June 28, 1932. M. J. GOLDBERG 1,865,000

PUMPING MEANS

Filed Nov. 30, 1928 2 Sheets-Sheet 1

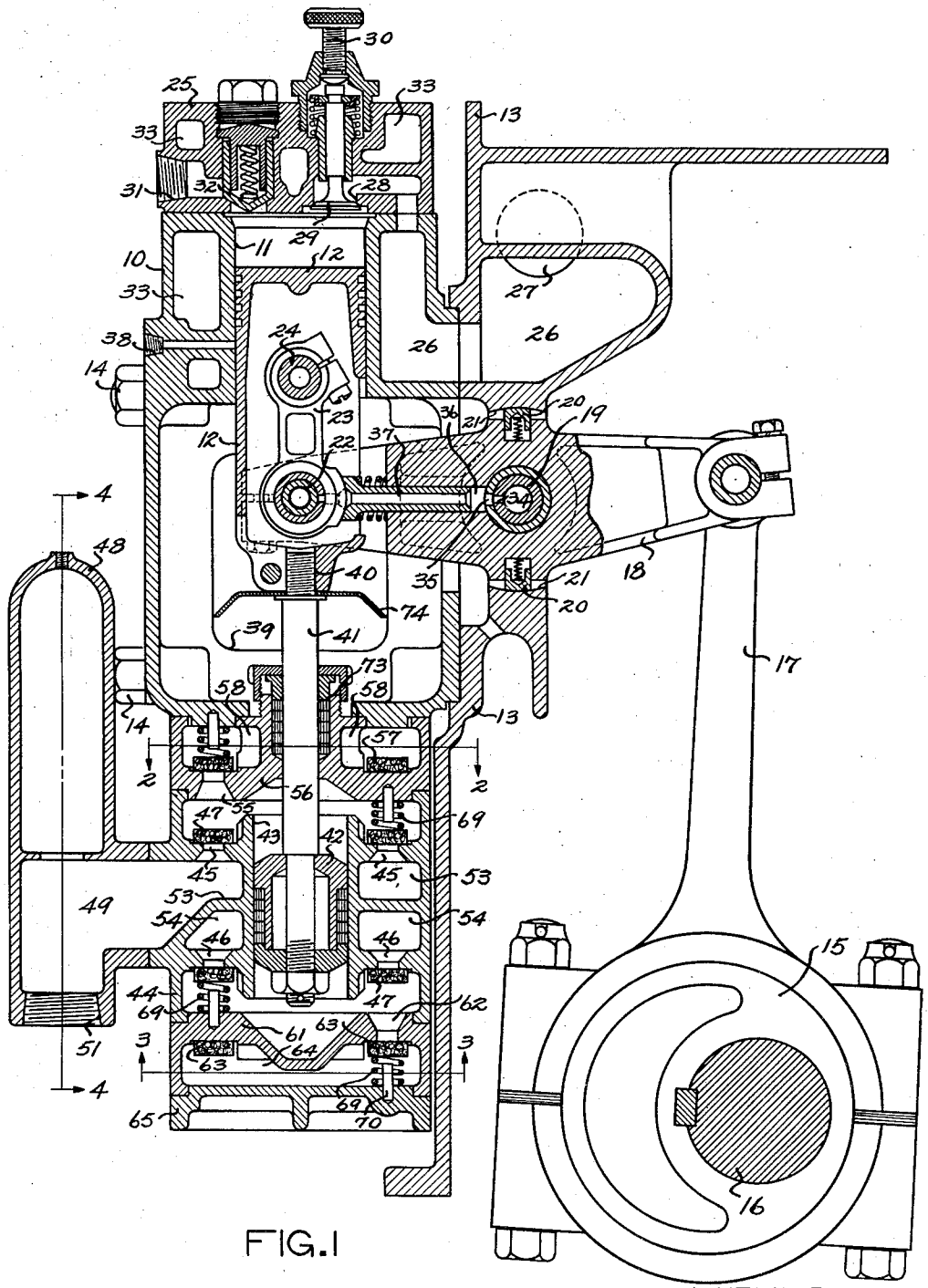


FIG. 1

INVENTOR
MORRIS J. GOLDBERG

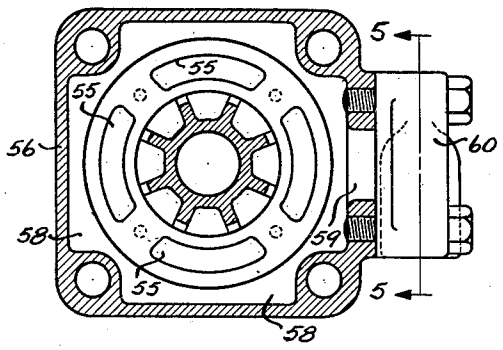
BY Roy M. Eiers
ATTORNEY

June 28, 1932. M. J. GOLDBERG 1,865,000

PUMPING MEANS

Filed Nov. 30, 1928 2 Sheets-Sheet 2

FIG. 2



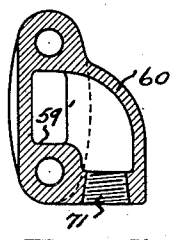
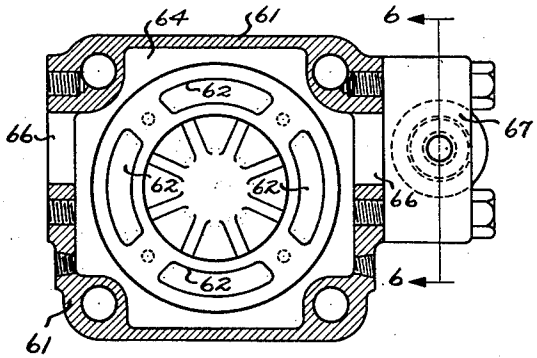


FIG. 5

FIG. 3



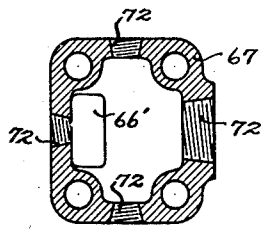
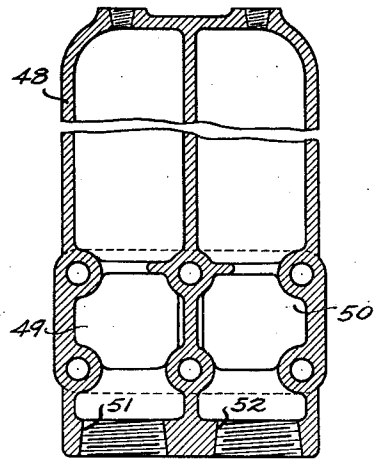


FIG. 6

FIG. 4



INVENTOR
MORRIS J. GOLDBERG
BY
Roy M. Eilers
ATTORNEY

Patented June 28, 1932 1,865,000

UNITED STATES PATENT OFFICE

MORRIS J. GOLDBERG, OF BELOIT, WISCONSIN, ASSIGNOR TO FAIRBANKS, MORSE & CO., OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

PUMPING MEANS

Application filed November 30, 1928. Serial No. 322,931.

This invention relates to improvements in pumping means, and particularly to an improved arrangement, combination and construction of accessory pumps of the types used with internal combustion engines.

An object of the present invention is to provide an improved accessory pump assembly, which is neat and compact in arrangement, which will provide for a maximum ease of assembly, and which is economical to construct and maintain.

A further object of the invention is an improved provision for arranging a plurality of displacement pumps operatively associated with a common piston, by which means it is possible to effect a movement of a plurality of different fluids in distinct and separate pump passages, such movement of the fluids being obtained without admixture.

A still further object of the invention is to provide an improved construction of valve means in accessory pumps, by which a full suction and discharge of fluid is possible by a comparatively slight lift of the valve mechanism.

An additional object is to provide an improved accessory pump assembly arranged to form a unitary, removable structure, constituting a plurality of replaceable sections, each of the sections, or the entire structure, being removable from and replaceable on the engine, as a unit.

Further objects and advantages will appear from the following detailed description of parts and the accompanying drawings, in which Fig. 1 is a sectional elevation of the preferred accessory pump assembly; Fig. 2 is a section taken along the line 2—2 in Fig. 1, and showing the preferred form of pump discharge chamber; Fig. 3 is a section taken along the line 3—3 in Fig. 1; Fig. 4 is a section taken along the line 4—4 in Fig. 1 and showing the preferred form and arrangement of the pump-suction supply chamber; Fig. 5 is a section taken along the line 5—5 in Fig. 2; Fig. 6 is a section taken along the line 6—6 in Fig. 3.

It will, of course, be understood that the present description of parts and the accompanying drawings, relate to a single preferred executional embodiment of the present invention, and that substantial changes in the described arrangement, combination and construction of the parts, may be made without departing from the spirit and full scope of this invention.

