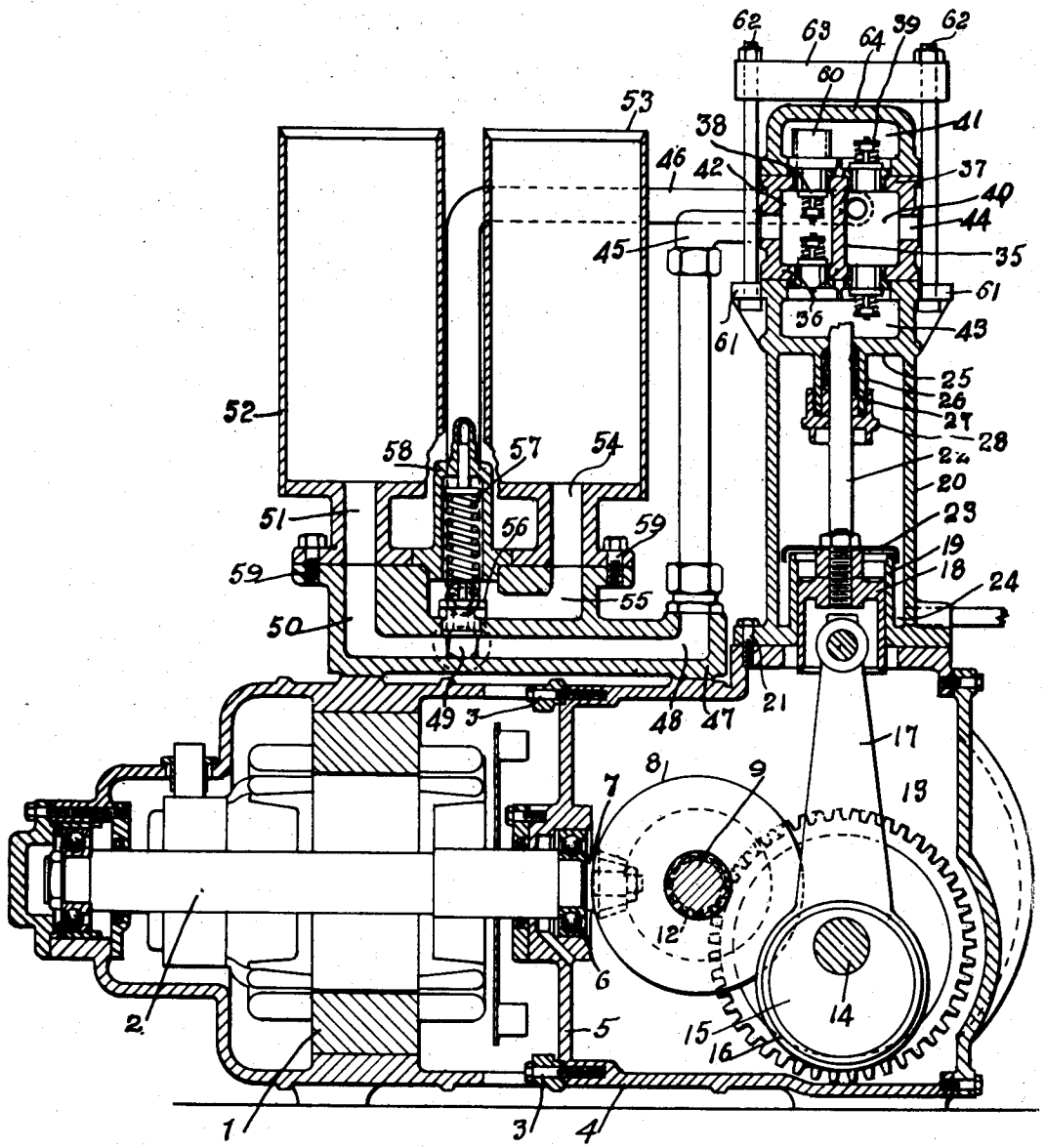
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Filed Aug. 31, 1928 7 Sheets-Sheet 1

Fig. 1.




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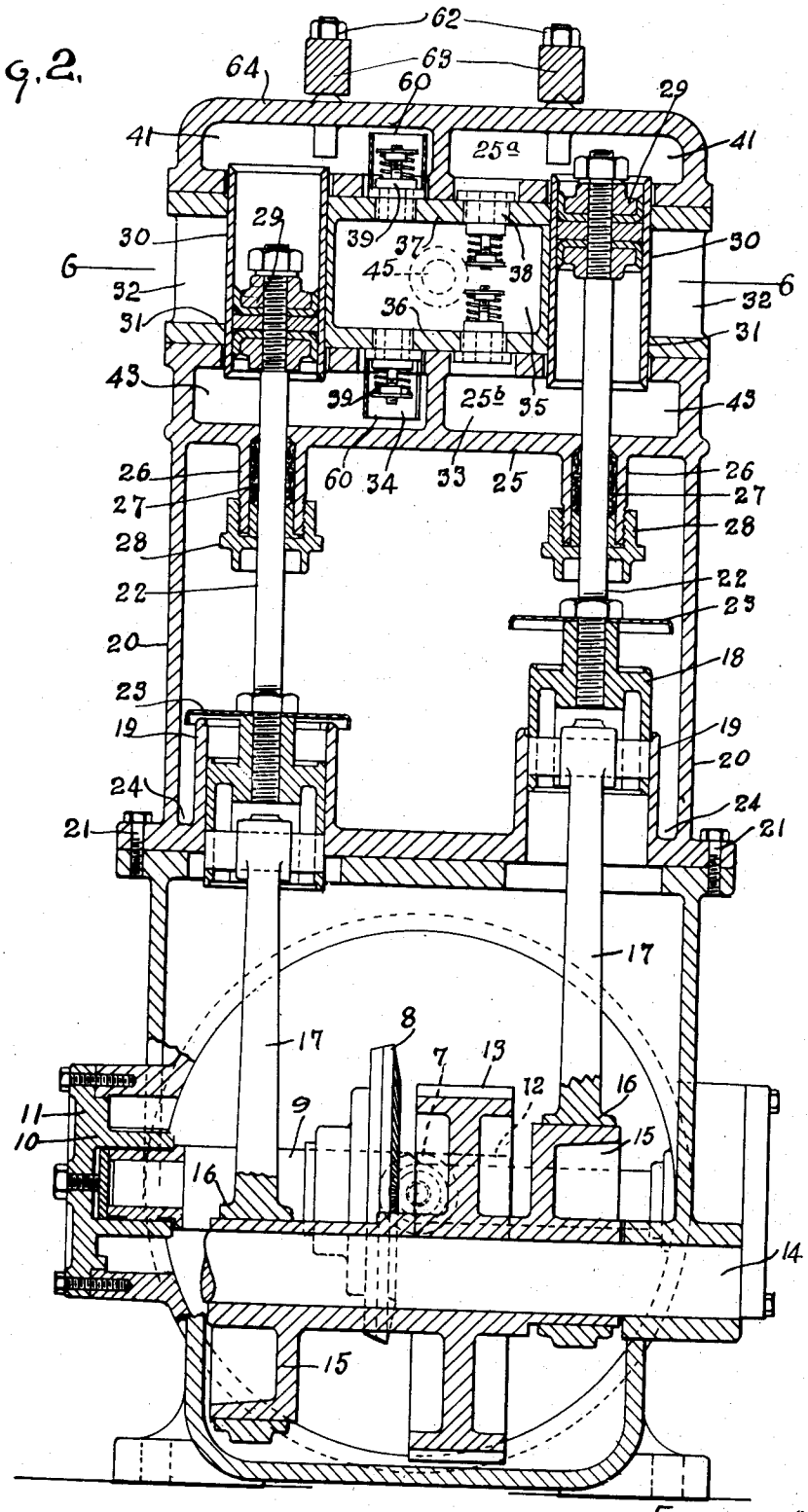
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Fig. 2.




