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PUMP UNIT FOR A CENTRAL LUBRICATING INSTALLATION

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FIG. 2

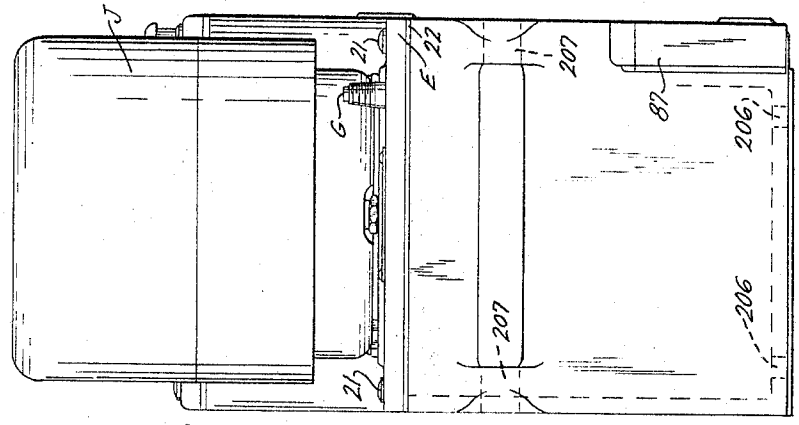

FIG. 1

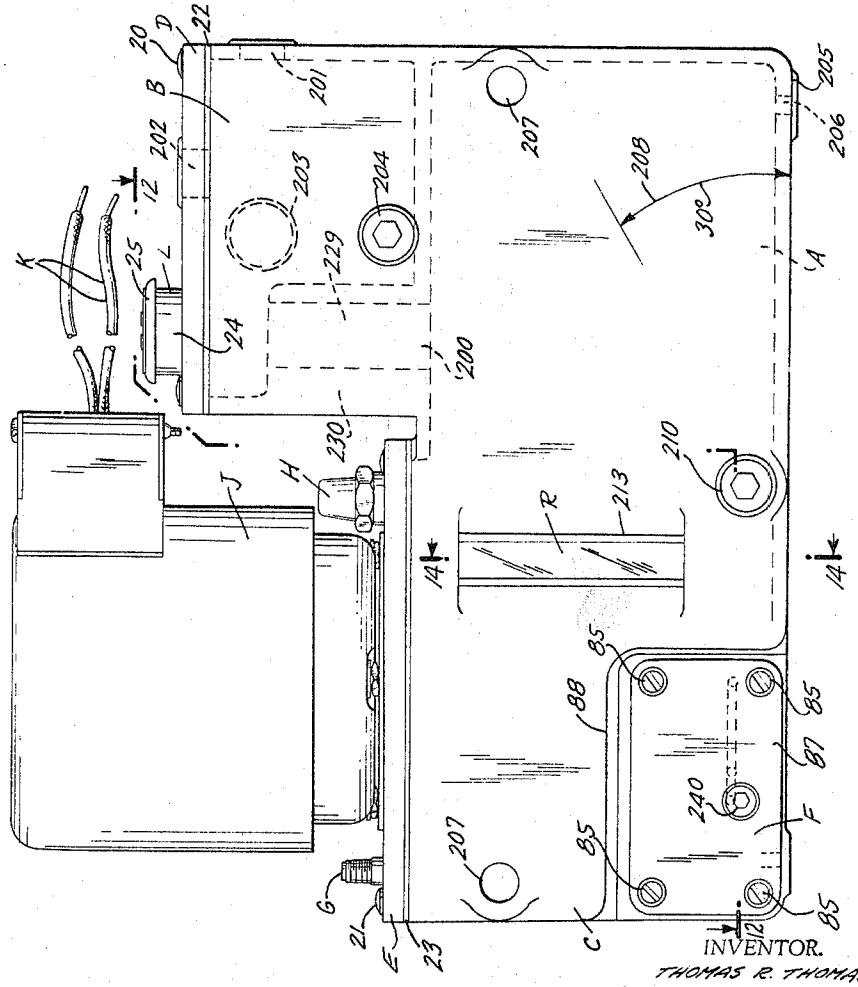

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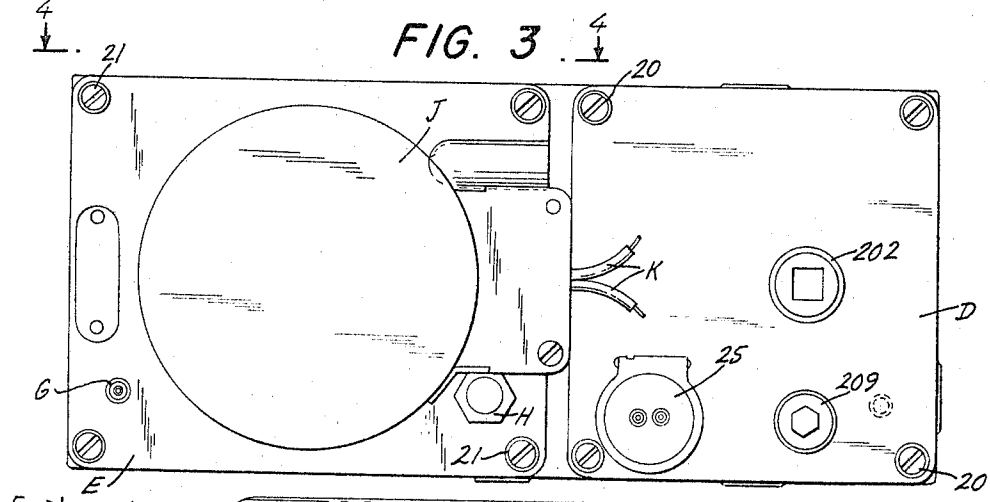
FIG. 3



