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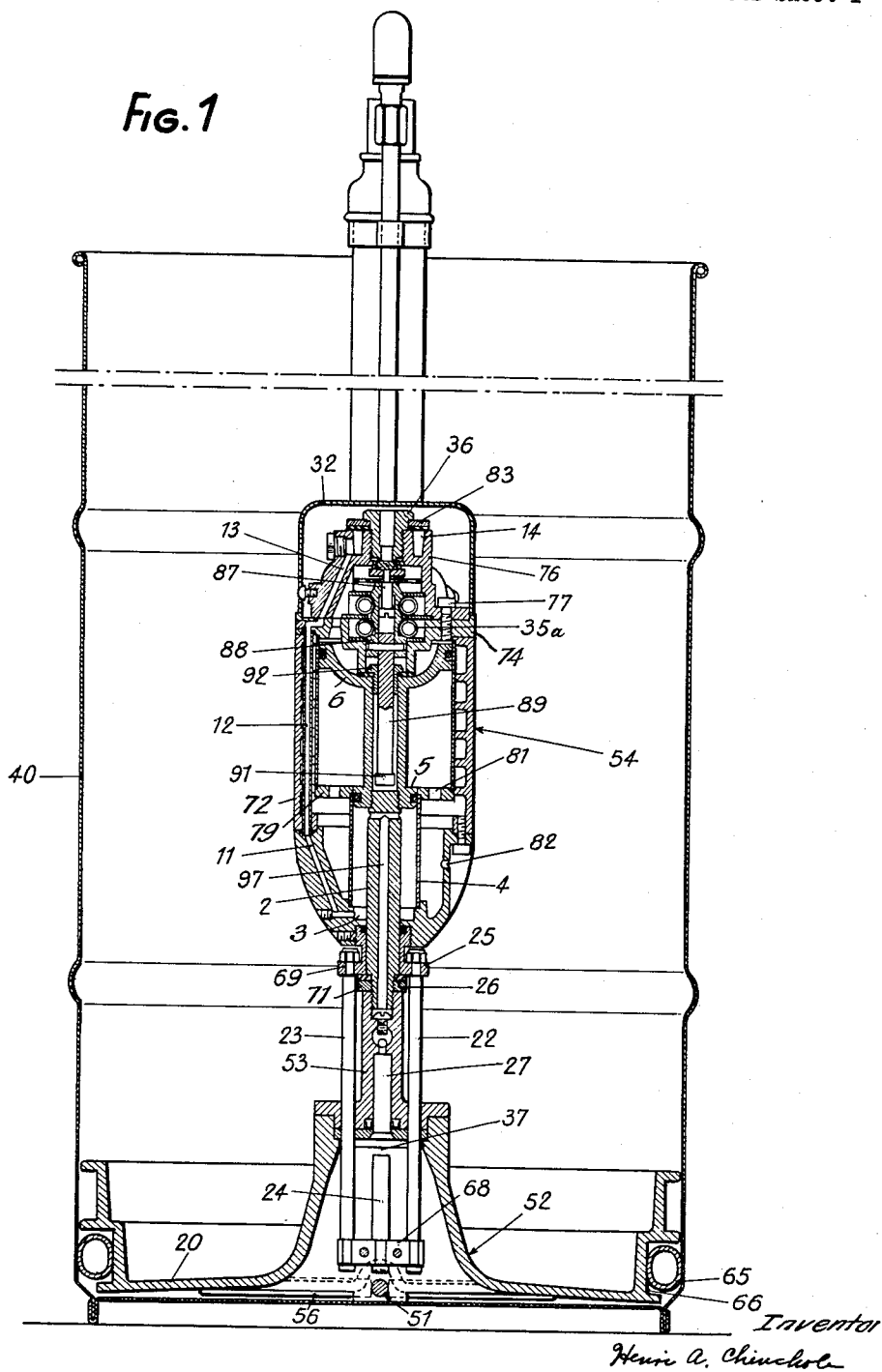
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DISPENSING DEVICE WITH MEANS TO CREATE A PERCUSSIVE EFFECT

