conveniently drilled from externally of the end closure 22, and the lower ends of the passages then closed by plugs 57' and 62', respectively. The port 60 also communicates with the intake chamber 23 through the medium of a short passage 64 which opens at one end to the vertical passage 62 and at the other end opens to an arcuate recess 65 formed in the end closure 22 and opening outwardly of the strainer 47.

The discharge control valve mechanism 12, as above stated, is of the general type disclosed in my above mentioned copending application, but is specifically like the valve disclosed and claimed in my copending application Serial No. 346,602, filed July 20, 1940. Reference is made to the last mentioned application for a detailed description of the valve mechanism. Suffice it

to say, therefore, that the bore 26 is closed by end caps 68 and 69, one of which has opening therethrough the discharge port 28, while the other carries an adjusting screw 70. Within the bore is a sleeve 71, and slidable within that sleeve is a piston 72, the closed end of which serves to control discharge through the port 28. Passage 58 opens to the bore 26 between cap 68 and the adjacent end of the sleeve 71, as best seen in Fig. 2, while passage 63 opens to the bore 26 between the cap 69 and the adjacent end of the sleeve 71 and hence is in communication with the interior of the piston through the open end thereof. The fluid under pressure, which is supplied to the bore 26 through the passage 58, acts on the closed end of the piston and tends to shift the same for the purpose of opening the port 28 against the reaction of a compression spring 73 bearing at one end against the adjusting screw 70 and at the other end against the head of the piston internally thereof. Suitable ports and passages are provided in the sleeve 71 and the piston 72, so that after the piston has been shifted a predetermined extent communication is effected to a greater or less degree, depending upon the extent of shift of the piston, between the interior of the piston and the passage 58, thereby permitting excess fluid to be by-passed. While this by-passed fluid may be permitted to flow through port 29 and return directly to the source, preferably port 29 is closed by a suitable plug 75 causing the by-passed fluid to flow through the passage 63 into the intake chamber 23.

In the modified form shown in Fig. 7, there is disclosed an electric motor 10', like the motor 10, and having a shaft 16' and a casing including an end closure or bell 14'. Also disclosed is a housing for the pump device 11' and the valve mechanism 12' which is a two-part housing. One of the parts, namely, the end closure or cap 22' is identical with the end closure of the first form. The other part, which is herein designated 74, is generally similar to the part 21 in that it is cup-shaped and provides an intake chamber 23', but is dissimilar in that it is formed as an integral part of the bell 14' and is devoid of the boss 33. In view of this modification, the shaft 16' is extended so as to form the driving shaft for the pumping device 11', completely eliminating the shaft 32 of the first form. The casing part 74 still has an axially and inwardly extending annular flange 31' forming a bearing for the shaft 16' and the end closure 22' is still formed with a recess 50' in which the splined end of the shaft 16' is received to form an outboard bearing therefor. In other respects the construction of Fig. 7 is identical with that of Figs. 1 to 6, and, for purposes of more readily understanding, like parts have been given the same reference character plus a prime, even though such parts have not been specifically mentioned in the description of the form of pumping unit shown in Fig. 7.

It is believed apparent from the foregoing description that I have perfected a pumping unit which has many advantages both from a manufacturing and from an installation service standpoint. My pumping unit is extremely compact, particularly has it a minimum length in its axial dimension. Manufacturing cost is reduced by the elimination of the element which heretofore formed one wall of the pump chamber, and which is herein displaced by the end closure 22, and by reduced number of machining operations, particularly the elimination of the necessity of machining the main casing member 21 internally. Mounting of the pump device 11 together with the strainer 47 on the end closure and making the same removable with the end closure, greatly facilitates inspection, repair or cleaning of the pump unit, while at the same time this construction makes possible the provision of an outboard bearing for the drive shaft for the pump device and thus improves operation and prolongs the life of the pumping unit. It is also to be noted that though the end closure 22 is employed to provide certain ports and passages, the entire pump device may be removed either for repair or replacement without disturbing the external conduit connections. In the form disclosed in Figs. 1 to 6, the complete pump device and control valve unit is readily attached to or detached from the driving motor in a most simple manner involving only relative axial movement between the motor and the unit housing, and the tightening or loosening of a few set screws.