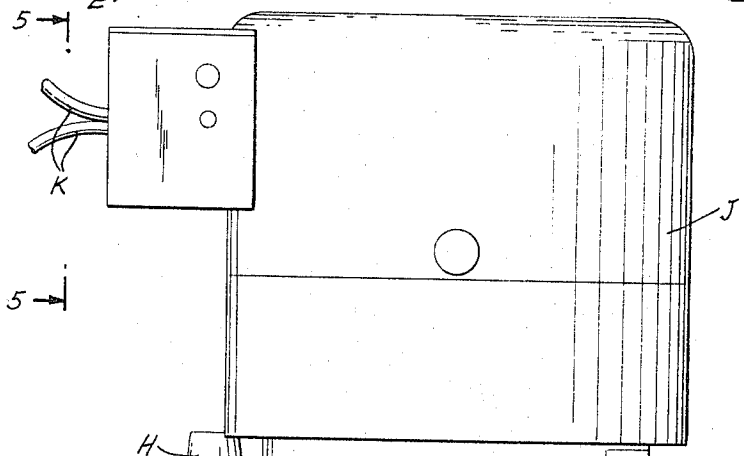


FIG. 4

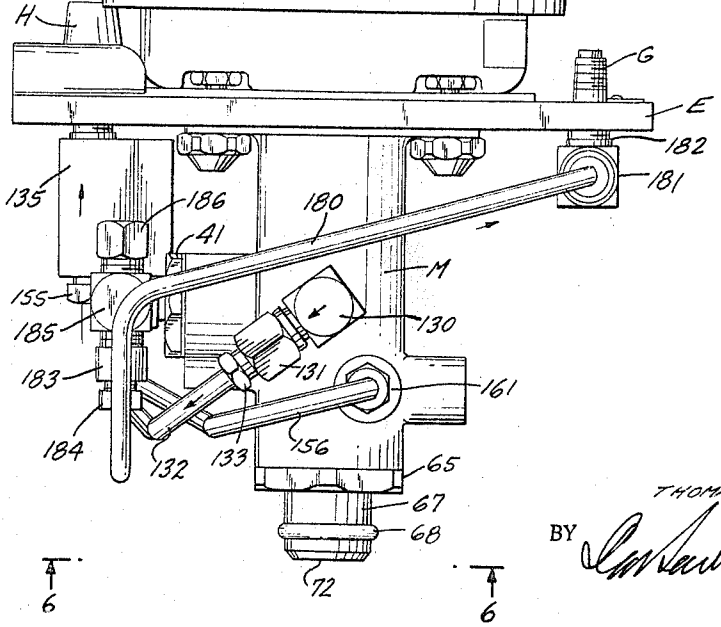


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FIG. 6

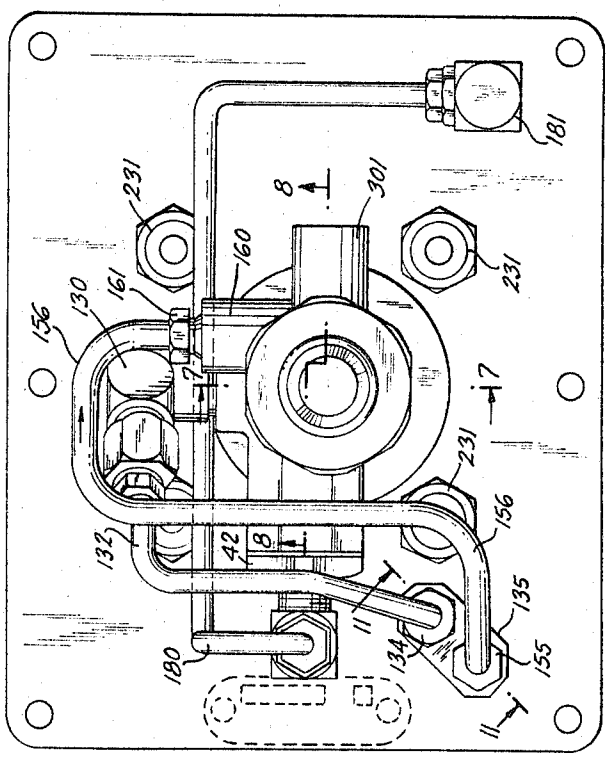
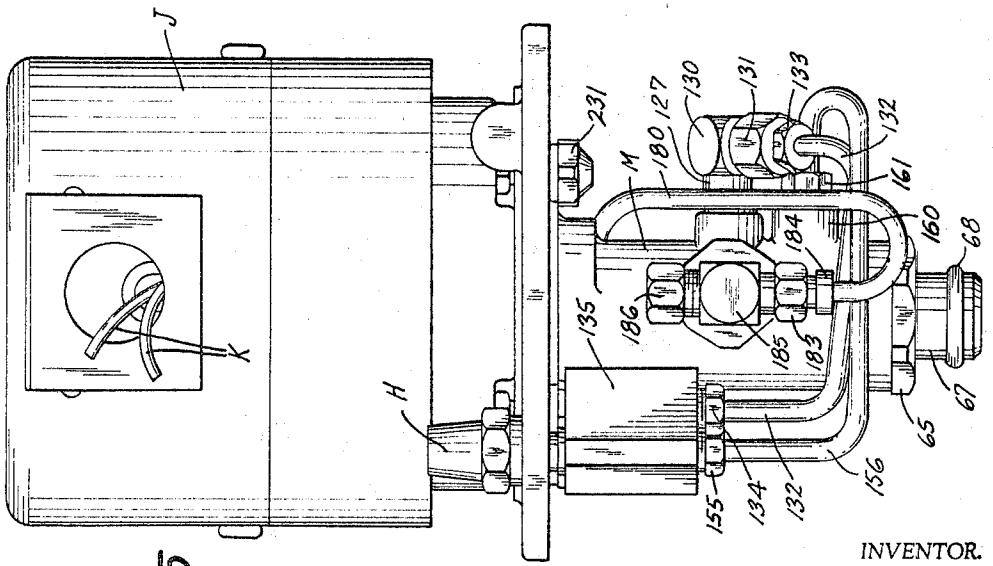


FIG. 5



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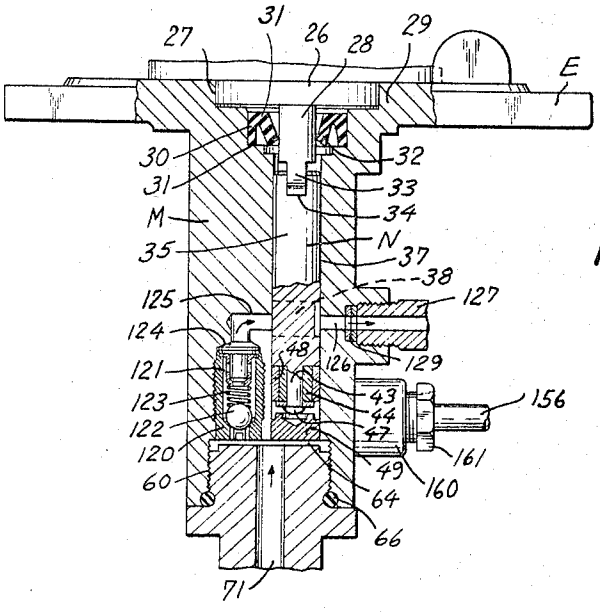

FIG. 7

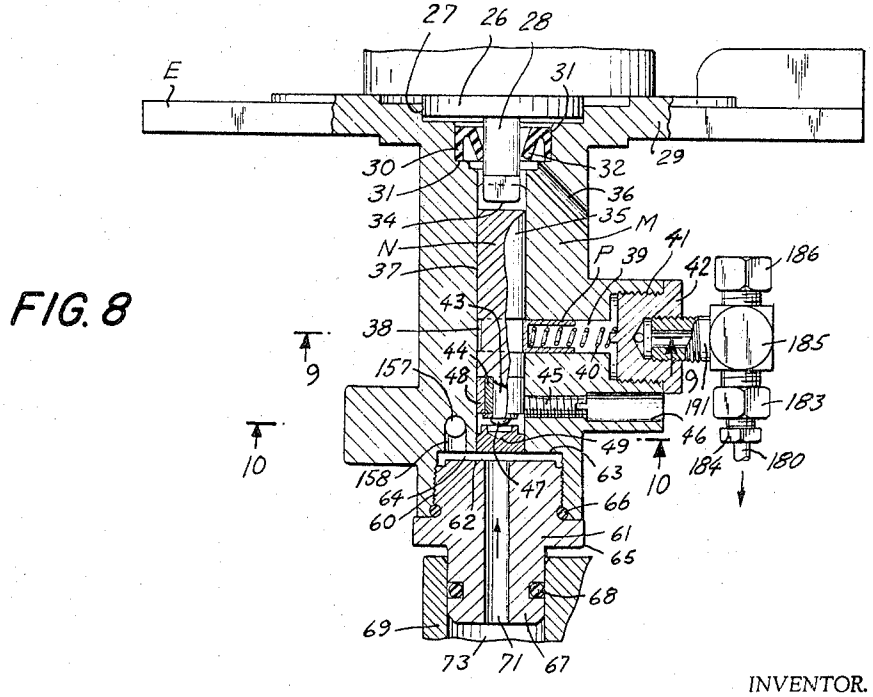

FIG. 8

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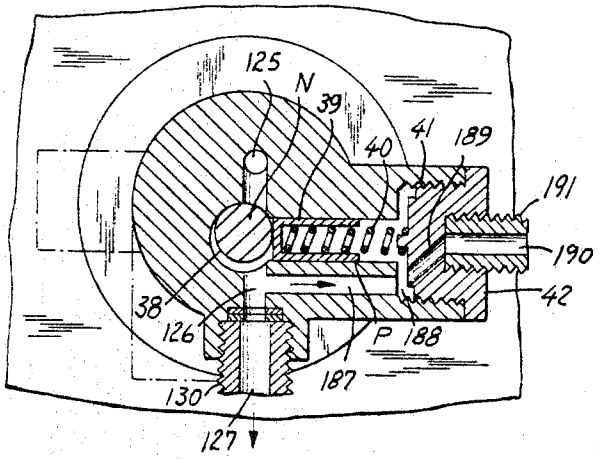
FIG. 9