Filed April 22, 1958

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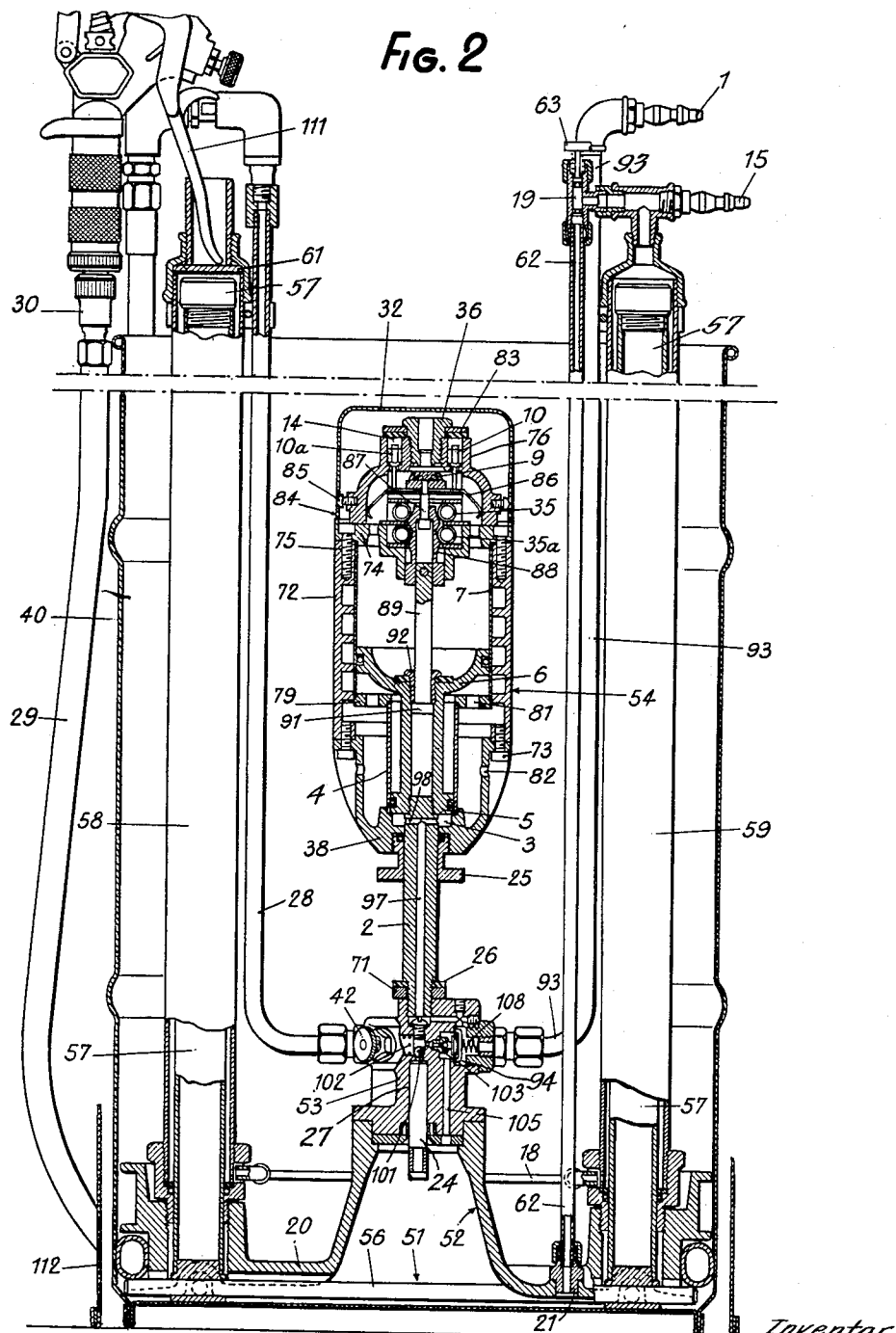
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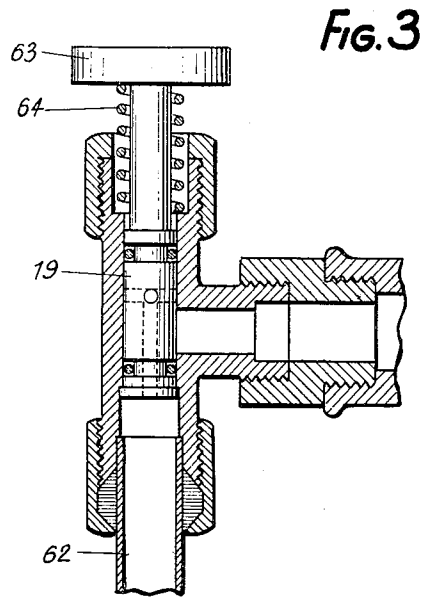
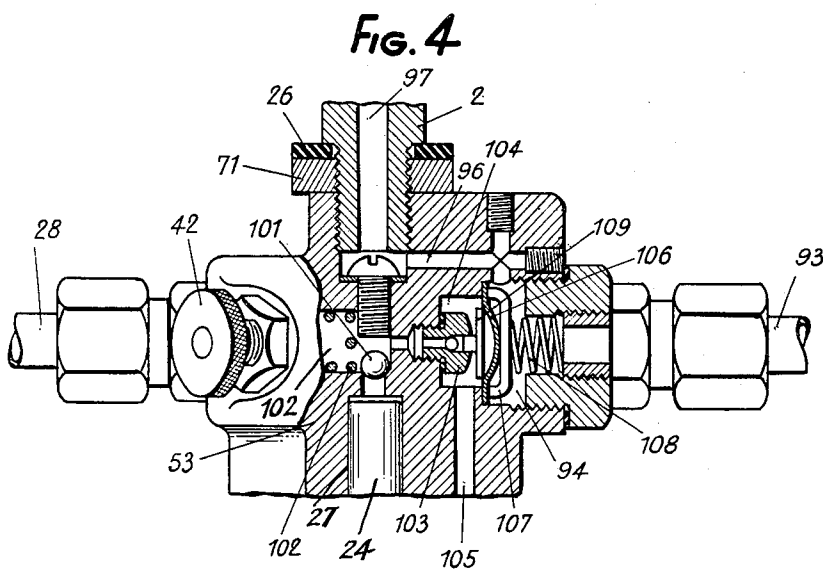
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DISPENSING DEVICE WITH MEANS TO CREATE A PERCUSSIVE EFFECT