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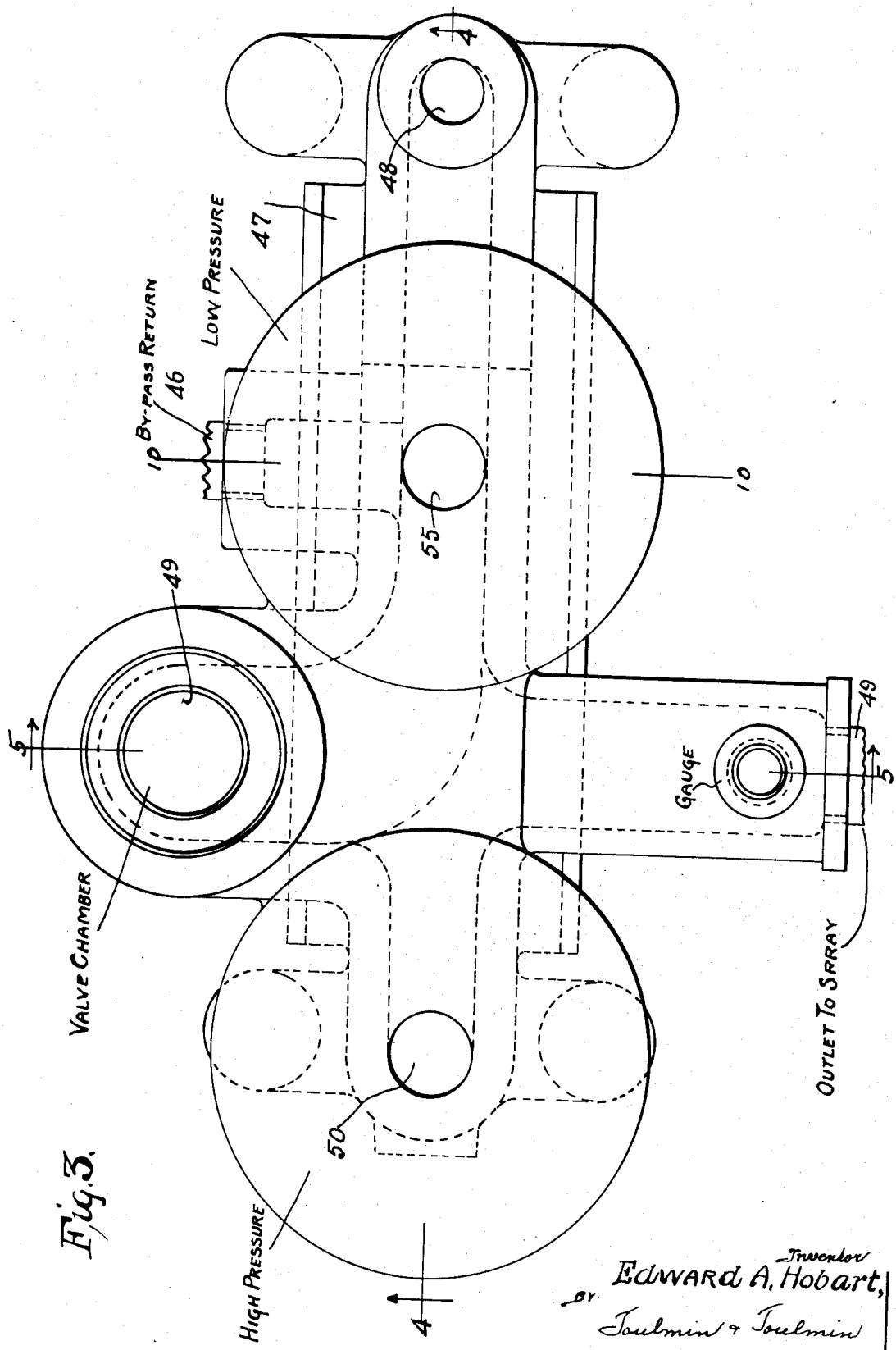



Fig. 3.