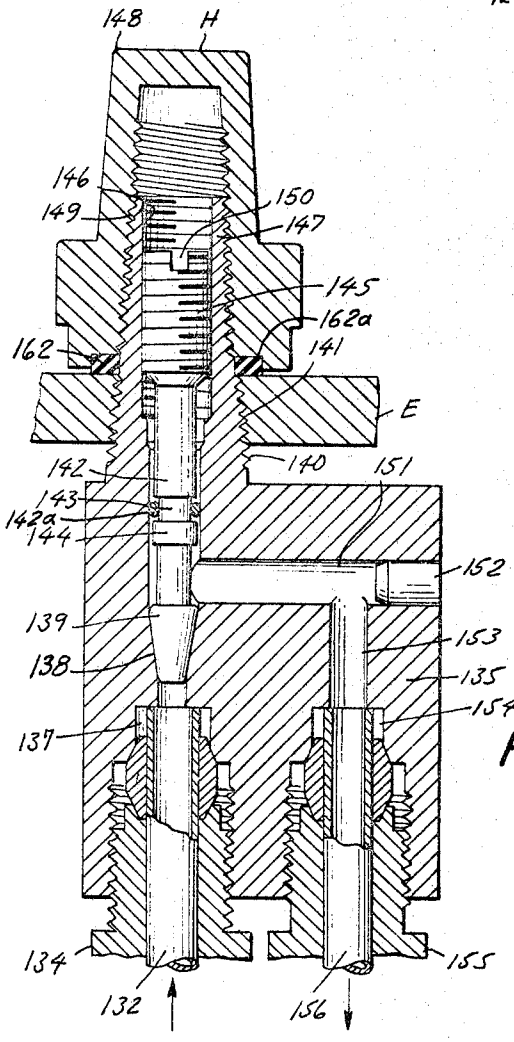


FIG. 10

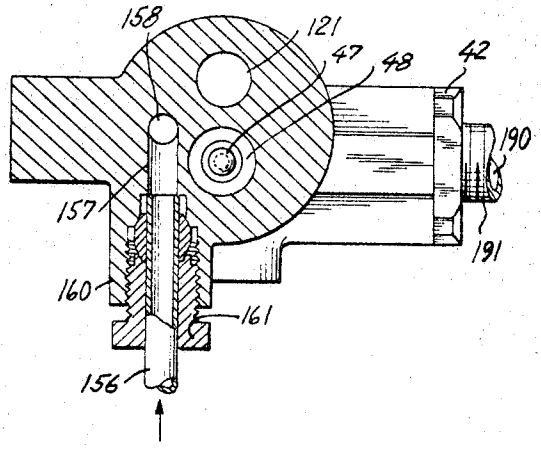


FIG. 11

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FIG. 12

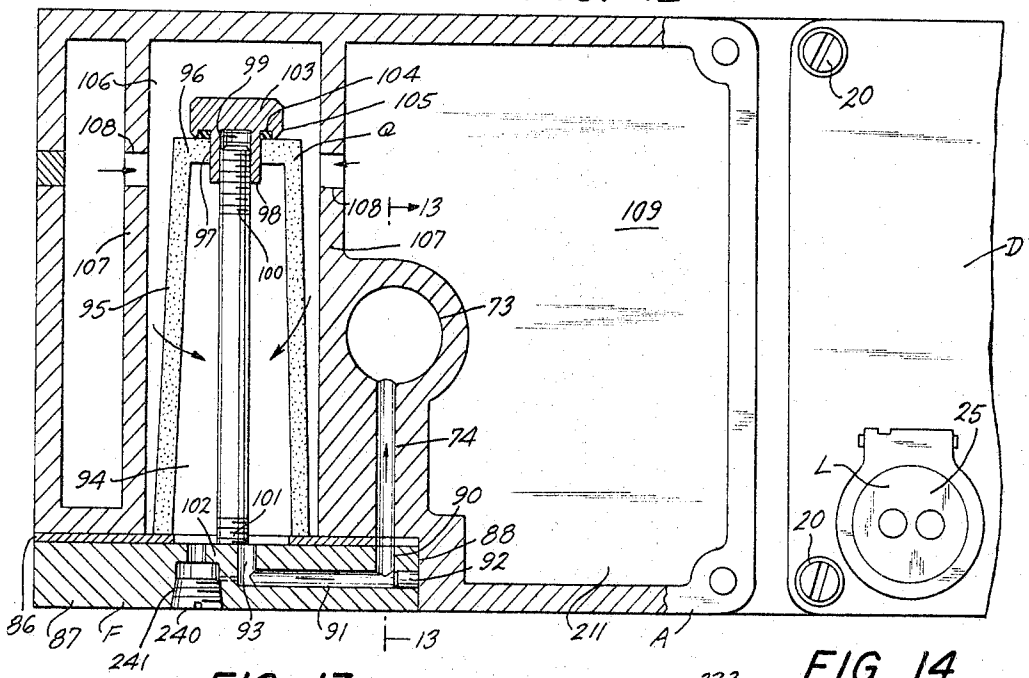


FIG. 13

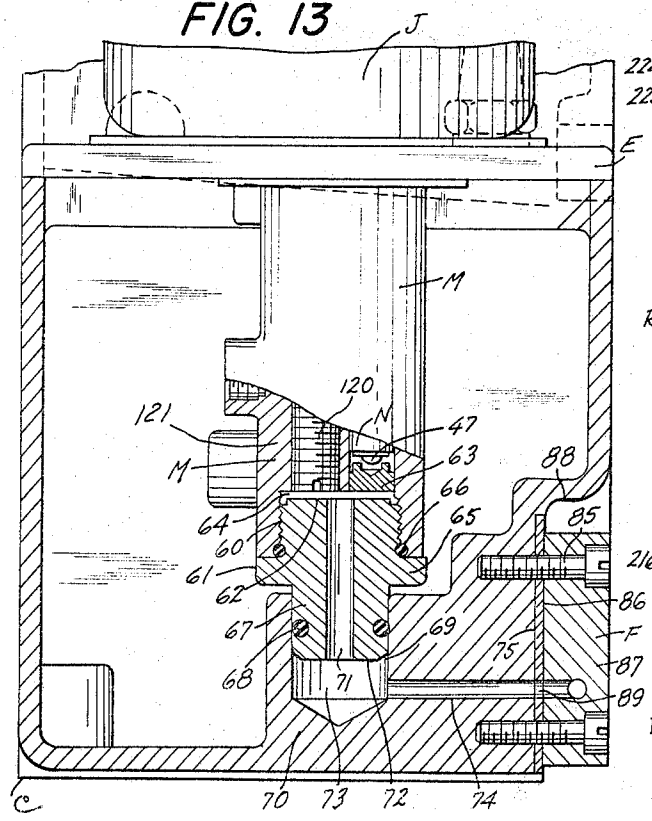
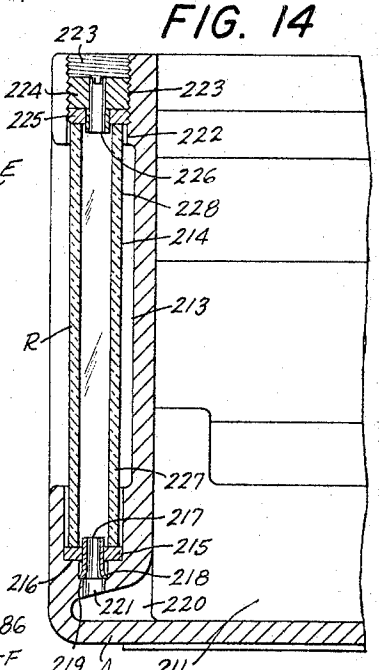


FIG. 14



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PUMP UNIT FOR A CENTRAL LUBRICATING INSTALLATION

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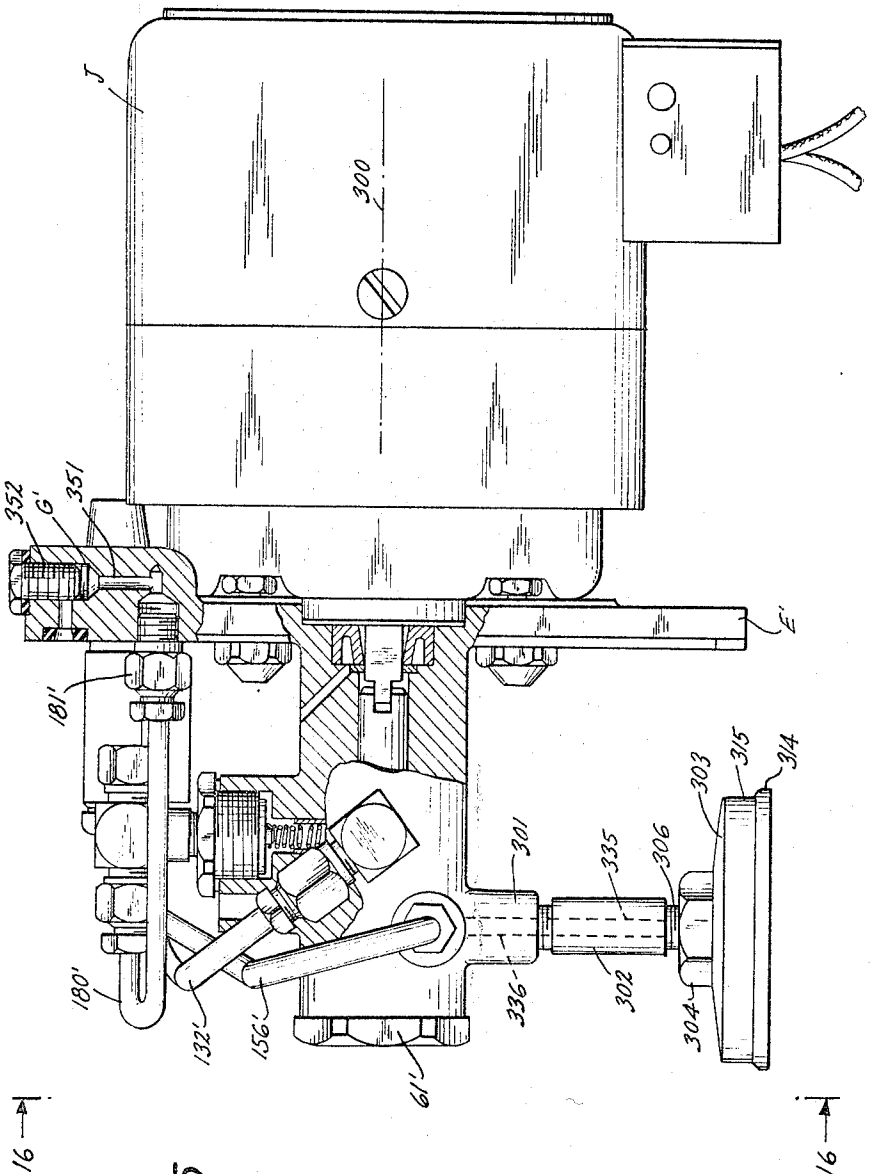