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The present invention relates to grease pumps intended to exhaust the grease barrels or drums found on the market for greasing vehicles. Usually these are forcing pumps extending right to the bottom of the drum and operated by an air motor situated above the drum.

Such pumps operate in a satisfactory manner with oils or greases capable of maintaining or quickly resuming their own horizontal level.

Unfortunately, the best grease being of a thick and fibrous body, the first emptying pulsations are efficient, but when approximately two-thirds of the drum is exhausted, the level of the grease sinks in the form of a funnel and the forcing pump loses its priming as soon as the air penetrates to the bottom of the funnel.

This inconvenience is partially eliminated by disposing, on the surface of the grease, a follower disc formed by a circular horizontal plate traversed by the pump and which, by atmospheric depression forces the grease to descend as a uniform whole. The inconvenience of this sort of disc is that it must adhere completely to the surface of the grease otherwise the air pockets incorporated dilate on depression and the disc no longer plays its part. In addition the extraction of these atmospheric discs from the bottom of the drum raises a difficult and sometimes insoluble problem.

The general object of the invention is to create a grease pump which does not present the above-mentioned inconvenience shown by pumps already in existence.

For this purpose, the grease pump according to the invention, which is of the type including a follower plate, is remarkable in that the body of the pump is incorporated with the said plate, by preference co-axially with this latter.