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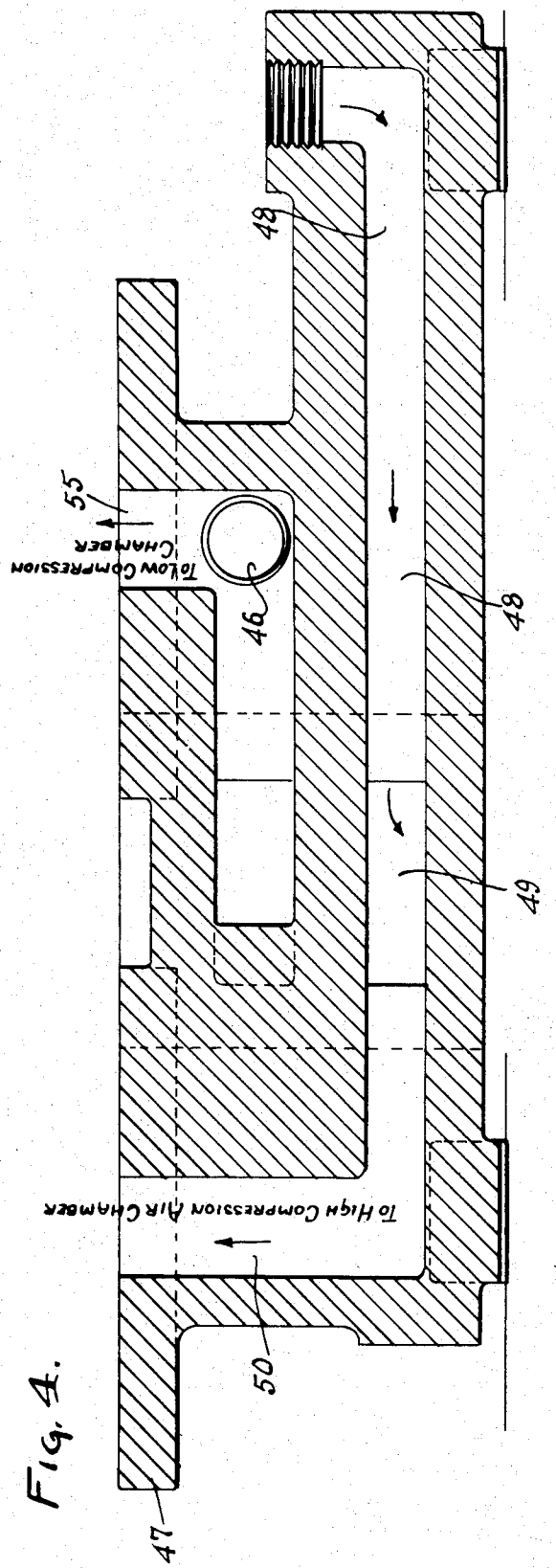



Fig. 4.

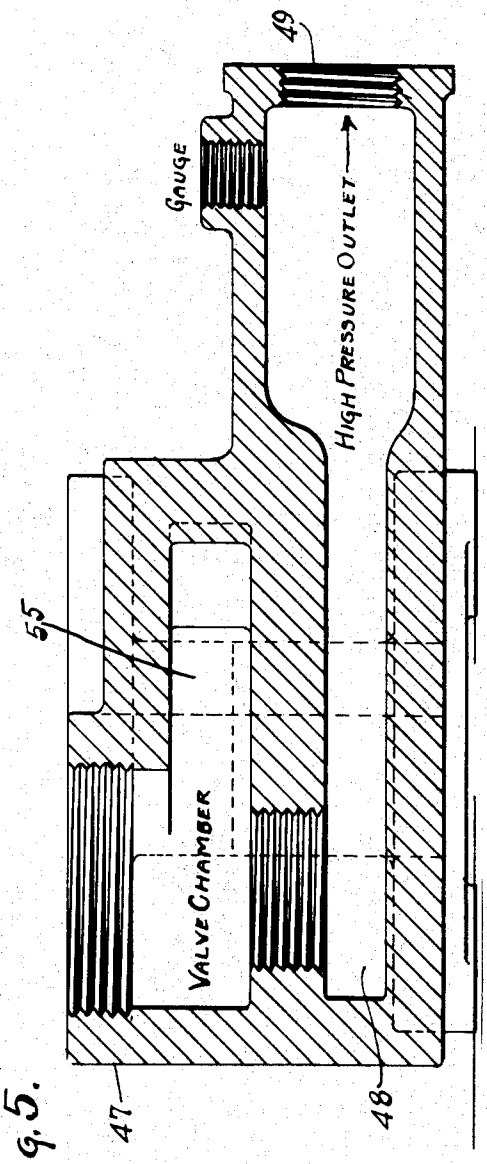



Fig. 5.

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Fig. 6.