FIG. 15

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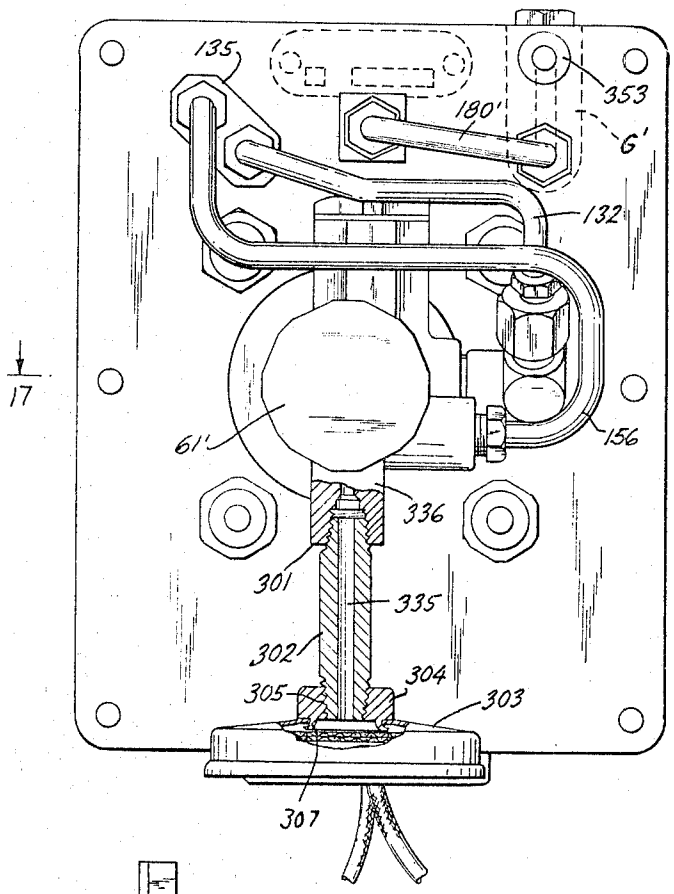
FIG. 16



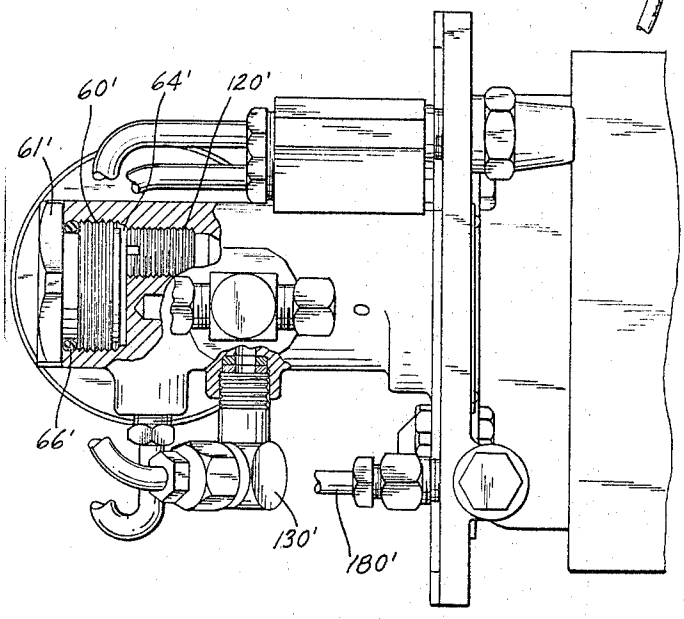


FIG. 17

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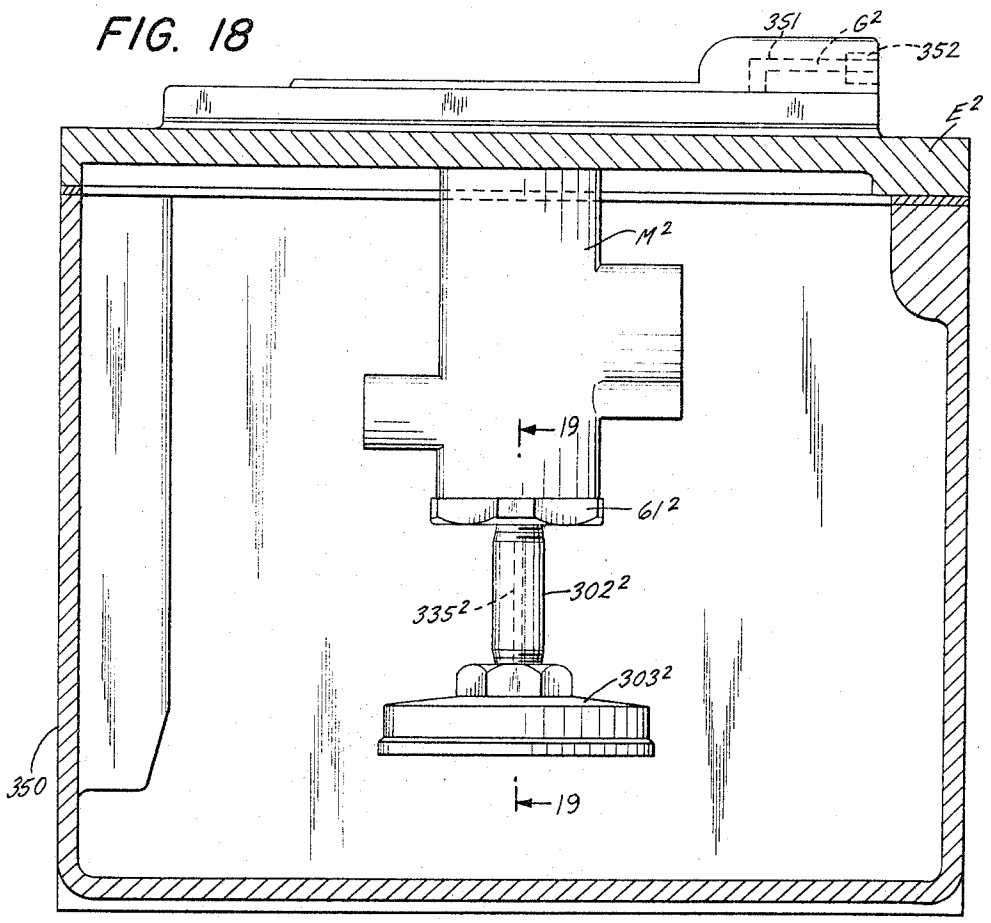
FIG. 18



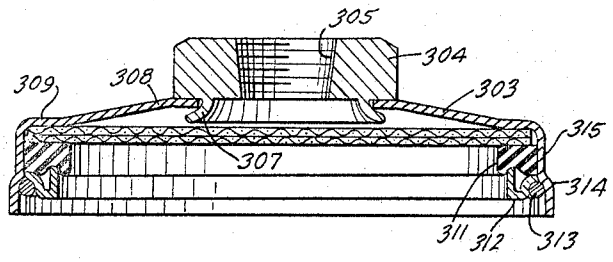
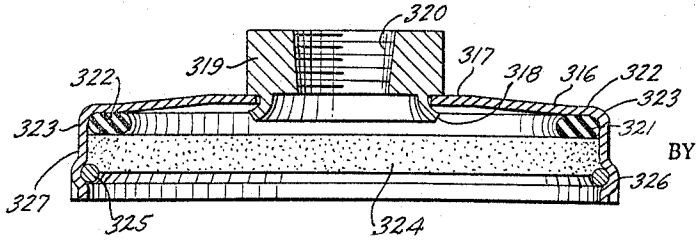


FIG. 19

FIG. 20



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United States Patent Office 3,272,285 Patented Sept. 13, 1966

3,272,285

PUMP UNIT FOR A CENTRAL LUBRICATING INSTALLATION

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Filed June 11, 1963, Ser. No. 287,027
15 Claims. (Cl. 184—27)

The present invention relates to a lubricating system, and it particularly relates to a centralized lubricating system in which the lubricant may be applied continuously or intermittently to bearings of a mechanism at varying levels and at different locations and at varying distances from the central lubricating supply.

Although not limited thereto, the present invention is particularly adapted to bearings which require continuous lubrication and in which an excess of lubricant may be readily returned to a reservoir where it may be filtered and then again forced through the system by means of a lubricating pump operated automatically during the operation of the machine.

It is among the objects of the present invention to provide a centralized lubricating installation having a combined lubricant supply or reservoir, pump and drive mechanism which will form a unit and compact assembly which may be readily mounted in or about the mechanism to be lubricated and which will supply lubricant to such mechanism throughout operation thereof.

Another object is to provide a lubricating installation in which lubricant is delivered from a central pressure source or pump through an unobtrusive conduit system to bearings in and about the mechanism with any excess lubricant being returned to the reservoir or otherwise suitably disposed of without flowing upon the exterior of the machine.

Still further objects and advantages will appear in the more detailed description set forth below, it being understood, however, that this more detailed description is given by way of illustration and explanation only and not by way of limitation, since various changes therein may be made by those skilled in the art without departing from the scope and spirit of the present invention.

In accomplishing the above objects, it has been found most satisfactory according to one embodiment of the present invention to provide a lubricating installation which will provide a combined reservoir and pump installation having suitable means to filter or purify any lubricant that may be supplied to the pump and which will also have suitable drive means associated with the pump.

In one preferred form of the invention, the reservoir and pump are positioned in side by side relationship with the drive mechanism being positioned alongside of the reservoir and directly above the pump and taking the form of an electric motor.

The connections to the electric motor are so arranged that it will be set into operation when the operation of the machine is started and will be stopped when the operation of the machine is stopped or taken out of operation.

In the preferred form of the present invention, the central pressure source is desirably a vane pump which is driven continuously during the operation of the machine by said electric motor and which may be turned on or off in conjunction with the operation of the main machine motor or power source.

There may be electrical connections between the main power source for the mechanism and the drive for the pump which will cause the motor for the pump to be started in operation a short time or sufficient time before the machine is operated so that the lubricant pressure will be developed throughout the distributing system before the machine is started in operation.

The lubricating pump itself may have a plurality of parallel outlet feed systems which operate, together with the system feeding lubricant to the bearings which will permit lubricant to be bypassed back to the reservoir and which will enable regulation of the pressure upon the external system.