In order better to coordinate the pump operations and for ease of description, the example illustrated constitutes an air compressor, in combination with bilge and circulating cooling-water pumps, adapted for use with a water-cooled internal combustion, marine engine. It will, of course, be understood that the particular described use, and the arrangement of the various pump units, may be altered; as each may function as a separate pump that may be used for any particular pumping operation.

Referring by numerals to the drawings, the body structure 10 is preferably formed as a one-piece frame structure, provided with a bore forming a cylinder 11, in which operates a piston 12. The body 10 is detachably mounted to the engine-frame 13 by means of bolts 14. An eccentric 15 is keyed or otherwise secured to a rotatable engine shaft 16, in order to actuate a link 17 pivoted to one end of a rocker 18. The rocker is pivoted at 19 to the engine frame, and at the point of extending through the frame, is provided with spring-pressed packing elements 20, slidably secured against the surfaces 21 formed in the engine frame 13. The opposite end of the rocker 18 is connected by a pin 22 to connecting rod 23, which is, in turn, pivotally mounted on the piston pin 24. By this mode of construction, the rotation of the engine shaft 16, and the actuation thereby of its connected parts, produces a true straight-line reciprocating movement of the piston 12, which, in the present example, constitutes with the cylinder 11 and related parts, an air compressor.

The air passages to and from cylinder 11 are formed in the body 10 and in the cylinder head 25. The intake air passage 26 is formed partially in the engine-frame 13 and partly in the body structure 10, and receives intake air through the opening 27, which is, by preference, located between the engine-frame 13

and the body structure 10 in order to muffle, effectively, any noise incident to the suction impulses. Air is taken into the cylinder 11 from air passage or chamber 26, through an intake port 28, which is closed by a spring-pressed suction valve 29, which may be of conventional construction. The action of the suction valve 29 is subject to regulation by means of adjusting screw 30, which increases or decreases the spring tension on the valve, and thus controls the suction. The compressed air is discharged into an outlet chamber 31, by the lifting of the spring loaded discharge valve 32, which controls the passage of compressed air from the cylinder 11 to the chamber 31, whence it may be distributed to a receiver, or utilized as required.

The air passages and air cylinder are water cooled by water-jackets 33.

Lubrication of the compressor and associated mechanism is effected by introducing a supply of oil through opening 34 in the rocker pivot pin 19, from which location the oil flows through an opening 35 into a reservoir 36, formed in the rocker 18. A telescoping tube 37 is slidably mounted in the reservoir, and the oil is directed through the tube, from the reservoir 36, to lubricate the pin 22. The compressor piston 12 is, preferably, lubricated by means of oil supplied through the passage 38 formed in the body 10; this same source of lubricant being sufficient to care for the lubrication requirements of the piston pin 24.

The entire compressor assembly is rendered removable as a unit from the engine-frame 13, by the removal of the bolts 14, and by disconnecting the rocker 18, which is made possible by the ready accessibility to these parts through the opening 39 formed in the body 10. By the above described construction, the parts are easily assembled and adjusted, and are economical to construct and maintain.

One end of the body 10 is adapted to carry, in detachable engagement, an assembly comprising a plurality of pumps, which by way of illustration, will be referred to as a combined bilge- and circulating-water pump. This assembly is formed in separate removable and replaceable sections, as will hereinafter be more fully described.

The piston 12 is provided with a threaded recess portion 40, for threaded engagement with a pump piston rod 41 which is associated with a piston 42, common to, and serving both the circulating-water and bilge pumps. The movement of the piston 12 is transferred to the piston 42 through the rod 41. The piston 42 operates in a cylinder 43 formed in section 44 of the assembly, in which are also formed suction valve ports 45 and 46. The suction valve ports 45 or 46, prererably consist of annular, slotted openings, similar to the discharge ports shown in Fig. 2, and hereinafter described. Improved spring-pressed annular valves 47, formed preferably of a fibrous material, or the like, provide a closure for each of the valve ports 45 and 46.

The fluid supply to the pumps identified with cylinder 43, is provided through a chambered intake equalizing enclosure 48, which comprises separate compartments 49 and 50. As best seen in Fig. 4, the separate supply pipes, for example the bilge suction and the circulating-water suction pipes, are adapted to be connected respectively to the threaded openings 51 and 52. Each connected supply pipe may be interconnected to a separate and distinct source of fluid supply. The bilge water intake or supply, flows to the annular passage 53, whence it is drawn through the suction port 45 into the cylinder 43. Likewise, the circulating water supply is drawn into the annular passage 54 from which point it is conducted through the port 46, thence into the cylinder 43.