The invention also relates to the method of realization calling for at least one of the following features of novelty:

(a) The piston of the grease pump is operated by a motor also carried by the follower plate;

(b) The pump motor is an alternating compressed air motor;

(c) The motor is placed vertically and, at the end of the downward stroke, its mobile part strikes a stop provided on the follower plate which causes a percussion effect favorable to the uniform shaking down of the grease;

(d) The rod of the motor piston is integral with the follower disc, while the mobile cylinder serves as a percussion mass;

(e) The piston rod is hollow and serves to conduct the compressed air to the motor;

(f) The air motor piston is formed of a set of two elementary single stroke pistons, integral one with the other, one of these elementary pistons being the operating piston which assures the lifting of the mobile part of the motor and, at the same time, effects the working stroke of the grease pump; while the other elementary piston, or return piston, cooperates with the weight of the mobile part of the motor to make it descend;

(g) The return piston, which is of a smaller section than the operating piston, is permanently subjected to the pressure of compressed air, while the operating piston is only subjected to it during its downward run, the two

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elementary piston then forming, during the said operational stroke, a differential piston;

(h) The alternating supply of the compressed air necessary for the working of the motor is assured by a distributor integral with one of the parts of the motor and comprising at least an inlet valve and an outlet valve operated by means of a control connected to the other part of the motor;

(i) The distributor is integral with the mobile cylinder of the motor and forms part of the percussion mass;

(j) The working piston is situated over the return piston and the distributor, placed on the upper part of the cylinder, is connected to the lower end of the return piston permanently fed with compressed air;

(k) Air is admitted in the return cylinder by means of a cross-canal pierced in the piston rod, just under the lower surface of the return piston, and which has its outlet in an axial canal of the said piston rod, the said axial canal being connected to a compressed air supply;

(l) The outlet of the grease pump cylinder is equipped with an air coupler;

(m) The grease delivery chamber of the pump contains a discharger valve of which the outlet communicates with the space under the follower plate, and which is pushed into its closed position by a membrane submitted to the pressure of the compressed air admitted to the motor, so that when the supply of compressed air is stopped, the said discharger valve allows the pressure to fall in the grease delivery pipe;

(n) The follower plate, at least in its central part which carries the body of the grease pump, is in the form of a bell;

(o) The circumference of the follower plate is equipped with a sealing joint intended to rub against the inner wall of the grease drum;

(p) The grease pump piston is fixed in the center of a cross-piece placed under the follower plate. The ends of this cross-piece are connected by two vertical rods sliding through the said plate and integral with the mobile part of the vertical alternating motor, the stroke of the said grease pump piston being long enough for it to emerge completely from the body of the pump, at the base, at the end of its downward stroke and thus permit the grease to enter in the said pump body;

(q) The follower plate is mounted in such a way as to be able to slide on the vertical guides integral with a supporting base situated under the said plate and widely open to let the grease pass through;

(r) Each of the vertical guides is constituted by a jack, by preference pneumatic, intended to act at the same time for the raising of the follower plate and of the whole motor mechanism, after exhaustion of the grease;

(s) The piston of each jack is integral with the supporting base and the cylinder integral with the follower plate;

(t) The follower plate is pierced by an air-hole;

(u) The air-hole is equipped with a connection for a compressed air supply in order to assure the beginning of the separation of the plate from the bottom of the exhausted grease drum;

(v) The air-hole is supplied with compressed air by a duct connected, by means of a tap, to the air supply of the pneumatic jacks.

The invention will be understood better after perusal of the following description and examination of the annexed drawings which show, by way of an unrestrictive example, a method of realizing this invention.

In these drawings:

FIGURE 1 represents diagrammatically, in diametrical vertical section, a percussion follow-up pump for vehicle greasing, according to the invention, disposed in a drum supposed to be already empty;

FIGURE 2 is another vertical section of the same

pump, made along a perpendicular plane of the plane section of FIGURE 1; and

FIGURES 3 and 4 are sectional views, on a larger scale of certain of the details of FIGURE 2.

The percussion follow-up pump for vehicle greasing according to the invention, essentially comprises a supporting base 51, a follower unit 52 which carries the body of the pump 53 and an air motor unit 54 which at the same time serves as a percussion device.