The pump is so arranged that it may be positioned either horizontally or vertically and so that the filter outlets may be associated directly with the pump and consist of cup members and suitable filter units therein or sintered metal cones or sleeves which will remove the major portion of the impurities or dirt from the oil particularly where it is used in a circulating system.

Where excess oil has been supplied to the bearings, the oil may be drained from the bearing by suitable return system and then returned to the reservoir by gravity.

The reservoir is desirably provided with a settling chamber from which the lubricant may pass into the main reservoir and then again be picked up by the pump after it has been filtered.

The reservoir itself should preferably be provided with level gauges and drain plugs for removing any accumulated dirt or soil therefrom and the metal filter where utilized should desirably be mounted into the side of the reservoir so as to enable ready removal therefrom and replacement thereof or for cleaning if required.

The filter should desirably be of such a nature that even without removal it can be cleaned or reverse-flushed by blowing air therethrough.

The unit is preferably used in connection with a pressure signal switch which will indicate when proper pressures are maintained, for example of 15 to 30 pounds per square inch.

Such a pressure signal switch may indicate when the pressure fails to attain proper level, for example 7 to 8 pounds per square inch whereupon a suitable light or audible signal will be given to indicate that the system should be checked or serviced.

The present invention will be particularly directed to the pump construction in which there is a vane type construction with a shaft having an eccentric portion being driven by the electric motor.

This pump desirably has aligned inlet and outlet passages transverse to the axis of the vane which leads and feeds lubricant to an eccentric portion of a shaft upon which and in which the spring pressed vane rides.

An inlet passage from the pump will receive lubricant through a filter from the main reservoir supply which filter may consist of a porous sintered metal filter or flat disc like filter held in a cup and the pump may be directly immersed in the lubricant reservoir or connected thereto by a suitable passageway in which the sintered filter unit is positioned.

The outlet of the pump will desirably lead to the other side of the spring pressed vane member so as also to apply pressure to said spring pressed vane member and then to the outlet to the distribution system.

This outlet system may be provided with a blow off valve to prevent an excess pressure being built up in the outlet distribution system.

Parallelly with this distribution system is also desirably positioned another system in which the lubricant may be bypassed back to the pump or reservoir.

This bypass may lead directly to the pump inlet beyond the filter where the oil has already been filtered.

Desirably the motor and entire pump mechanism are mounted upon a plate which serves as a cover element for the reservoir.

In the prefered construction, the cover will carry the electric motor, an adjustment for the bypass system which

may include a needle valve and the outlet to the distribution system.

With the foregoing and other objects in view, the invention consists of the novel construction, combination and arrangement of parts as hereinafter more specifically described and illustrated in the accompanying drawings, wherein is shown an embodiment of the invention, but it is to be understood that changes, variations and modifications can be resorted to which fall within the scope of the claims hereunto appended.

In the drawings wherein like reference characters denote corresponding parts throughout the several views:

FIG. 1 is a side elevational view of the assembled pump and reservoir unit with the motor in position thereon.

FIG. 2 is an end elevational view from the left side of FIG. 1.

FIG. 3 is a top perspective view of the combined pump and reservoir unit.

FIG. 4 is a side elevational view of the motor and pump unit removed from the reservoir assembly of FIG. 1 taken from the right side of FIG. 1.

FIG. 5 is a side elevational view taken from the left side of FIG. 4 or the right side of FIG. 2.

FIG. 6 is a bottom plan view taken from the bottom of FIGS. 4 and 5.

FIG. 7 is a fragmentary transverse vertical sectional view taken upon the line 7—7 of FIG. 6 showing the internal construction.

FIG. 8 is a fragmentary vertical offset transverse sectional view taken upon the line 8—8 of FIG. 6.

FIG. 9 is a fragmentary horizontal sectional view taken upon the line 9—9 of FIG. 8.

FIG. 10 is a transverse vertical sectional view taken upon the line 10—10 of FIG. 8.

FIG. 11 is a fragmentary transverse vertical sectional view taken upon the line 11—11 of FIG. 6 upon an enlarged scale as compared to FIG. 6.

FIG. 12 is a fragmentary offset transverse horizontal view taken upon the line 12—12 of FIG. 1 upon an enlarged scale as compared to FIG. 1.

FIG. 13 is a fragmentary transverse vertical sectional view taken upon the line 13—13 of FIG. 12.

FIG. 14 is a fragmentary transverse vertical sectional view taken upon the line 14—14 of FIG. 1.

FIG. 15 is a side elevational view similar to FIG. 4 but of an alternative embodiment.

FIG. 16 is an end elevational view of the alternative form of pump and motor unit as shown in FIG. 15 taken from the left side of FIG. 15.

FIG. 17 is a fragmentary side plan view of the pump unit taken from the line 17—17 of FIG. 16.

FIG. 18 is a diagrammatic transverse sectional view partly in section showing an alternative form of filter and pump arrangement.

FIG. 19 is a transverse sectional view upon an enlarged view showing a filter cup unit which may be employed with the pump unit of FIGS. 15 to 18 upon an enlarged scale as compared to FIGS. 15 and 18, taken from the line 19—19 of FIG. 18.

FIG. 20 is a transverse vertical sectional view showing an alternative form of a filter cup unit similar to FIG. 19, also shown upon an enlarged scale as compared to FIGS. 15 and 18.

Referring to FIGS. 1 and 2, there is shown a reservoir A which may have an upper settling chamber B for any returned oil.

The reservoir may also have a reduced height portion C which serves as a pump housing and also carries the removable filter unit F.

The reservoir A is provided with removal covers D and E which permits access to the settling chamber B and to the pump housing C, said pump housing forming part of the reservoir.

As shown in FIGS. 1 and 2, the cover E also carries the outlet connection G to the external distribution system, the bypass adjustment H and the drive motor J.

This drive motor may be a shaded pole sealed bearing motor of the totally enclosed fan type with 1/30 horsepower.

It is desirably single phase, 115 volt and 60 cycle type and has also a starting amperage of 1.9 and a running amperage of 1.3.

The electrical connections to the motor are indicated at K, and they may be suitably provided with a switching arrangement which will set the motor in operation for a predetermined short period before the machine is actually started.

Desirably the auxiliary cover D is provided with a filler L.

Referring particularly to the pump structure itself, there is a pump body M depending from the cover E which has a main pump shaft N (see FIGS. 7, 8 and 9), a follower vane P and a conical sintered metal filter unit Q (see FIG. 12) forming part of the filter unit F.

The outside of the reservoir is also provided with a sight glass R shown in side view in FIG. 1 and in section in FIG. 14.

Referring particularly to FIGS. 1, 2 and 3, the covers D and E will be held in position by means of the corner bolts or screws 20 and 21 on the walls of the reservoir A.

As indicated in FIG. 1, gaskets 22 and 23 may be employed to provide a lubricant tight connection.

On the cover D, the filler connection L has an inlet tube 24 with a hinge cover 25 permitting addition of lubricant when required.

The motor J as indicated in FIGS. 7 and 8 has a projecting lower insert element 26 which fits into the recess 27 in the upper portion of the cover E.

The motor shaft has an extension 28 which projects into the central portion 29 of the cover.

The cover E has an integral downward extension forming the pump body M and the recess 27 which communicates with the smaller recess 30 in the upper part of the pump body M which receives the annular sealing member 31.

The sealing member as shown in FIGS. 7 and 8 has an outside leg 31 resting against the wall of the recess 30 and an inside oblique leg 32 riding against the shaft extension 28 of the motor J.

The shaft extension 28 has a lower flat projection 33 which projects into the slot 34 at the upper end 35 of the main pump shaft N (see FIGS. 7 and 8).

The recess 30 also is provided with an oblique downward passage 36 which will permit any lubricant flowing into the recess past the shaft N to flow outwardly and back to the reservoir A.

The shaft N fits into the bore 37 of the pump body M (see FIGS. 7 and 8), and it has an eccentric portion 38 which serves together with the vane P to create a flow of lubricant under pressure.

The cup shaped vane P will ride in the transverse bore 39 and will be pressed against the eccentric portion 38 by the coil spring 40 (see FIGS. 8 and 9).

The bore 39 has an enlarged outer tapped portion 41 which receives the sealing nut 42 which holds the spring 40 in position and compresses the same (see FIGS. 8 and 9).

The lower end of the shaft N has a reduced diameter extension 43 which carries the sleeves 44 and 48. The sleeve 48 is held in position by the set screw 45 accessible through the opening 46 in the side of the pump body.

The sleeve 44 is held in position by the spun over head 47 of the pin extension 43. The sleeve 44 and extension 43 are press fitted together.

The end of the bore will be sealed by means of the insert 49 which has sufficient clearance so as not to contact the peened over portion 47 of the pin 43.

The lower end of the pump body M as shown in FIG. 7 has a threaded recess 60 which is sealed by the plug 61

which terminates at 62 short of the inner face 63 of the recess 60 so as to form a pump inlet chamber 64.

The plug 61 has an enlarged shoulder 65 (see FIGS. 7, 8 and 13) which enlarged shoulder 65 has an O-ring 66 forming a seal.

The plug 61 has an extension 67 (see FIGS. 8 and 13) which has a groove carrying the O-ring 68.

This extension 67 is fitted into the circular bore 69 in the base 70 of the pump housing C.