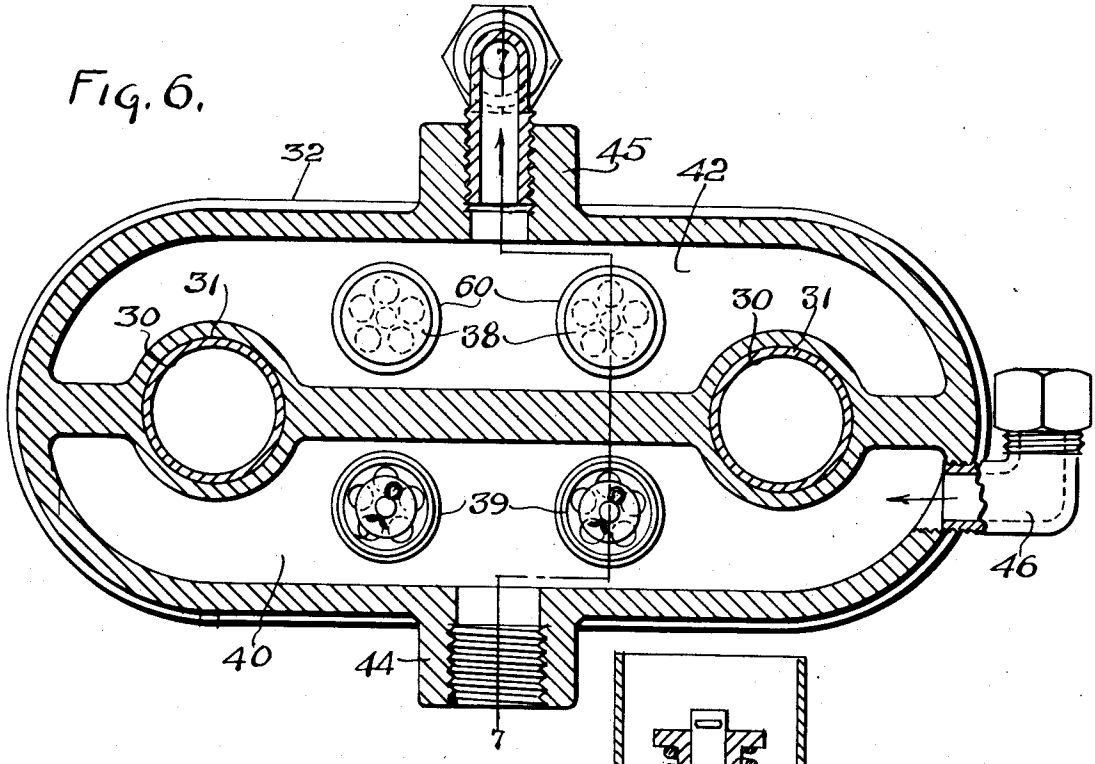
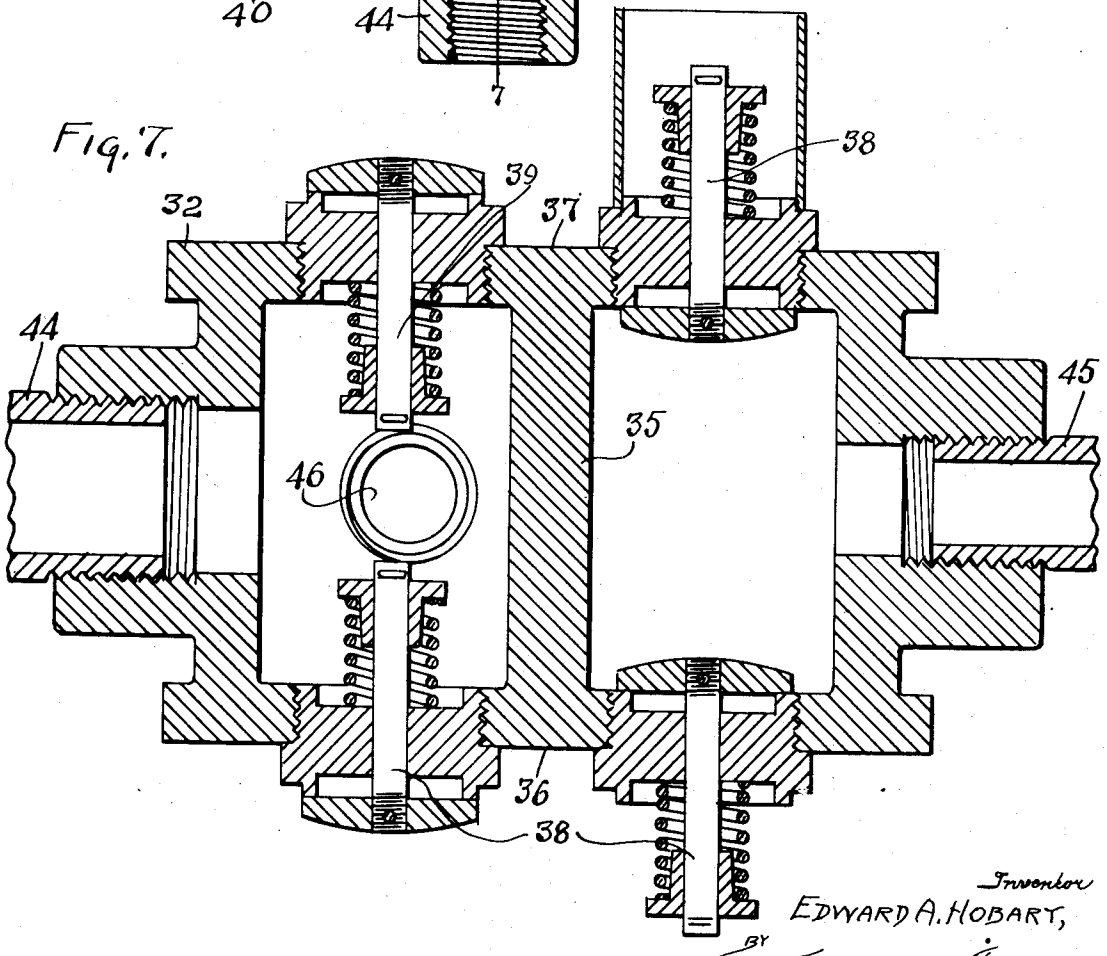



Fig. 7.




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Fig. 8.