The supporting base 51 includes the cross-pieces 56 suitably stayed and destined to support the whole pump unit when this latter is not in the grease drum, or else when the drum in which it has been placed is exhausted. The jack cylinders 58 and 59 slide on the two pneumatic jack rods 57, of which the lower ends are integral with the supporting base 51. Each jack rod 57 is constituted by a tubular component closed at its two ends. The cylinders 58 and 59 of the two jacks are fixed, by their lower ends, to two diametrically opposed points of a disc or follower plate 20 which constitutes the principal part of the follower unit 52. The upper end of the jack cylinder 58 is blocked by a stopper 61, while the upper end of the jack cylinder 59 is connected to the nipple 15 comprising the compressed air inlet. In addition the lower ends of the two jacks are connected by a duct 18. The follower plate 20 is pierced by a hole in which is screwed a coupling 21 also connected by a pipe 62 and a lateral valve 19, to the mouth-piece 15 (see in particular FIGURE 3). The valve can be brought temporarily into the open position for as long as one presses on the push button 63, in opposition to a release spring 64.

The diameter of the follower plate 20 is sensibly equal to the interior diameter of the drum 40 of the grease to be distributed, so that it can slide in the latter. A tubular toric joint 65, placed in the annular groove 66 of the plate, assures the tightness between this latter and the interior wall of the drum.

The central part of the follower plate 20 is in the form of a bell and supports the grease pump body 53, the piston 24 of this pump being fixed in the center of a mobile cross-piece 68 itself fixed on the two lower ends of two vertical rods 22, 23, which slide through the base of the pump body which forms the summit of the central bell of the follower plate.

The upper ends of the two rods 22, 23 are fixed to a flange 69 which constitutes the lower part of the motor unit 54. This flange slides vertically on the two single stroke pistons 5 and 6, together forming a differential piston fixed on the upper end of a hollow rod 2 which is screwed on the upper part of the pump body 53. Between the shoulder of the rod 2 and the upper face of the pump body an annular stop 71 is imprisoned, fitted with an elastic washer 26 against which the lower face of the flange 69 of the motor and percussion unit, strikes.

The motor unit 54 is essentially constituted by a cylindrical body 72, a conical nose 38 fixed to the lower part of this body 72, by screws 73, a cylinder head 74 fixed to the upper part of the said body by screws 75, and a distributor 76 fixed on this cylinder head by screws 77. The cylinder body 72 is fitted with a liner sleeve 7 which slides on the big piston or motor piston 6, while a sleeve 4 fixed on one hand to the conical nose 38 and on the other hand to a centering ring 79 integral with the sleeve 7, slides on the small piston or return piston 5. The casing space comprised between the two pistons 5 and 6 is in communication with the atmosphere by the holes 81 of the centering ring 79 and by the holes 82 of the conical nose 38.

The alternating supply device of the compressed air motor contains an annular admission chamber 14 provided in the distributor 76 and closed by an annular cover 83 maintained in place by a screwed stopper 36 which has an axial canal serving as an exhaust outlet for the compressed air from the motor. The distributor

76 is covered by a cylindrical hood 32, forming a damper, pierced by holes 84 and maintained in place by screws 85.

The distribution is carried out under the control of two inlet valves 10 and 10a situated in the inlet chamber 14. The closing of these inlet valves is governed by release springs (not shown). The valve rods are integrally connected with a transversely extending blade spring 86 itself being rigid with a pin 87 mounted in a cam socket 88 which slides axially in the head 74 of the cylinder 72 under the action of a control rod 89 which itself slides in the two piston units 5 and 6. The pin 87 slides for a short stroke in the socket 88 and the rod 89 slides in the pistons for a run inferior to the stroke of the cylinders on the pistons, so that at the end of each of these latter strokes the control rod 89 is lifted or lowered a small distance in relation to the bottom of the cylinder and to the distributor. To this effect the lower end of the control rod 89 is equipped with a head 91 which strikes either against the upper end of the rod 2, or against the lower end of a hollow stopper 92 screwed in the hubb of the big upper piston 6.