The central bore 71 through the plug will serve as the main inlet for the lubricant to the pump M–N from the filter unit.

In FIG. 13, it will be noted that the extension 67 terminates at 72 above the end of the bore 69 so as to leave an inlet chamber 73.

This inlet chamber 73 receives lubricant through the transverse bore 74 which leads to the side or face 75 of the pump housing C.

The removable filter unit F is mounted upon the side or face 75 by means of the bolts 85 with the intervening gasket 86 forming a lubricant tight connection (see FIGS. 12 and 13).

The removable filter unit F has a plate 87 mounted by the bolts 85 on the face 75.

This plate 87 will fit in the shallow recess 88 in the lower left hand corner of the unit as shown in FIGS. 1, 12 and 13.

The bore 74 communicates at 89 through the gasket 86 with the short transverse bore 90 in the plate 87.

This bore 90 in turn communicates with the transverse bore 91 sealed at its end by the plug 92.

The bore 91 then leads into the transverse bore 93 and into the interior chamber 94 of the filter Q.

The chamber 94 is formed by the sintered metal unit Q which has the conical sides 95 and the top 96.

The top 96 has a central opening 97 which receives the tubular projection 98 having the tapped central portion 99.

The tapped central portion 99 receives the threaded rod 100 which extends through the chamber 94.

The other threaded end 101 fits into a tapped opening 102 in the plate 87 (see FIG. 12) and draws the tubular projection 98 of the clamping member 103.

The clamping member 103 has a lower recess 104 which receives the gasket or member 105 which presses down on the top of the conical member 96.

The cone 95 will be enclosed within a chamber 106 formed by the side walls 107 having the in flow openings 108 (see FIG. 12).

The lubricant will flow inwardly from the reservoir area 109, through the opening 108, into the chamber 106, through the sintered metal unit Q, through the bores 90, 93, 91 and 74 and into the opening 73 (see FIGS. 12 and 13).

It then will flow from the chamber 73 up through the bore 71 into the relatively flat chamber 64 (see FIGS. 7, 8 and 13).

From the flat chamber 64, the lubricant will flow past the ball check valve unit 120 (see FIG. 7) which is fitted into a recess 121 in the lower part of the body M of the pump.

This ball check valve has a ball 122 pressed down by the spring 123.

The lubricant will flow past the ball check valve into the chamber 124 and then into the right angled bore 125 to flow into the pump chamber formed by the eccentric portion 38 of the rotating pump shaft N.

The lubricant will then be forced out into the bore 126 (see FIG. 7) and thence into the outlet connection 127.

The outlet connection 127 is held securely in position against the gaskets 129.

The outlet connection 127 forms part of the adapter 130 (see FIG. 5) which has an outlet connection 131 connected to the tube 132 (see FIGS. 5 and 6).

The compressed coupling connection 133 will establish a tight connection between the tube 132 and the unit connection 131.

The lubricant will then flow through the tube 132 (see FIGS. 4 and 5) to the unit 135 having the compressed coupling connection 134.

The unit 135 is best shown in FIG. 11, and the connection 134 will lead into the tapped socket 136 having the recess 137 which communicates with the tapered bore 138 controlled by the conical member 139 of a needle valve.

As shown in FIG. 11, the unit 135 has a threaded extension 140 which is threaded through the opening 141 in the cover E.

The conical head 139 of the needle valve unit has the reduced diameter portion 143 and intermediate enlargements 142 and 144, and it also has an enlarged threaded extension 145 which fits into the tapped recess 146.

The reduced diameter portion 143 contains a sealing O-ring 142*a* to prevent oil leakage along threaded extension 145 and the conical valve 139.

The outer threaded projecting portion 147 receives a cap 148 forming part of the bypass unit H.

The inner threaded recess 149 of the cap H may be applied to the threaded extension 147 to close off the adjustment. A lower recess 162*a* contains a gasket 162.

When the cap H is removed, the fillister slot 150 in the top of the threaded portion 145 of the needle valve is accessible and the conical portion 139 may be elevated or lowered so as to permit a greater or a smaller amount of lubricant to bypass such needle valve.

Above the conical head 139 in the body 135 is the transverse bore 151 which is plugged at 152 in the side of the body 135.

There is another transverse bore 153 in FIG. 11 which will then permit the lubricant to flow downwardly in the chamber 154 and thence by the compression coupling connection 155 into the tube 156.

It is possible to adjust the clearance between the conical head 139 and the tapered bore 138 permitting lubricant to bypass from the outlet tube 132 back into the tube 156 from which it will pass into the compression coupling connection 155 in the body M of the pump (see FIG. 7).

It will pass via the bore 158 into the flat chamber 64 and through the ball check valve unit 120 (see FIG. 7), to the inlet bore 125 to the eccentric recess 38 and then again to the outlet connection at 127 in FIG. 7.

The tubing 156 is connected by the compression coupling connection 161 to the projection 160 through the side of the body M (see FIGS. 5, 6, and 10), through which the bore 157 of FIG. 8 extends.

The main outlet connection tube 180 which leads to the adapter fitting 181 mounted on the underside of the cover A by the screw connection 182 is connected by means of the adapter 183 and the compression coupling connection 184 to the member 185 which carries the blow off valve 186.

This blow off valve will relieve any excess pressure created by the pump and by the coaction of the eccentric 38 and the cup shaped follower vane P as shown in FIGS. 8 and 9.

This blow off valve 186 will prevent excessive pressures being fed into the line by the outlet pipe 180 and the outlet connection G to the outside distributing system.

The lubricant is fed from the pump formed by the eccentric 38 and the vane follower cup by the internal system as best shown in FIG. 9 where the outlet bore 126 of FIG. 7 has a transverse bore connection 187 leading to the recess 41.

The threaded recess 41 receives the closure nut 42 which holds the spring 40.

The lubricant will flow into the shallow chamber 188 and then through the oblique bore 189 into the outlet bore 190 of the threaded extension 191 of the member 185 and thence to the tubing 180 to the outlet system G.

To summarize the operation of the pump, the filtered lubricant will normally be removed through the bore 71 of FIG. 7 from the chamber 73 which is shown in FIG. 12 and receives filtered lubricant from the conical sintered filter Q through the passageways 93, 91 and 74.

The lubricant will then pass through the shallow chamber 64 directly below the pump unit and in the pump body M (see FIGS. 7, 8 and 13).

The lubricant tight seal is formed between the chamber 73, and the shallow chamber 64 by means of the O-ring 68 which encircles the extension 67 and makes a seal between the extension 67 and the walls of the chamber 73 into which it is inserted.

The lubricant will then flow from the shallow pump inlet chamber 64 past the inlet check valve 122 which is spring pressed (see FIG. 7).

The O-ring 66 as indicated in FIGS. 7, 8 and 13 will seal the chamber 64 and also will provide a lubricant tight connection between the plug 61 and the lower part of the pump body M into which the plug 61 is screwed by means of the threaded recess 60.

The lubricant after it passes the check valve unit 120 and the ball check 122 will pass into the chamber 124 and through the ring annular bore 125 into the eccentric chamber formed by the eccentric 38 (see FIG. 7).

The lubricant will then pass from the inlet passageway 125 as shown in FIG. 9 to the outlet passageway 126.

The lubricant from this point has two paths to follow: one to the bypass unit H and the other to the external distribution system as indicated at G (see FIGS. 1 and 4).

The lubricant that passes to the external system will flow through the bore 126 and into the transverse bore 187 as shown in FIG. 9.

It will pass from the bore 187 into the chamber 188 under the nut 42 which chamber communicated with the bore 39 in which the cup shaped vane P will operate, thus exerting pump pressure upon the back of the vane on the side opposite that which rides upon the eccentric 38 of the pump shaft N (see FIG. 9).

The lubricant which is to be discharged to the external system will pass through the oblique bore 189 in the nut 42 through the passageway 190 into the three-way connection element 185.

The lubricant to the external line will then pass through the adapter connection 183 past the compression coupling arrangement 184 and the tubing 180 to the adapter 181 and to the external distribution system formed by the connection G.

Any excess lubricant pressure will be relieved at the safety or blow off valve 186, such valve being shown in FIGS. 4, 5 and 8.

At the same time to prevent excess lubricant to be passed into the external line, a bypass connection is provided at 126 through the outlet connection 127 forming part of the adapter 130 and through the connection 131 to the tube 132 which leads to the body 135 of the bypass unit.

By removing the head 149 and adjusting the conical member 139 in respect to the conical bore or recess 138, a predetermined amount of proportion of lubricant may be fed back through the bores 151 and 153 of FIG. 11 through the tubing 156 into the bore 157 (see FIGS. 8 and 10) and through the transverse short bore 158 back into the inlet chamber 64 where it may be picked up again by the pump consisting of the shaft and the follower cup P.

The elbow or adapter fitting 130 may receive a check valve if desired, the spring of which may be set to permit bypassage of lubricant only when a certain pressure is exceeded by the pump.

Normally, the major portion of the lubricant should pass through the internal bore system through the bore 187 of FIG. 9 to the outlet tube 180 with the pump pressure being applied to the reverse side of the vane as indicated in FIG. 9 to give a balanced pressure.

The lubricant which is bypassed through the body 135 may be used to give an adjustment to regulate the flow which is bypassed to the pump and which will also control the pressure at the outlet of the pump.