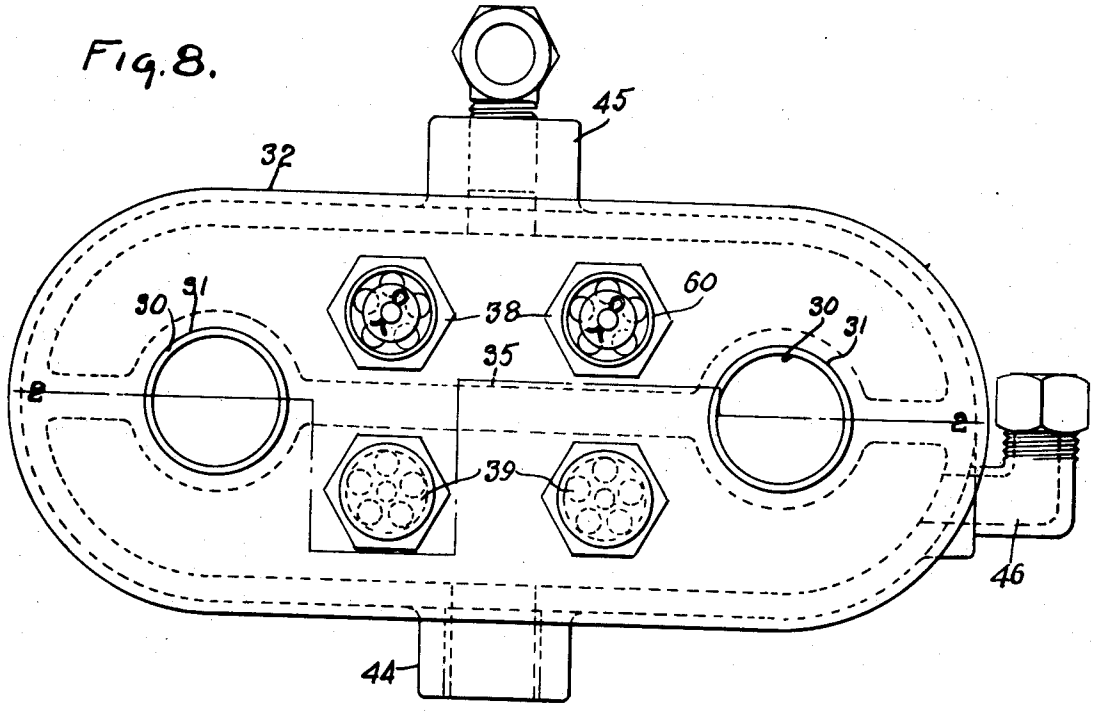
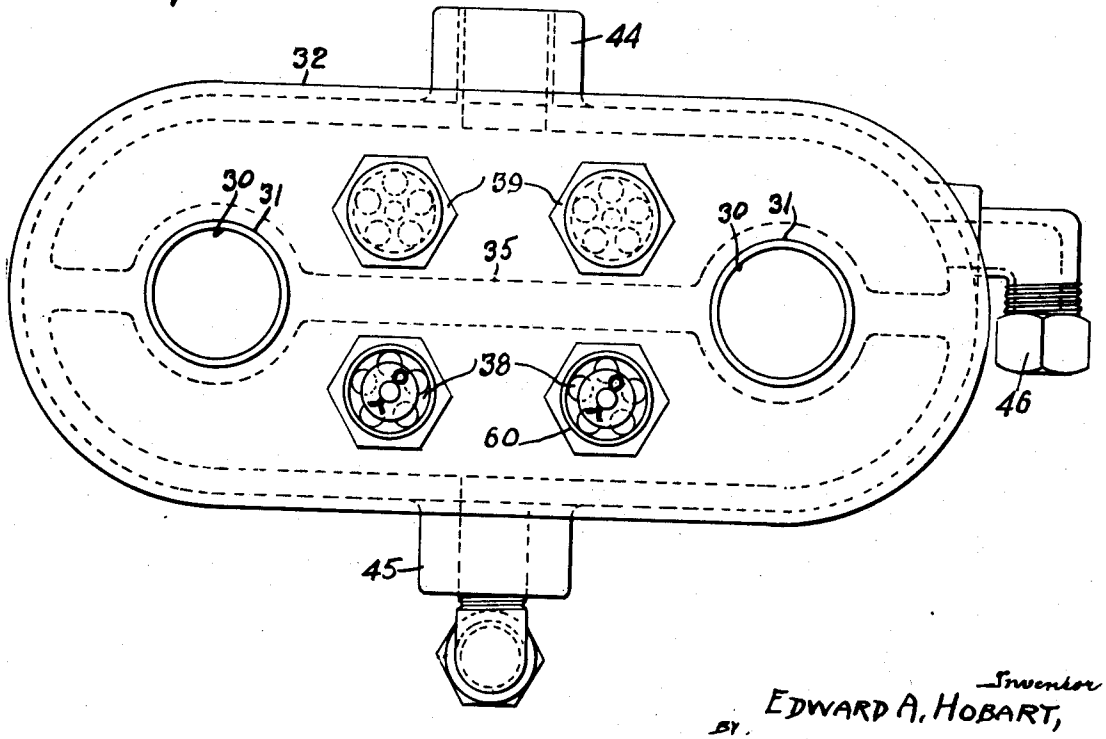



Fig. 9.




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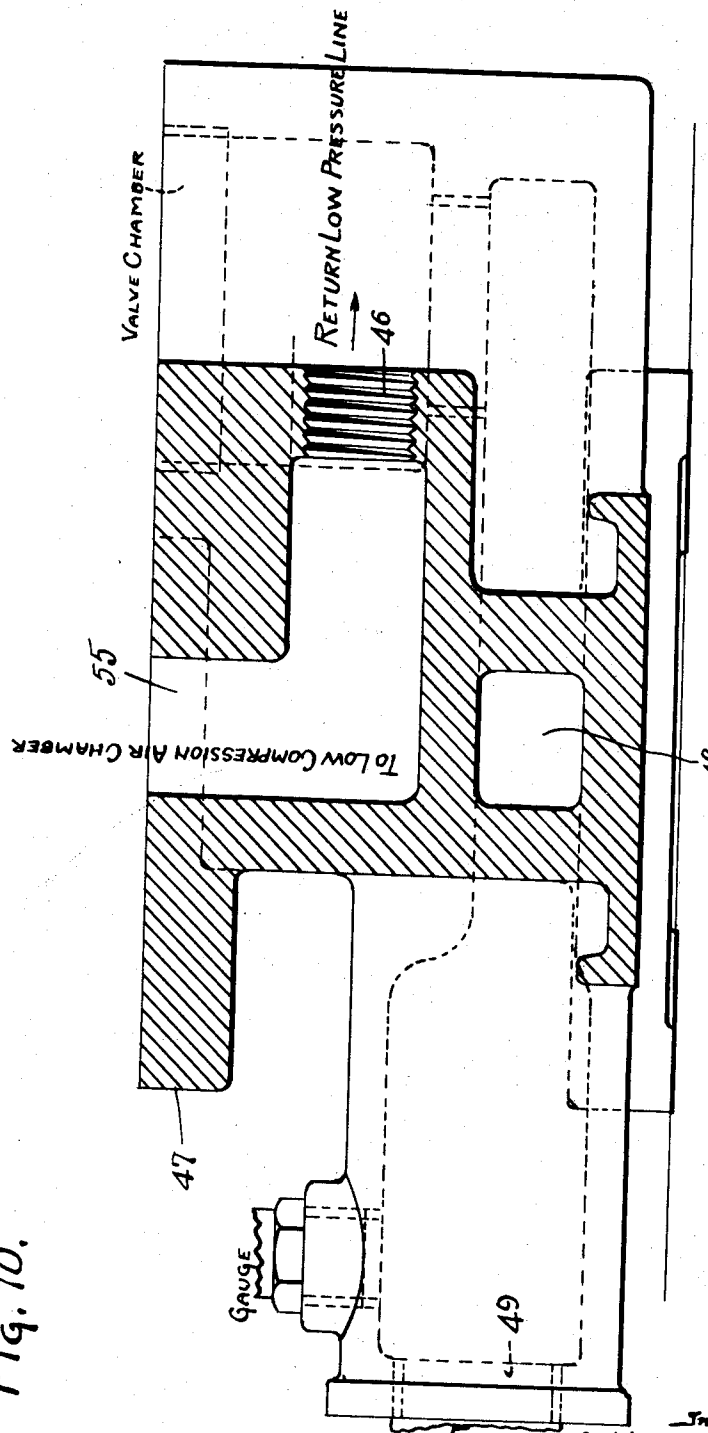



Fig. 10.