The exhaust outlet valve is formed by a cylindrical packing supporting member 9 integral with the upper end of the pin 87 and the seat of which is formed by the lower edge of the pierced stopper 36. Owing to this arrangement, the inlet valves are shut when the outlet valve is open and vice versa. The free opening and shutting of the valves is assured by means of a dead center passing device which, in this example, is constituted by a double-conical cam resulting from the exterior form of the socket 88 which cooperates with two toric springs 35, 35a, axially retained in the necks of the bottom of the cylinder and of the distributor. The two springs 35 and 35a are formed by coiled springs rolled in the form of tori.

The compressed air is fed to the motor, from a nipple 1, by way of a pipe 93, a chamber 94 provided in the pump body 53 (see FIGURE 4), a duct 96, an axial duct 97 in the rod 2, the transverse duct 98 (and back to FIGURE 1), an annular chamber 3 and an ascending duct 11 in the conical nose 38, a vertical duct 12 in the cylinder body 72, a canal 13 in the distributor 76, the inlet chamber 14 and thence into the big cylinder. This cylinder 7 is, therefore, in communication alternatively with the compressed air supply and with the atmosphere. On the other hand, the lower face of the small piston 5 is permanently subjected to the pressure of the compressed air.

As a result, when compressed air is admitted to the big piston, the motor and percussion unit 54 is lifted by a force equal to the difference of the pushing forces exerted by the compressed air on the big and small pistons, while, when this big piston is on discharge, the percussion unit is pushed toward the bottom by both the compressed air pressure on the small piston and the weight of the mobile unit. Thus there is provided a novel single-stroke pneumatic motor the return stroke of which is carried out by the use of compressed air.

As for the grease forced by the piston 24 in the pump body 27, it passes by a check valve constituted by a ball 101, a chamber 102, an ascending pipe 28, a flexible hose 29 and a control valve 30.

With the view of reducing the pressure in the grease delivery pipe, when the compressed air pipe is not connected to the opening 1 of the apparatus, a grease return circuit is provided which comprises, from chamber 102, a valve 103, a chamber 104, a pipe 105 which opens into the inside of the bell of the follower plate. The two chambers 94 and 104 are separated by a membrane 106 subjected on one of its faces, by the intermediary of a part 107, to the action of a spring 108, and to the pressure of the inlet air and, on its other face, to the action of a part 109 which bears against the valve ball 103 subjected, in consequence, to the grease pressure. As soon

as the compressed air admission ceases at the opening 1, the pressure of the grease in the chamber 102 is then capable of opening the valve 103 and the said pressure falls.

An exhaust tap 42, of any suitable classical type, mounted on the wall of the chamber 102 permits the discharging of the air which is found, at the beginning, in the bell of the follower plate, in the pump cylinder and in the said chamber which constitute the high points where the air builds up. This device is exceptionally handy for priming up the pump or repriming it in case of loss of priming during the course of the operation.

The general arrangement of the whole is such that when the motor unit is in its lowest position, the grease pump piston 24 has emerged completely from the pump cylinder 27 in order to permit the grease which is found in the bell of the follower plate to penetrate into the pump body from all sides, as a result of the vacuum prevailing in the said pump body.

An envelope 112 of slightly larger dimensions than those of the grease drum 40 and only partly shown on FIGURE 2, protects and covers the whole apparatus.

The apparatus functions in the following manner:

After having removed the cover of a drum 40 full of grease, the whole unit is placed on the upper surface of the grease. Its weight forces it down, so that the grease rises through the spaces of the base 51 and penetrates into the bell 52 of the follower plate 20.

First of all the air is expelled from the bell by means of the discharger tap 42, as explained above, and this operation can be repeated during the first strokes of the pump.