The opening or closing of the bypass valve will also regulate the outlet pressure of the pump since moving the conical nose element 139 from the conical recess 138 will reduce the pressure and the amount of oil flowing to the external system through the connection G while closure of the conical nose 139 against the recess 138 will increase the pressure and oil flow to the external system.

The blow off valve 186 may be set for a definite valve pressure to safeguard the system or may be adjustable to limit the maximum pressure which may be applied to the external system at any time.

Desirably, the pump unit supplies a constant flow of lubricant into the external system, and it gives a constant delivery once the conical valve member 138–139 of FIG. 11 has been regulated.

The use of pump pressure to exert a pressure on the back of the vane in addition to the pressure of the spring 40 will assure a constant flow at all times.

Pressures higher than the spring pressure will be permitted and at the same time the discharge will adjust itself with the change of oil viscosity to attain a constant volume of oil discharge, with the pressure varying with the change in the oil viscosity.

It is desirable to use a non-compounded clean lubricant mineral oil, the viscosity of which may be changed in accordance with the requirement of a particular machine.

The bypass valve 138–139 of FIG. 11 is desirably set when the machine is at operating temperature and when the flow of oil at the various bearings is observed.

At such time the valve 138–139 of FIG. 11 may be closed to give additional flow and greater lubricant pressure or opened to give less flow and less oil pressure.

It will be noted that the entire pump assembly may be readily removed by removing the cover E.

The cover E when removed will permit servicing the motor J, the pump unit as well as the various connections.

Desirably, the motor J is wired into the circuit of the machine so that it will be started before the machine is started and so that a lubricant pressure will be developed in the external system from the outlet connection G, to lubricate the machine before it operates.

The unit is very compact and may have a length of about 10", a width of about 4½" and a height of about 9 3/16" with the motor attached.

The sintered metal filter unit 95 of FIG. 12 is desirably of such construction that it will remove particles ranging from 50 microns and up, and it can be readily replaced by removing the bolts 85 and the plate 87 or it can be flushed out by compressed air without dismantling the lubricator by applying air at the opening 241 after removing the plug 240 (see FIG. 12).

Where the lubricant is circulated back to the reservoir, the upper chamber B may consist of a settling chamber separated by the wall indicated by the dotted lines 200 from the main reservoir A, with the return inlet connection 201 from the external system.

Alternate return parts may be provided from the external system at 202 and 203 if desired (see FIG. 1).

The drain plug 204 may be positioned so that the upper settling chamber B may be readily flushed out of any dirt that has collected therein.

The mounting arrangements for this unit may either consist of the ridges 205 at each short side of the base of the reservoir which may have threaded openings 206 to receive mounting bolts not shown at each corner. The reservoir may also be mounted upon the openings 207 positioned on both sides of the reservoir as indicated in FIGS. 1 and 2.

The bottom mounting 205–206 will normally consist of four ¼–20" tapped holes in the bottom.

The side mounting will consist of two sets of 13/32" diameter horizontal holes at the sides of the unit.

Such a mounting is particularly suitable for mounting upon 3/8" diameter studs or bars.

It is not necessary that the lubricant unit be perfectly horizontal since it may be mounted at an inclination to the horizontal as indicated by the angle **208** (see FIG. 1) permitting angular mounting up to 30 degrees from the end opposite the filter and pump unit as best shown in FIG. 1.

This will not adversely affect the operation of the lubricator.

Oil and dirt may be conveniently drained from the settling chamber B by means of the plug **204** which will also permit flushing of the settling chamber.

The top of the settling chamber may also be provided with a flush plug **209** (see FIG. 3).

The use of the settling chamber B will relieve the conical sintered filter **95** of a burden of removing an excessive amount of particles or dirt from the oil when the system is used as a return system.

The plug **210** shown on the side of the main reservoir unit A will permit drainage and flushing of the main lubricant reservoir alongside of the filter unit and particularly the space **211** as shown in FIGS. 12 and 14.

As indicated in FIG. 14, the level of lubricant in the reservoir may be readily indicated by the sight glass R.

The passages **108** in FIG. 12 permit oil from the reservoir to flow into the chamber **106** holding the sintered filter Q.

The oil or level gauge R as shown in FIG. 14 is positioned in a recess **213** in the side of the main reservoir body (see FIGS. 1 and 14).

The level indicator consists of a transparent tube **214** which extends vertically through the recess and at its lowered end presses down on the seal **215** in the recess **216**.

Extending through the seal is the short nipple **217** which has a flared lower end **218** positioned against the shoulder **219**.

Lubricant will flow into the bottom end of the tubular sight glass **214** from the recesses **220** and the vertical bore **221** which will communicate through **214** (see FIG. 14).

The upper end of the sight glass **214** fits into the recess **222**.

The upper portion of the recess **222** is threaded as indicated at **223** and it receives the threaded plug **224** which presses down the annular seal **225** up to the upper end of the tubular sight glass **214**.

The threaded plug **224** has a nipple like extension **226** into the upper end of the tubular sight glass **214**.

The tubular sight glass **214** will indicate at its lowermost portion **227** the minimum oil level that should be maintained in the reservoir A, and at its upper portion **228** will indicate the full position.

Additional lubricant may be added through the oil filler cap L shown in FIGS. 1, 3 and 12.

After the oil has been settled in the upper chamber B, it is returned by means of the passageway **229** which forms the only means of communication of the settling chamber B and the main resrevoir A.

This oil inlet filler L may be directly above the passageway **229**.

This passageway **229** may be bored vertically in through the enlargement **230** in the side of the upper settling chamber B, or it may be cast integral with the reservoir.

The motor J is mounted by the threaded bolt and nut connections **231** (see FIGS. 5 and 6) and upon lifting of the cover, the motor may be readily removed by removing the nuts of these bolt and nut connections **231** for servicing or replacement.

In the alternative arrangements of FIGS. 15 to 20, correspondingly functioning parts as shown in FIGS. 1 to 14 are indicated by the same numerals but are provided with a superior one or prime in FIGS. 15 to 17, and are provided with a superior two in FIG. 18.

Essentially the units as shown in FIGS. 15 and 20 are designed with a non-return system where the lubricant is fed out to the bearings and is not returned to the reservoir.

In such a case, the sintered filter unit Q of FIG. 12 may be omitted and a settling chamber B may also be eliminated.

In such a case, a single rectangular reservoir (not shown) may be utilized and the unit may be mounted either vertically or horizontally as the case may be.

In FIG. 15 is shown a horizontal mounting with the cover E' having a vertically position and with the axis of the motor J and with the axis **300** of the motor and pump being horizontal.

In this case, the boss **301** is used as an inlet connection and it has a double threaded end tubular connection **302** to the cup shaped filter unit **303**.

FIG. 19 shows one type of filter unit with a hexagonal head **304** having a threaded opening **305** to receive the lower threaded end **306** of the sleeve **302**.

The head **304** by means of the turned in or swaged portion **307** receives the base **308** of the cup shaped filter **303**.

The base **308** has the flat portion **309** which the superimposed screens **310** abut.

These screens are peripherally held in position by means of the annular gasket or sealing ring **311**.

The ring **311** is held in position by means of the clamping ring **312** which is held in position by means of the snap ring **313** fitting into the recess **314** in the skirt **315** forming the side of the filter housing **303**.

The ring **311** may be made of either rubber or felt.

On the alternative unit of FIG. 20, the filter housing or cup unit **316** at its base **317** is held by the swaged over portions **318** of the hexagonal connector **319** having the threaded bore **320**.

The sealing O-ring gasket **321** is positioned against the outer flat portion **322** and in the corner **323** of the cup.

Pressed against this O-ring **321** is the sintered metal filter disc **324** which is held in position by the snap ring **325** fitting in the ridge **326** of the skirt **327**.

Either unit of FIG. 19 or FIG. 20 may be used in connection with the pump units of FIGS. 15 to 18 to give a filtering effect as far as non-return lubricant is concerned which is received in the reservoir without being returned from any bearings.

In FIGS. 15, 16 and 17, the plug **61'** will be threaded into the tapped socket **60'** with the O-ring **66** giving the seal.

There will be no extension such as **67** in FIG. 13, and there will be no bore **71** through the plug **61'** and the pump inlet chamber **64'** will receive lubricant from the filter unit **303** which will be supplied through the bores **335** and **336** (see FIGS. 15 and 16).

These bores will lead into the bore system **157** and **158** as shown in FIGS. 8 and 10.

In the unit of FIG. 18 is diagrammatically shown an alternative without the connecting tubing and without the motor of a cover E^2 and which is carrying a pump body M^2 and a filter unit 303^2. The connection here is made through the pipe or tubing 302^2 directly into the plug 61^2.

The reservoir **350** is a rectangular shape and the cover E^2 may carry the motor J, the bypass adjustment H and the outlet connection G^2 (all of which are not shown).

The filter unit 303^2 may be of the construction as shown in FIGS. 19 and 20.

The tubing connections and various internal bores are the same as those shown in FIGS. 1 to 17.

Lubricant will flow from the filter through the bore 335^2 and then into a bore similar to **71**.

In the units of FIGS. 15 to 18, the covers E' and E^2 may be mounted directly upon a machine housing in which a recess serves as a reservoir or is formed in the structure itself.