I claim as my invention:

1. A pump of the rotary element type comprising a pump housing including a main casing member forming an intake chamber and having an open end and a removable closure for the open end of said main casing member, means carried by said end closure and forming therewith a pump chamber, rotary pump elements mounted in said pump chamber, a shaft for driving said pump elements, a fluid intake port and a fluid discharge port leading to and from said pump chamber, and an auxiliary intake port formed in said end closure for supplying additional fluid to the pump elements intermediate the intake and discharge ports.

2. A pump of the rotary element type comprising a main casing member forming an intake chamber and having an open end and fluid intake and discharge ports adapted for the connection of external conduits thereto, a removable closure for the open end of said main casing member, means forming a pump chamber, rotary pump elements mounted in said pump chamber, a shaft for driving said pump elements journaled in and projecting through said main casing member, said shaft being splined at its inner end to permit movement of the pump elements longitudinally thereof while having a rotary driving engagement therewith, and a rotary seal for said shaft, said pump chamber forming means being mounted on said end closure for removal as a unit therewith without disturbing the external conduit connections to said main casing member or the seal for the shaft.

3. A pump of the rotary element type comprising a pump housing including a main casing member having a cup-shaped recess therein opening through one end thereof, a fluid supply port communicating directly with the recess and a discharge port, both ports being adapted for connection of external conduits of a fluid circuit to make said main casing member a substantially permanent part of the circuit, and a removable closure for the open end of said main casing member, chamber forming means mounted on the inner face of said closure to be disposed within said recess when the closure is in position and to be removable with the closure as an incident thereto and without disturbing said main casing member or its connections with the conduits, an intake and an exhaust port in said chamber forming means, passages in said removable closure and in said main casing mem-

ber operable when said closure is in position to complete communication between said intake port and said recess, and between said exhaust port and said discharge port, rotary pump elements mounted within said chamber forming means and removable from within said recess simultaneously with said end closure and with said chamber forming means, a bearing formed in the closed end of said main casing member, and a shaft for driving said pump elements journaled in said bearing and projecting into said chamber forming means, said shaft at its end projecting into said chamber forming means having splines to permit movement of the pump elements longitudinally thereof while having a rotary driving engagement therewith.

4. A pump of the rotary element type comprising a normally stationary main casing member having a cup-shaped recess, a fluid intake port communicating with said recess, and a fluid discharge port, both ports being adapted for the connection of external conduits thereto, a removable closure for the open end of said main casing member, chamber forming means mounted on the inner face of said end closure to be disposed within said recess when the closure is in position and to be removable with the closure as an incident thereto and without disturbing said main casing member or said external conduits, rotary pump elements mounted within said chamber forming means and removable from within said recess simultaneously with said end closure and with said chamber forming means, a bearing formed in the closed end of said main casing member, and a shaft for driving said pump elements journaled in said bearing and projecting into said chamber forming means, said shaft at its end projecting into said chamber forming means having splines to permit movement of the pump elements longitudinally thereof while having a rotary driving engagement therewith.

5. A pump of the rotary element type comprising a pump housing including a main casing member having a recess therein opening through one end thereof and ports for attachment to external conduits of a fluid circuit to make said main casing member a substantially permanent part of the circuit and a removable closure for the open end of said main casing member, chamber forming means mounted on the inner face of said end closure to be disposed within said recess when the closure is in position and to be removable with the closure as an incident thereto and without disturbing said main casing or its connection with the circuit conduits, passages in said removable closure and in said main casing member registering when said closure is in position to complete communication between said chamber forming means and said ports, rotary pump elements mounted within said chamber forming means and removable from within said recess simultaneously with said end closure and with said chamber forming means, and a shaft projecting within said chamber forming means and having a driving engagement with at least one of said rotary pump elements for driving said pump elements.

6. A pump of the rotary element type comprising a pump housing including a first casing member having formed therein a plurality of ports for attachment to external conduits of a fluid circuit to become a substantially permanent part of the circuit and a second casing member removably secured to said first casing member, chamber forming means carried by said second casing member to be disposed within the housing formed when said members are assembled and to be removable with the second casing member as an incident to removal thereof and without disturbing said first casing member or its connection to the conduits, passages in said second casing member and in said first casing member registering when said casing members are assembled to complete communication between said chamber forming means and said ports, rotary pump elements mounted within said chamber forming means, a bearing in said first casing member, a shaft journaled in said bearing and projecting into said chamber forming means, said shaft at its end projecting into said chamber forming means having splines to permit movement of the pump elements longitudinally thereof while having a rotary driving engagement therewith, and a rotary seal for said shaft.