It should be supposed that the apparatus is found in the position shown on FIGURE 2, that is to say that the outlet valve 9 has opened, which occurs when the motor and percussion unit 54 is at its highest point in relation to the fixed parts, namely the pistons 5, 6 and the hollow rod 2. The charge of compressed air contained in the chamber formed by liner sleeve 7 is suddenly emptied into the atmosphere by the hollow valve seat 36 and the openings 84 of the damper 32 (FIGURE 2). At this instant, the grease piston 24 lifted by the two rods 22 and 23 (FIGURE 1) has completely penetrated in the body of the pump 27, forcing in front of it the grease contained therein. The cylindrical chamber formed by liner sleeve 4, which is always under pressure because it is connected in permanence to the source of air, becomes filled with compressed air which has the effect of forcing downwardly the mobile part of the motor unit until the part 25, having slipped along the hollow member 2, strikes the abutment stop 26 (FIGURE 1). Pushed by the two rods 22 and 23, the grease pump piston emerges completely from the pump body 27 leaving a wide open passage 37 of the full diameter of the pump cylinder whereupon the grease, drawn by the vacuum, which has formed in the pump body 27, rushes in and fills the latter. Thus, contrary to conventional pumps of this general classification, there is no inlet valve for the grease, such valve being rendered needless by the complete emergence of the piston 24 from the pump body 27.

The shock of the mobile part of the motor on the stop 26 is propagated in the disc 20 under atmospheric pressure and causes a slight movement of the latter downwards in the drum corresponding to the quantity of grease which has been expelled by the body of the pump 27. This mechanical action is intended to complete and to aid the descent by depression in the case where undesirable air pockets between the grease and the follower plate 20 should otherwise interfere with this descent.

In arriving at the lower limit of its run the mobile unit 54 drives in the control rod 89 and its head 91 comes to strike on the upper end of the rod 2. The double-conical cam 88 passes through the springs 35 and 35a and the outlet valve 9 closes, while the inlet valves 10 and 10a open at the same instant. The compressed air therefore

penetrates into the cylinder 7, which tends to raise the mobile unit but this lifting is only possible when the compressed air is driven out of the cylindrical chamber 4 by the small piston 5. The difference of sections of the two pistons makes this possible and the air going the opposite way to the way by which it arrived is not directly exhausted from the pump but further used by passing from the cylinder 4 into the ducts 11, 12, 13 and penetrates with the incoming air into the cylinder 7. The motor stroke begins with a force proportional to the pressure of the air on the piston 6 decreased by the counter pressure on the piston 5. The mobile part progressively slides upwards along the length of the hollow rod 2 drawing the grease piston 24 towards the top by the intermediary of the two rods 22 and 23. The grease is driven into the body of the pump and from there, directed by the pipe 28, the flexible hose 29 and the control valve 30 onto the mechanism to be lubricated.

It is therefore a question of a single acting air motor with a return piston, the return movement accomplished by the application of compressed air, the motor being connected by its mobile part to a grease pump which is also single acting. The alternative movement, slow when upwards and rapid when downwards, with shock at its lowest point, effects the required hammering causing the progressive driving down of the atmospheric disc in the grease drum, this grease always remaining carefully rammed down because of the hammering. It should also be noted that the two vertical draw rods 22 and 23 connected to one another by a cross-piece 68 beat continuously inside the cone 52 and work the grease contained therein. This working changes the texture of the grease contained in the cone 52 and renders its admittance by suction in the body of the pump 27, easier. The role of the percussion is therefore not only to render easy the filling up of the pump but mainly to obtain the drawing up of the grease into the cone 52 where the working is effected. This action continues until the atmospheric disc reaches the bottom of the drum 40.

To release the disc and bring it up through the empty drum, it is only necessary to disconnect the air connection at 1 and connect it up to 15. The air then enters the cylinders of the two jacks 58 and 59 connected by the pipe 18 and their action tends to separate the follower plate 20 from the empty drum. At the beginning the resistance to the separation is considerable and no jack could overcome it. The small lateral valve 19 is then operated by finger pressure to allow a small quantity of compressed air to penetrate under the atmospheric disc by the opening 21. As soon as the separation has commenced, the two jacks 58 and 59, finish off the operation of lifting up the follower plate until it leaves the drum.

It will be noticed that, the pump being stopped, as soon as the handle 111 of the control valve or grease gun is operated, the pressure falls in the grease delivery circuit and the motor starts up immediately under the pressure of the compressed air always present in the supply circuit. The shutting of the grease gun immediately provokes a rapid rise in pressure of the grease contained in the delivery circuit, including the pump body 27, until this force is equal to that of the compressed air in the motor. At this moment this latter stops.