In the unit as shown in FIGS. 15 to 18, the outlet connection may be made at G' in FIGS. 15 and 16, and G^2 in FIG. 18, and these may be connected at right angular outlet bores **351** which will permit connection by the sockets **352** to a suitable outlet piping connection.

However, if desired, an internal bore system may be fed from the connection **353** as indicated in FIG. 16 which can have a suitable gasket sealed to an internal bore system in the machine and there need be no external tubing.

As many changes could be made in the above lubrication, and many widely different embodiments of this invention could be made without departing from the scope of the claims, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense.

Having now particularly described and ascertained the nature of the invention, and in what manner the same is to be performed,

What is claimed is:

1. In a centralized lubricating installation for distributing lubricant to spaced bearings in and about a mechanism, a reservoir, a central pump detachably mounted on said reservoir comprising a detachable cover having mounting means, a drive arrangement carried on the top side of the cover, a pressure and volume adjustment and an outlet connection mounted on the cover, a pump body on the other side of the cover, a central shaft extending across the top of the cover and through the body and driven by said arrangement, said shaft having an eccentric recessed portion forming a pump chamber, a spring pressed follower vane riding in said recess located transversely to the shaft, inlet and outlet bore systems in the pump body having opposite inlet and outlet ports at the eccentric portion and tubing connections to said chamber and to said recess on the side of the vane away from said shaft, means to regulate the pressure and volume discharge of said pump connected to said systems and also from said outlet system to the outlet connection.

2. In a centralized lubricating installation for distributing lubricant to spaced bearings in and about a mechanism, a reservoir, a central pump detachably mounted on said reservoir comprising a detachable cover having mounting means, a drive arrangement carried on the top side of the cover, a pressure and volume adjustment and an outlet connection mounted on the cover, a pump body on the other side of the cover, a central shaft extending across the top of the cover and through the body and driven by said arrangement, said shaft having an eccentric recessed portion forming a pump chamber, a spring pressed follower vane riding in said recess located transversely to the shaft, inlet and outlet bore systems in the pump body having opposite inlet and outlet ports at the eccentric portion and tubing connections to said chamber and to said recess on the side of the vane away from said shaft, means to regulate the pressure and volume discharge of said pump connected to said systems and also from said outlet system to the outlet connection, said outlet bore system having an internal bore connection to the opposite side of the follower vane from that riding in said recess.

3. In a centralized lubricating installation for distributing lubricant to spaced bearings in and about a mechanism, a reservoir, a central pump detachably mounted on said reservoir comprising a detachable cover having mounting means, a drive arrangement carried on the top side of the cover, a pressure and volume adjustment and an outlet connection mounted on the cover, a pump body on the other side of the cover, a central shaft extending across the top of the cover and through the body and driven by said arrangement, said shaft having an eccentric recessed portion forming a pump chamber, a spring pressed follower vane riding in said recess located transversely to the shaft, inlet and outlet bore systems in the pump body having opposite inlet and outlet ports at the eccentric portion and tubing connections to said chamber and to said recess on the side of the vane away from said shaft, means to regulate the pressure and volume discharge of said pump connected to said systems and also from said outlet system to the outlet connection, said outlet bore system having a valve to limit the pressure created by said pump.

4. In a centralized lubricating installation for distributing lubricant to spaced bearings in and about a mechanism, a reservoir, a central pump detachably mounted on said reservoir comprising a detachable cover having mounting means, a drive arrangement carried on the top side of the cover, a pressure and volume adjustment and an outlet connection mounted on the cover, a pump body on the other side of the cover, a central shaft extending across the top of the cover and through the body and driven by said arrangement, said shaft having an eccentric recessed portion forming a pump chamber, a spring pressed follower vane riding in said recess located transversely to the shaft, inlet and outlet bore systems in the pump body having opposite inlet and outlet ports at the eccentric portion and tubing connections to said chamber and to said recess on the side of the vane away from said shaft, means to regulate the pressure and volume discharge of said pump connected to said systems and also from said outlet system to the outlet connection, said pump having inlet and outlet check valves and having an inlet chamber into which lubricant is fed from said adjustment.

5. In a centralized lubricating installation for distributing lubricant to spaced bearings in and about a mechanism, a reservoir, a central pump detachably mounted on said reservoir comprising a detachable cover having mounting means, a drive arrangement carried on the top side of the cover, a pressure and volume adjustment and an outlet connection mounted on the cover, a pump body on the other side of the cover, a central shaft extending across the top of the cover and through the body and driven by said arrangement, said shaft having an eccentric recessed portion forming a pump chamber, a spring pressed follower vane riding in said recess located transversely to the shaft, inlet and outlet bore systems in the pump body having opposite inlet and outlet ports at the eccentric portion and tubing connections to said chamber and to said recess on the side of the vane away from said shaft, means to regulate the pressure and volume discharge of said pump connected to said systems and also from said outlet systems to the outlet connection, said reservoir having a conical sintered filter unit to remove dirt and grind from any returning oil.

6. In a centralized lubricating installation for distributing lubricant to spaced bearings in and about a mechanism, a reservoir, a central pump detachably mounted on said reservoir comprising a detachable cover having mounting means, a drive arrangement carried on the top side of the cover, a pressure and volume adjustment and an outlet connection mounted on the cover, a pump body on the other side of the cover, a central shaft extending across the top of the cover and through the body and driven by said arrangement, said shaft having an eccentric recessed portion forming a pump chamber, a spring pressed follower vane riding in said recess located transversely to the shaft, inlet and outlet bore systems in the pump body having opposite inlet and outlet ports at the eccentric portion and tubing connections to said chamber and to said recess on the side of the vane away from said shaft, means to regulate the pressure and volume discharge of said pump connected to said systems and also from said outlet system to the outlet connection, said installation having a return system and said reservoir having a settling chamber for said return system and also having a main reservoir chamber with an overflow from the settling chamber to the main reservoir chamber and said main reservoir chamber having a pump inlet compartment and a

filter means to position between the reservoir chamber and the pump inlet compartment.

7. In a centralized lubricating installation for distributing lubricant to spaced bearings in and about a mechanism, a reservoir, a central pump detachably mounted on said reservoir comprising a detachable cover having mounting means, a drive arrangement carried on top side of the cover, a pressure and volume adjustment and an outlet connection mounted on the cover, a pump body on the other side of the cover, a central shaft extending across the top of the cover and through the body and driven by said arrangement, said shaft having an eccentric recessed portion forming a pump chamber, a spring pressed follower vane riding in said recess located transversely to the shaft, inlet and outlet bore systems in the pump body having opposite inlet and outlet ports at the eccentric portion and tubing connections to said chamber and to said recess on the side of the vane away from said shaft, means to regulate the pressure and volume discharge of said pump connected to said systems and also from said outlet system to the outlet connection, said outlet bore systems having split connections one to the adjustment and the other to the outlet connection, said reservoir unit also carrying a filter inlet unit for the pump and a detachable mounting plate on the side of the reservoir for said filter unit.

8. A pump unit for a centralized lubrication installation having a plurality of high restriction flow metering outlets and a branched distributing conduit system with a single inlet from a pump and a plurality of distribution outlets communicating with bearings to be lubricated, said distribution outlets resisting discharge of lubricant from the pump and causing the build-up of pressure in said conduit system; a continuous rotary pump, said pump including a rotary shaft having an eccentric peripheral recess therein which is located intermediate its length, a cylindrical cup-shaped follower vane riding in said recess, said recess having walls perpendicular to the main axis of the shaft and a bottom portion parallel to the axis of the shaft, said follower vane having sides tangential to and contacting the walls of said recess and the bottom portion of the recess at all times, inlet and outlet conduits on opposite sides of said recess, conduit connections to the side of the follower vane opposite the shaft and adjacent the outlet conduit, a spring to press said follower vane against said recess, means to

adjust the pressure of said spring, a tubing system leading to and from said inlet and outlet conduits and to the inlet of said conduit system, and a reservoir for receiving said pump.

9. The pump unit of claim 8, with said reservoir having a cover detachably mounted thereon and said pump being dependently carried by said cover.

10. The pump unit of claim 8, with said pump having a shaft positioned vertically and said reservoir carrying a motor with a vertical shaft and said vertical shaft of said motor having a detachable driving connection to said pump shaft.

11. The pump unit of claim 8, with said pump having an elongated cylindrical body having an upper end and a lower end, a cover for the reservoir carrying said upper end, a pump inlet chamber at the lower end, a plug fitting in said lower end sealing said pump chamber and a recess in the reservoir receiving said plug.

12. The pump unit of claim 8, with said reservoir having a cover and a pressure and flow adjustment carried by said cover and connected to said tubing system.

13. The pump unit of claim 8, with said reservoir having a main reservoir chamber and a settling chamber side by side and an overflow from the settling chamber to the main chamber.

14. The pump unit of claim 8, with said reservoir having an inlet filter for the pump and means to detachably mount said filter on the side of the reservoir.

15. The pump unit of claim 8, with said recess having a single inlet and a double outlet and bores leading from said double outlet to said tubing system.

References Cited by the Examiner

UNITED STATES PATENTS

2,162,932	6/1939	Blanchard	184—7
2,308,815	1/1943	Kocher	184—27 X
2,426,817	9/1947	Charlton et al.	184—6
2,879,733	3/1959	Pierce	184—60 X
2,974,604	3/1961	Pierce	91—140 X
3,079,867	3/1963	Thomas	103—123

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