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# UNITED STATES PATENT OFFICE

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## PUMP

Application filed August 31, 1928. Serial No. 303,210.

My invention relates to pumps and, in particular, to pumps utilized for automobile washing installations.

It is the object of my invention to provide a pump which will supply high pressure and low pressure water, which will be a compact unit and in which, when the water spray is shut off, the high pressure water will be diverted through a low pressure recirculation line without injury to the pump.

It is a further object to provide a unitary structure carrying a high pressure air chamber, a low pressure air chamber and a valve system for automatically connecting the low pressure chamber and its associated lines into the pump upon the accomplishment of a predetermined high pressure in the high pressure system without interfering with the operation of the pump.

It is a further object to provide a pump in which the cross head bearings, piston rod bearing and gasket openings and pistons will be rigidly aligned and capable of being provided for by a single boring operation to insure their alignment.

It is a further object to provide a unitary valve casing, pistons and valve system which may be assembled as a unit and placed in a position in alignment with the cross head housing without the necessity of adjustments and fittings so as to insure rapidity in assembly and changeability in repair.

It is a further object to provide a pump comprising a lubrication casing for the crank shaft motor driving gears to the crank shaft and strap eccentrics for the pitmen mounted on the crank shaft, a separate unitary cross head housing, a separate unitary valve and cylinder housing and a separate valve chamber cover housing, all of which housings are assembled by four main bolts and several supplementary bolts.

Referring to the drawings:

Figure 1 is a vertical longitudinal section through the car washing mechanism;

Figure 2 is a section on the line 2—2 of Figure 8;

Figure 3 is a plan view of high and low pressure air chamber;

Figure 4 is a section on the line 4—4 of Figure 3;

Figure 5 is a section on the line 5—5 of Figure 3;

Figure 6 is a section through the cylinder and valve housing taken transversely thereof on the line 6—6 of Figure 2;

Figure 7 is a section on the line 7—7 of Figure 6;

Figure 8 is a top plan view of the valve housing;

Figure 9 is a bottom plan view of the valve housing;

Figure 10 is a section on the line 10—10 of Figure 3.

Referring to the drawings in detail, 1 is a motor having an armature shaft 2. The cage of the motor is bolted by the bolts 3 to one end of a crank case housing 4 of a motor car washer pump. The armature shaft projects through the end wall 5 of this crank case 4 and is supported therein on a ball bearing 6. The end of the armature shaft 2 projecting into the crank case 4 is provided with a bevel pinion 7 which drives a bevel gear 8 mounted on a cross shaft 9 that is journaled in bearings 10 that are mounted in detachable plates 11 on the side walls of the crank case 4.

This shaft 9 carries a pinion 12 which meshes with a gear 13 mounted upon the straight pump shaft 14 upon which are mounted the eccentric 15 that in turn carry the straps 16 of the pitmen 17. These pitmen are provided with cross head slides 18 that are guided in the guides 19 which are formed as integral parts of a cross head housing 20 which is bolted by the bolts 21 upon the top of the crank case housing. These cross heads have attached thereto the piston rods 22 equipped with splash plates 23 for preventing the splash or dripping of water from entering into the lubricant in the crank case chamber. The water that drips down by gravity is shed into the bottom of the cross head housing 20 as at 24 from which it may be drained in any manner desired.

The upper end of this cross head housing is provided with a transverse partition 25 having depending sleeves 26 in which are mounted packing 27 held in position by the

threaded member 28 mounted on the sleeves 26.

The piston rods 22 carry pistons 29 working in cylinders 30. These cylinders are mounted in openings 31 which are bored in alignment with the structure heretofore described, within a casing known as the cylinder and valve casing 32. This casing is arranged to cooperate with the valve casing chambers 33 and 34 formed above the bottom 25 on either side of the partition 25*b*.

This casing is divided longitudinally by the partition 35. The bottom wall of the casing 32 is designated 36. The top wall is designated 37. Each of the upper and lower walls of these chambers carries a pair of outlet valves 38 and inlet valves 39, eight valves in all. The chamber 40 is an inlet chamber. The chamber 41 in the head is an accumulation chamber divided by the partition 25*a* and the chamber 42 is an outlet chamber. The chamber 43 is an accumulation chamber divided by the partition 25*b* into chambers 33 and 34.

The inlet line is designated 44 and the outlet line is 45. The recirculation low pressure line is 46 and is connected into the chamber 40 for recirculation through the pump. The high pressure outlet line 45 is connected into the manifold 47 to communicate with the high pressure passageway 48 which discharges at 49. Into this line is connected through the passageway 50 the passageway 51 of the high pressure air chamber 52. This chamber is integral with the casing forming the low pressure air chamber 53 which has a passageway 54 communicating with the passageway 55 in the manifold 47.

Communication between the passageway 48 and passageway 55 is established by the opening of the valve 56 against the three hundred pound spring 57 contained within the housing 58.

The by-pass pipe 46 is connected into the passageway 55. It will be noted that the housing for the spring 57 and the high pressure and low pressure air chambers is a unitary one and is mounted as a unit upon the manifold 47 and retained thereon by the bolts 59.

Sleeves to protect the system from becoming air bound are mounted adjacent the valves which communicate with the chamber 41, such sleeves being designated 60.

The cross head housing is provided with ears 61 through which bolts 62 are inserted. These bolts carry transverse straps 63 which securely lock the cover casing 64 having the chambers 41 in position on the cylinder valve casing 32 which in turn is locked upon the top of the cross head housing 20.