The discharge ports and passages, are, by preference, formed in separate sections for each pump. By way of illustration, discharge ports 55 are provided for the bilge, in the section 56 (best seen in Fig. 2), which is removably attached to the body 10. The ports 55 are preferably annular slotted openings, and are arranged to be closed by spring-pressed annular valves 57, similar in form to the suction valves 47, described above. The bilge pump discharge passes through these valves into a chamber 58 formed partially in the section and partly in the body 10, from which chamber the water is led through an opening 59 in the section 56 (see Figs. 2 and 5), and a registering opening 59′ in a fitting 60, whence it is to be piped to any desired location, through an opening 71.

The circulating water discharge ports and passages, are formed in a section 61. The discharge ports 62, (best seen in Fig. 3), are similar in construction to the described ports 55, and are controlled by valves 63. The pump discharge of circulating water is conducted through ports 62 into a chamber 64 formed in the section 61 and enclosed by a head section 65. The water passes from the last named chamber through an opening 66 formed in the section 61 and a registering opening 66′ in a fitting 67, from where the pump discharge may be piped to the cooling-system of the engine, or to other desired locations. The fitting 67 is provided with various openings 72 to which pipes may be threaded to deliver the discharge of circulating water to different locations. Such of these openings as are not in use, may be plugged.

The various sections described, such as 44, 48, 56, 61 and 65 are adapted to be related to form a unitary assembly, such assembly being removable as a whole from the engine frame, and the several sections being removable from

the body 10. By this mode of construction, it is possible to effect a neat and compact structure which is economical to construct and assemble, and which facilitates any necessary service and repairs.

The particular valve assembly illustrated is regarded as novel, in that it provides a compact mechanism operable in a limited space. All of the valves illustrated are shown, for the sake of uniformity as being of similar construction, in that each of the annular valve rings is formed of a fibrous or non-metallic material, and each valve is actuated against a group of spaced springs 69, guided in their travel by guide pins 70, and adapted to urge each of the valves toward closed position.

The operation of the pumps from a common driving shaft of the engine will be apparent from the preceding description of parts, and their relation. The rotation of the engine shaft 16 actuates one end of the rocker 18, which transmits a straight line motion to the piston 12, through the rod 23. Motion of the piston 12 is transferred to the piston 42 by reason of the driving connection between connecting rod 41 and the piston 12.

It will be seen that the actuation of the piston 42, produces the requisite motion for operating the described plurality of liquid-displacing pumps, and permits each pump to function as a separate mechanism, complete in itself, except for a common piston 42. The point of entrance of rod 41, for combined operation of the two liquid pumps, into section 56, is maintained water-tight by a stuffing box 73. Any excess lubricating oil from the compressor is prevented from creeping along the rod, and entering the water chamber by means of a deflector or umbrella 74, detachably mounted on the rod 41.

It will readily be seen that the described assembly forms a neat and compact arrangement, which provides ease in manufacture and assembling, and which provides an accumulation of pumping units, readily adaptable to any type or condition of service. Further, the particular types of pumps illustrated may be used for any plurality of pumping operations, and need not be restricted to the described combination of bilge, circulating and compressor pumps illustrated and described herein.

It will be further seen that the combined pump assembly, makes possible the pumping of two distinct and different fluids without admixture, by a common piston. This unique arrangement eliminates the use of separate accessory units for each class of fluid to be handled. Further, the improved arrangement and combination utilizes a limited amount of available space, to house a plurality of separate, distinct operating units.

I claim as my invention:

1. In a pump assembly, a pump body of sectional construction, a pair of aligned, rigidly connected pistons, a pair of aligned cylinders therefor, constituted by spaced sections of the assembly, an intake valve and an associated discharge valve, said valves being operatively related with one of said pistons, and one of said valves carried by a section disposed between the cylinder sections, and a second intake and discharge valve assembly carried in part by a section near one end of the assembly and operatively related to the other piston, said second valve assembly being out of communication with the first named set of valves, and piston-operating means including a rocker pivoted without, and extending within the pump body.

2. In a pump assembly including a pump body built up of sectional units, a piston, a sectional unit forming a cylinder for said piston, intake and discharge valve assemblies disposed at opposite ends of said cylinder, a valve section disposed at each end of the cylinder section, separate fluid passages in the end and cylinder sections, leading to and from the respective valve assemblies, whereby the pump is adapted simultaneously to displace, without admixture, a plurality of liquids, a unitary chambered member carried laterally of the cylinder section, and forming separate intake equalizing chambers for each of the liquids displaced by the pump, means including another of said sectional units, forming an air compressor, aligned with said cylinder, and means for concurrently operating said compressor and said piston, including a rocker extending within the compressor section.