7. A pump of the rotary element type comprising a pump housing including a first casing member having formed therein a plurality of ports for attachment to external conduits of a fluid circuit to become a substantially permanent part of the circuit and a second casing member removably secured to said first casing member, chamber forming means carried by said second casing member to be disposed within the housing formed when said members are assembled and to be removable with the second casing member as an incident to removal thereof and without disturbing said first casing member or its connection to the conduits, passages in said second casing member and in said first casing member registering when said casing members are assembled to complete communication between said chamber forming means and said ports, rotary pump elements mounted within said chamber forming means, a bearing in said first casing member, a shaft journaled in said bearing and projecting outwardly of said housing at one end for connection to a source of power and at its other end projecting through said chamber forming means, said shaft at its end projecting through said chamber forming means having splines to permit movement of the pump elements longitudinally thereof while having a rotary driving engagement therewith, and a recess in the inner face of said second casing member in which the splined end of said shaft is received to form an outboard bearing for said shaft when said second member is attached to said first member.

8. A pumping unit comprising a motor, a pump housing including a first casing member having ports therein for attachment to external conduits of a fluid circuit to make said first casing member a substantially permanent part of the circuit, and a second casing member removably attached to said first casing member to complete the pump housing, a pump device having rotary pump elements mounted on said second casing member to be disposed within the pump housing when the members are assembled and to be removable as an incident to removal of said second casing member and without disturbing said first casing member or its connections to the circuit conduits, a rotary shaft driven by said motor for driving said pump device journaled in said first casing member and having a splined end projecting through said pump device for rotary driving engagement with one of the pump elements while permitting axial movement for removal of said

second casing member and said pump device as a unit without disturbing said shaft or said first casing member, and a recess in the inner face of said second casing member in which the splined end of said shaft is received to form an outboard bearing for said shaft when said second member is attached to said first member.

9. A pumping unit comprising a motor, a pump housing including a first normally stationary casing part having a cup-shaped recess and a second casing part in the form of an end closure removably attached to said first casing part, a pump device having rotary pump elements, mounted on the inner face of said second casing part removable as an incident to removal of said second casing part and without disturbing said first casing part, a rotary shaft driven by said motor for driving said pump device journalled in said first casing part and having a splined end projecting through said pump device for rotary driving engagement with one of the pump elements while permitting axial movement for removal of said second casing part and said pump device as a unit without disturbing said shaft or said first casing part, a rotary seal for said shaft mounted in said first casing part, and a recess in the inner face of said second casing part in which the splined end of said shaft is received to form an outboard bearing for said shaft when said second part is attached to said first part.

10. A pumping unit comprising a pump housing including a first casing member having ports formed therein for attachment to external conduits of a fluid circuit to make said first casing member a substantially permanent part of the circuit, and a second casing member removably attached to said first casing member and when attached completing the pump housing, a pump device carried by said second casing member to be disposed within the pump housing when the members are asembled and to be removable with the second casing member as an incident to removal thereof and without disturbing said first casing member or its connections with the circuit conduits, passages in said second casing member and in said first casing member functioning when said members are assembled to complete communication between said pump device and said ports, a motor for driving said pump device, a casing for said motor including a removable end bell, said pump housing being supported by said removable end bell, and a shaft driven by said motor projecting through said end bell and having a driving connection with said pump device disengageable by movement of said pump device axially of said shaft.

11. A pumping unit comprising a motor, a casing for the motor including a removable end bell having a bearing centrally thereof, a pump housing including a first casing member integral with the removable end bell of said motor casing and having ports formed therein for attachment to external conduits of a fluid circuit to make said first casing member and said end bell substantially permanent parts of the circuit, and a second casing member removably attached to said first casing member and completing the pump housing, a pump device mounted on said second casing member to be enclosed within the pump housing when the members are assembled and to be removable with said second casing member as an incident to removal thereof and without disturbing said first casing member or its connections to the circuit conduits, passages in said second casing member or parts carried thereby and in said first casing member functioning when said members are assembled to complete communication between said pump device and said ports, and a shaft journaled in the bearing in said first casing member and having driven engagement with said motor and driving engagement with said pump device disengageable by movement of the pump device axially of the shaft as an incident to disengagement of said second casing member from said first casing member.