*Method of operation.*—As the right hand piston (Figure 2) descends, it will draw in liquid through the inlet opening 44 thereby lifting one of the inlet valves 39 admitting fluid into the compression chamber, such as 41. On its return stroke, the pressure on the liquid in the chamber 41 forces the liquid out through the outlet valve 38 into the outlet chamber 42 and passageway 45. The same operation is repeated with respect to the lower compression chamber 43 and its associated inlet and outlet valves.

Thus, the partition 35 serves to separate the valve casing into inlet and outlet chambers while the partitions 25*a* and 25*b* serve to divide the compression chambers so as to segregate them each to its own piston and cylinder.

The operation of the pistons by the rotation of shaft 14 draws the fluid from the inlet chamber through the valves into the accumulation chambers 41 and 43. From these chambers the operation of the pistons forces the fluid from the accumulation chambers through valves into the outlet chamber 42. From the outlet chamber the fluid passes through the outlet 45 and ultimately into the high compression chamber 52. From the high compression chamber the fluid passes either through the service pipe or through valve 56 into the low pressure outlet chamber, from which it may pass back through pipe 46 into the inlet chamber 40.

It will be understood that I desire to comprehend within my invention such modifications as may be necessary to adapt it to varying conditions and uses.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a car washer, an integral structure consisting of a driving motor, a pump crank shaft driven directly therefrom, pump mechanism operated from said crank shaft, a high and low pressure distribution manifold connected to said pump and mounted upon said motor, low pressure and high pressure unitary air chambers mounted on said manifold, valve mechanism carried thereby for placing said low pressure air chamber in communication with the high pressure chamber, delivery means for conveying away the high pressure, and means for recirculating the pressure from the high pressure side through the low pressure side to the pump.

2. In a car washer, a pump, means for driving the pump, a manifold having high pressure lines connected to the pump outlet and a low pressure line, a valve therebetween, an outlet line from the pump to the manifold, an exit from the high pressure line, a return line from the low pressure side of the manifold to the pump, a high pressure air chamber supported on the manifold connected to the high pressure line of the manifold, a low pressure chamber supported on the manifold connected to the low pressure line of the manifold whereby when the high pres-

sure side exceeds a predetermined amount it enters the low pressure side and recirculates into the pump.

3. In a car washer, a motor and a motor casing, a pump crank casing attached thereto, a pump erected upon the pump crank casing, a high and low pressure line manifold mounted upon the pump casing and the motor casing, a unitary high pressure and low pressure air chamber structure mounted on said manifold, means of connecting said manifold to the pump on the high and low pressure sides, and an exit means from the high pressure side of the manifold.

4. In a car washer, a motor casing having a motor therein with an armature shaft, an armature shaft projecting beyond said casing, a crank case casing attached to one side of the motor casing for a pump into which said armature shaft projects, a transverse power shaft journaled in the crank case, a bevel gear thereon, a bevel pinion carried on the armature shaft meshing therewith, a pinion on said transverse shaft, a horizontally disposed crank shaft journaled in said crank case, a gear thereon meshing with said pinion and a pitman operated from said crank shaft.

5. In a car washer, a motor casing having a motor therein with an armature shaft, an armature shaft projecting beyond said casing, a crank case casing for a pump into which said armature shaft projects, a transverse power shaft journaled in the crank case, a bevel gear thereon, a bevel pinion carried on the armature shaft meshing therewith, a pinion on said transverse shaft, a crank shaft journaled in said crank case, a gear thereon meshing with said pinion and a pitman operated from said crank shaft, a cross head slide, a housing therefor mounted on the crank case casing having a guide for said slide, a cylinder and valve casing mounted on the cross head casing and having a cylinder therein and a cover casing mounted thereon, a piston rod in said cross head and a piston connected thereto operating in the cylinder in the cylinder casing.

6. In a car washer, a motor casing having a motor therein with an armature shaft, an armature shaft projecting beyond said casing, a crank case casing for a pump into which said armature shaft projects, a transverse power shaft journaled in the crank case, a bevel gear thereon, a bevel pinion carried on the armature shaft meshing therewith, a pinion on said transverse shaft, a crank shaft journaled in said crank case, a gear thereon meshing with said pinion and a pitman operated from said crank shaft, a cross head slide, a housing therefor mounted on the crank case casing having a guide for said slide, a cylinder and valve casing mounted on the cross head casing and having a cylinder therein and a cover casing mounted thereon, a piston rod in said cross head and a piston connected thereto oeprating in the cylinder in the cylinder casing, a valve chamber communicating with the cylinder on the top of the cross head casing, valve chambers and valves in the cylinder casing and a valve chamber in the cover casing communicating with the cylinder and the chambers in the cylinder and valve casing, an inlet cylinder, and exit lines to the respective valve chambers in the valve casing.

7. In a car washer, a motor casing having a motor therein with an armature shaft, an armature shaft projecting beyond said casing, a crank case casing for a pump into which said armature shaft projects, a transverse power shaft journaled in the crank case, a bevel gear thereon, a bevel pinion carried on the armature shaft meshing therewith, a pinion on said transverse shaft, a crank shaft journaled in said crank case, a gear thereon meshing with said pinion and a pitman operated from said crank shaft, a cross head slide, a housing therefor mounted on the crank case casing having a guide for said slide, a cylinder and valve casing mounted on the cross head casing and having a cylinder therein and a cover casing mounted thereon, a piston rod in said cross head and a piston connected thereto operating in the cylinder in the cylinder casing, a valve chamber communicating with the cylinder on the top of the cross head casing, valve chambers and valves in the cylinder casing and a valve chamber in the cover casing communicating with the cylinder and the chambers in the cylinder and valve casing, an inlet cylinder and exit lines to the respective valve chambers in the valve casing, a manifold connected to the exit line, said manifold having a high pressure passageway and a low pressure passageway, an exit line connected to the air chamber, an air chamber connected to the high pressure passageway, valve means for establishing a communication between the high pressure and low pressure passageways, a return line from the low pressure passageway to one of the valve chambers of the valve casing, and a low pressure air chamber connected therewith.

8. In a car washer, a motor having an armature shaft, a crank case casing attached to said motor, an intermediate shaft journaled in said casing transversely of the armature shaft, gearing therebetween, a crank shaft journaled in said crank case casing, gearing therebetween it and the intermediate shaft and pump mechanism vertically disposed above said crank shaft and at right angles to the armature shaft and operatively connected to the crank shaft.