3. In a pump adapted to displace, conjointly, a plurality of fluids, and formed of a plurality of sectional units, one of said units constituting a cylinder, a piston in said cylinder, common to the fluids to be displaced, and intake and discharge valve assemblies for each of said fluids, each of said valve assemblies including an annular valve chamber formed in part by a separable sectional unit of even sectional dimensions with the cylinder unit, and forming an end portion of the cylinder, and an annular valve disposed in each of said valve chambers.

4. In a pump assembly adapted conjointly to displace a plurality of liquids, an intake and discharge valve assembly for each of the liquids to be displaced, means forming separate induction and discharge conduits for the separate liquids, and a housing of unitary construction connected to the intakes for the several fluids, said housing having therein a plurality of separate intake equalizing chambers.

5. In an assembly adapted for conjointly pumping a plurality of liquids, a built-up pump body consisting of a plurality of assembled sections, including a cylinder section, a piston in said cylinder section and

means for operating the piston; valve sections, comprising valve assemblies disposed at opposite ends of the cylinder section and removable end closure members disposed adjacent the valve sections, means forming in said cylinder and valve sections a plurality of separate liquid passages whereby said pump is adapted to displace, conjointly, a plurality of liquids.

6. A plural pump accessory unit for internal combustion engines including a housing formed of stacked sections, one thereof detachably secured to the engine with which the unit is used, and other of the sections being carried by said one section, an air compressor at one end of the unit, a pump cylinder for liquids, near the other end of the unit, a piston operating in the liquid pumping cylinder, means for conjointly actuating said air compressor and liquid pistons from the related engine, said means including a reciprocating drive member extending within the housing, a plurality of liquid intake and discharge valve assemblies, there being one of such assemblies for each of the liquids to be handled by the unit, and a plurality of separate intake and discharge channels collectively formed by the stacked sections, and adapted conjointly to conduct a plurality of separate liquids through the pumping unit, said channels being in communicating relation with said liquid pumping cylinder, whereby the piston therein is adapted simultaneously to displace a plurality of liquids.

7. The structural combination as an engine accessory pump, of an air compressor, a pumping unit adapted simultaneously to displace a plurality of liquids, and a plurality of detachably connected, stacked sections, collectively constituting an enclosure common to the moving parts of the compressor and pumping unit.

8. The structural combination with an internal combustion engine, of an accessory unit comprising an air compressor including a piston and a piston rod, a liquid pump including a piston, aligned with and fixedly secured to said compressor piston, means for actuating said compressor piston, conducting means, adapted upon operation of the liquid piston, to handle a plurality of separate fluids; and an enclosing casing common to said air compressor and pump and formed by a plurality of laterally adjacent sections, detachably connected together, whereby they may be assembled prior to connection with the associated engine.

9. In an accessory pump for internal combustion engines of marine type, an air compressor including a piston and a piston rod, a liquid pump including a piston, the pistons being secured to said rod, a liquid-pump cylinder, conducting means adapted upon operation of said liquid-pump piston, to provide a supply of cooling water for the engine, and to operate as a bilge pump, and a housing structure carrying the moving parts of said pump and compressor, said housing being formed of a plurality of superposed, detachably connected portions, said portions being provided with internal passages forming said liquid-conducting means, one of such portions provided with holding means adapted to permit their collective attachment to the engine, as an assembled unit.

10. In an accessory pump for internal combustion engines of marine type, an air compressor including a cylinder, a piston and a piston rod, a liquid pump including a piston aligned with and secured to the compressor piston, independently of said rod, a pump cylinder for said liquid pump, coaxial with the compressor piston, separate conducting means for a plurality of liquids, and a plurality of separate valve assemblies, said liquid pump being adapted thereby to conduct, without admixture, bilge water and engine-cooling water; said conducting means being associated with the liquid pump cylinder and piston, whereby said liquid pump is adapted to displace such fluids simultaneously; a casing common to said air compressor and liquid pump, whereby they may be attached to, and removed from the engine, as a unit, the casing consisting of stacked sections of substantially even size, detachably secured together, a rocker in driving relation with said piston rod, and extending into one of said sections, between said cylinders, a lubricant displacement device carried and operated by the rocker, and an eccentric adapted to be operatively associated with an engine shaft and connected to said rocker for simultaneously actuating, through said piston rod, said air compressor and liquid pump.

MORRIS J. GOLDBERG.