12. A pumping unit comprising a motor, a casing for the motor including a removable end bell having a bearing centrally thereof, a generally annular axially extending flange integral with said end bell providing a recess forming a fluid intake chamber, an intake port opening through said flange for direct communication with the chamber, a discharge port, both ports being adapted for attachment to external conduits of a fluid circuit to make said first casing member and said end well substantially permanent parts of the circuit, a closure member removably attached over the open end of said flange to complete with the flange a pump housing, a pump device mounted on the inner face of said end closure to be enclosed within the pump housing when the closure is in position and to be removable with said closure as an incident to removal thereof and without disturbing said annular flange or its connections to the circuit conduits, an intake port for the pump device communicating with the intake chamber, an exhaust port for the pump device, passages in said end closure and in said annular flange registering when the closure is in position to complete communication between the exhaust port of said pump device and said discharge port, and a shaft driven by said motor projecting through and journaled in the bearing in said end bell and having a driving engagement with said pump device disengageable by movement of the pump device axially of the shaft as an incident to disengagement of said end closure from said annular flange and end bell.

13. A pumping unit comprising a pump housing including a first casing member having ports formed therein for attachment to external conduits of a fluid circuit to make said first casing member a substantially permanent part of the circuit, and a second casing member removably attached to said first casing member and when attached completing the pump housing, a pump device carried by said second casing member to be disposed within the pump housing when the members are assembled and to be removable with the second casing member as an incident to removal thereof and without disturbing said first casing member or its connections with the circuit conduits, passages in said second casing member and in said first casing member functioning when said members are assembled to complete communication between said pump device and said ports, a motor for driving said pump device, a casing for said motor including an end bell, cooperating means on said end bell and on said first casing member engageable to couple said motor and said pump housing as a unit and to permit uncoupling and removal of said motor without disturbing said first casing member or its connections with the circuit conduits, and a shaft driven by said motor projecting through said end bell into the pump housing and having a driving connection with said pump device disengageable by relative movement axially of said shaft.

14. A pumping unit comprising a pump housing

including a first casing member having ports formed therein for attachment to external conduits of a fluid circuit to make said first casing member a substantially permanent part of the circuit, and a second casing member removably attached to said first casing member and when attached completing the pump housing, a pump device carried by said second casing member to be disposed within the pump housing when the members are assembled and to be removable with the second casing member as an incident to removal thereof and without disturbing said first casing member or its connections with the circuit conduits, passages in said second casing member and in said first casing member functioning when said members are assembled to complete communication between said pump device and said ports, a motor for driving said pump device, a casing for said motor including an end bell having an annular axially extending flange forming a recess, an annular boss on said first casing member adapted to be received within the recess in said end bell, means for securing said boss in said recess to couple said end bell and said pump housing into a unit and releasing said annular boss to permit disconnection and removal of said motor by axial withdrawal without disturbing said first casing member or its connections with the circuit conduits, and a shaft driven by said motor projecting through said end bell and said annular boss and having a driving connection with said pump device disengageable by relative movement of said pump device and said shaft axially of said shaft.

15. A pumping unit comprising a pump housing including a first casing member having a cup-shaped recess therein opening through one end thereof, a bearing formed in the closed end of said member and ports for attachment to external conduits of a fluid circuit to make said first casing member a substantially permanent part of the circuit, an annular boss projecting axially outwardly from the closed end of said member concentrically with the bearing and a second casing member removably attached to said first casing member to form an end closure therefor, a pump device carried by said second casing member on its inner surface to be disposed within the pump housing when said second casing member is in position and to be removable with the second casing member as an incident to removal thereof and without disturbing said first casing member or its connections with the circuit conduits, passages in said second casing member and in said first casing member functioning when said members are assembled to complete communication between said pump device and said ports, a shaft journaled in the bearing in said first casing member projecting at one end outwardly through and beyond said annular boss and projecting at the other end into said pump device and having a driving connection therewith disengageable by movement of said pump device axially of said shaft as an incident to removal of said second casing member, a motor for driving said pump device having a shaft constructed drivingly to be coupled with said first mentioned shaft by relative axial movement of the shafts toward one another, a casing for said motor including an end bell providing a bearing for said motor shaft and having a recess for the reception of the annular boss on said first casing member to permit assembly or disassembly of said motor and said pump housing without disturbing said first casing member or its connections with the external conduits.

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