It is clearly understood, of course, that the invention is not limited to the system of utilization shown and described here which is given only as an example, numerous modifications lie within the scope of the specialist without overstepping the limits of the invention.

Having thus described the invention, what is claimed

as new and desired to be secured by Letters Patent is:
1. A device for the automatic dispensing of lubricating grease or like semi-solid substances from a drum or similar container, said device comprising, a follower plate adapted to rest upon the upper surface of the grease contained in the drum and to be supported thereon at

progressively lowering levels as the supply of grease is depleted, a pump supported by said follower plate and having intake means opening beneath the plate and discharge means above the plate, said pump comprising a cylinder fixed to said follower plate and a plunger adapted to reciprocate in said cylinder to force grease through said discharge means, a reciprocating cylinder-and-piston fluid pressure motor also carried by said follower plate and operatively connected with the pump plunger to reciprocate the latter, one of the relatively reciprocating parts of the motor being fixed to the follower plate, an abutment on said follower plate, and the other or mobile part of the motor adapted to strike said abutments at the end of its downward movement, thus exercising upon the plate a percussion effect favorable to the settling of the grease and the avoidance of cavitation adjacent the intake means of the pump.

2. The device set forth in claim 1 in which the operative connection between the pump plunger and the motor comprises means for supporting the pump plunger from the mobile part of the motor, the lower end of the pump cylinder being completely open and the plunger adapted to enter and completely withdraw from said cylinder during its compression and return strokes respectively whereby the resulting vacuum in the cylinder suddenly upon withdrawal of the plunger serves to draw additional grease into the pump cylinder at maximum capacity, the parts being so proportioned and arranged that the maximum opening of the cylinder coincides with the moment of percussion, thus aiding the normal pump vacuum in presenting renewed quantities of grease to the cylinder intake end.

3. The device set forth in claim 1 in which the motor piston is supported on a vertical axially disposed rod which is fixed with relation to the follower plate, and it is the motor cylinder assembly which constitutes the part of the motor giving the percussive effect.

4. The device set forth in claim 3 in which the motor is provided with two vertically spaced pistons fixed to said rod, one of said pistons being the pump-operating piston which, upon pressure fluid being applied to the portion of the motor cylinder in which said piston is contained, serves to raise the mobile cylinder assembly of the motor and at the same time effect the discharge movement of the pump plunger; while the other of said

motor pistons, with fluid applied to the portion of the motor cylinder in which the latter piston is contained, serves to add force to the weight of the cylinder assembly to cause it to descend rapidly during the return stroke.

5. The device set forth in claim 4 in which the two pistons of the motor and their respective cylinder portions are of different diameters thus constituting a differential piston assembly, the return stroke piston being the smaller of the two and continually subjected to the fluid pressure, the larger operating piston being subject to fluid pressure only during the upward movement of the mobile pump and motor parts, but overbalancing the pressure on the smaller return piston at that time.

6. The device set forth in claim 5 in which the intermittent supply of pressure fluid for the operation of the motor is provided by means of a distributor carried by one of the motor parts and comprising an inlet valve and a discharge valve, means for operating said respective valves, and means carried by the other of said motor parts for actuating said valve operating means at proper intervals related to the stroke of the mobile parts, the distributor being carried by the motor cylinder assembly and thus adding to the mass of the mobile percussive parts.

7. The device set forth in claim 6 in which the distributor is mounted at a point above the level of the return piston, and conduit means is provided for placing the distributor in communication with the cylinder portion upon the side of the return piston which in continually subjected to the fluid pressure.

References Cited in the file of this patent

UNITED STATES PATENTS

1,781,374	Deutsch	Nov. 11, 1930
2,126,176	Davis	Aug. 9, 1938
2,221,763	Ginter	Nov. 19, 1940
2,280,708	Klein et al.	Apr. 21, 1942
2,300,110	De Hoog	Oct. 27, 1942
2,348,151	Rotter et al.	May 2, 1944
2,394,486	Rotter et al.	Feb. 5, 1946
2,443,146	Pyles	June 8, 1948
2,630,248	Hinz	Mar. 3, 1953
2,925,941	Bloxom	Feb. 23, 1960