9. In a car washer, a motor having an armature shaft, a crank case casing attached to said motor, an intermediate shaft journaled in said casing transversely of the armature shaft, gearing therebetween, a crank shaft journaled in said crank case casing, gearing therebetween it and the intermediate shaft

and pump mechanism vertically disposed above said crank shaft and at right angles to the armature shaft and operatively connected to the crank shaft, and air chamber and manifold distribution mechanism connecting said air chamber to said pump mounted jointly upon the motor and the crank case.

10. In a pump, the combination of a crank case, a cross head casing, a cylinder and valve casing and a cover casing superimposed one on the other in alignment, a cross head guide in the cross head casing aligned with a stuffing box in the cross head casing in the top thereof, a stuffing box, a cylinder in the valve casing aligned with the stuffing box, a valve chamber in the top of the cross head casing adapted to communicate with valve chambers in the cylinder and valve casing and valve chambers in the cover casing adapted to communicate with the valve chambers in the valve casing and said cylinder being adapted to communicate with the chambers in the valve casing through the respective chambers in the cover casing and the cross head casing and valves between the chambers in the cross head casing and the valve casing on the one side and the cover casing and the valve casing on the other side.

11. In combination in a car washer of pump mechanism comprising a plurality of parallel pistons and piston rods, a valve and cylinder casing, cylinders therein, inlet and exit chambers in said valve casing, accumulation chambers in a cross head casing support, and in communication with the lower ends of the cylinders, valves between said chambers and the chambers in the valve casing, a cover casing and accumulation chambers therein in communication with the upper ends of the cylinders, valves between said chambers and the chambers in the valve casing, an inlet line to one of the chambers in the valve casing, an exit line connected to the other of said chambers.

12. In a car washer, a motor having an enclosing cage with one end thereof open, means for attaching the open end of the motor to one wall of the crank case of a pump, an armature shaft in such motor adapted to project into said crank case, a transverse intermediate shaft in said crank case, gearing on said shaft and said armature shaft for interconnecting them, a second crank case shaft parallel to the intermediate shaft, gearing interconnecting said shafts, pumping mechanism connected to said crank shaft, a distribution manifold mounted jointly upon the crank case and upon the motor casing, air chambers mounted on said distribution manifold, said manifold forming a connection between the pump and the air chambers.

13. In a motor washer, a motor casing adapted to be ventilated, a crank case casing removably attached thereto adapted to contain lubricant, an armature shaft in said motor projecting into said crank casing, a bearing in said casing for said shaft having an oil chamber and a drain-back passage in sealed engagement with the shaft, a crank shaft in said crank casing, gearing means for driving said crank shaft to said motor armature shaft, pumping mechanism mounted upon said crank casing in sealed relationship thereto and operatively connected to said crank shaft, means of collecting water dripping from the pump mechanism between the pump mechanism and the crank case, and means for deflecting said dripping water from the crank case into said collecting means.

14. In a car washing pump, the combination of a lower and an upper accumulation chamber, a valve casing associated therewith carrying cylinders, cylinders communicating with the respective accumulation chambers, a piston and piston rod operating in each cylinder operable from a common crank shaft, said upper accumulation chambers communicating with the upper ends of the cylinders, inlet and outlet chambers located between the cylinders and valves between the inlet and outlet chambers and the respective accumulation chambers whereby each piston will draw in liquid into one accumulation chamber and discharge liquid from the other accumulation chamber, the incoming liquid coming from the inlet chamber between the cylinders and the outlet liquid being delivered to the outlet chamber between the cylinders.

15. In combination in a car washer, a duplex pump consisting of a crank casing, a cross head guide casing, accumulation chambers in the top thereof, a valve casing, cylinders in said valve casing communicating with the respective accumulation chambers at their lower ends, inlet and exit chambers in said valve casing, upper accumulation chambers mounted on the valve casing communicating with the upper ends of the cylinders, valves between the respective accumulation chambers and the inlet and outlet chambers of the valve casing, transverse partitions between the accumulation chambers and a longitudinal partition in the valve casing forming the inlet and exit chambers, a high pressure line connected to the outlet chamber, a return low pressure line connected into the inlet chamber and a valve means adapted to be opened at a predetermined pressure between the return line and the high pressure line.

16. In a car washer, in combination with a pump having an inlet and an outlet, a high pressure air chamber, a low pressure air chamber, a manifold supporting said chambers having a passageway connecting the outlet with the high pressure air chamber, and a second passageway connecting the low pressure chamber with the inlet, and a valve connection between said passageways to admit the pumped fluid from the high pressure

chamber to the low pressure chamber when a predetermined pressure has accumulated in the high pressure chamber.

17. In a car washer, in combination with a pump having an inlet chamber and an outlet chamber, a high pressure air chamber, a low pressure air chamber, a manifold supporting said chambers having a passageway connecting the outlet chamber with the high pressure air chamber and a second passageway connecting the low pressure chamber with the inlet chamber, and a valve connection between said passageways to admit the pumped fluid from the high pressure chamber to the low pressure chamber when a predetermined pressure has accumulated in the high pressure chamber.

18. In a car washer, a housing, a pump having an inlet and an outlet mounted on said housing, a manifold mounted on said housing, a high pressure air chamber and a low pressure air chamber mounted on said manifold, said manifold having a passageway connecting said outlet to said high pressure air chamber and a second passageway connecting said inlet to said low pressure air chamber, and a valve connection between said passageway to admit the pumped fluid into the low pressure air chamber on the accumulation of a definite pressure in the high pressure air chamber

19. In a car washer, a housing having a motor section and a motor therein and a gear section with pump operating gear therein connected to said motor, a pump operated by said gear mounted on said housing and having an inlet and an outlet, a manifold mounted on said housing, a high pressure air chamber and a low pressure air chamber mounted on said manifold, said manifold having a passageway connecting said outlet to said high pressure air chamber and a second passageway connecting said inlet to said low pressure air chamber, and a valve connection between said passageways to admit the pumped fluid into the low pressure air chamber on the accumulation of a definite pressure in the high pressure chamber.

In testimony whereof, I affix my signature.

EDWARD A. HOBART.