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METERING DEVICE FOR LIQUID LUBRICANT

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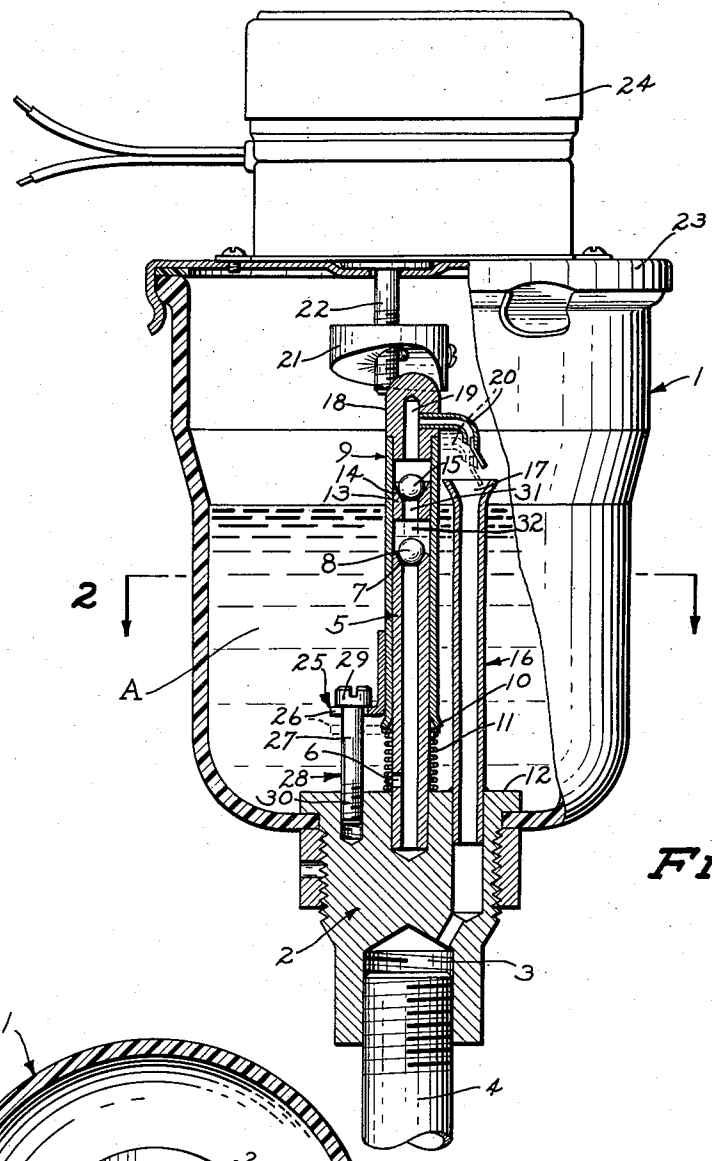

FIG. 1

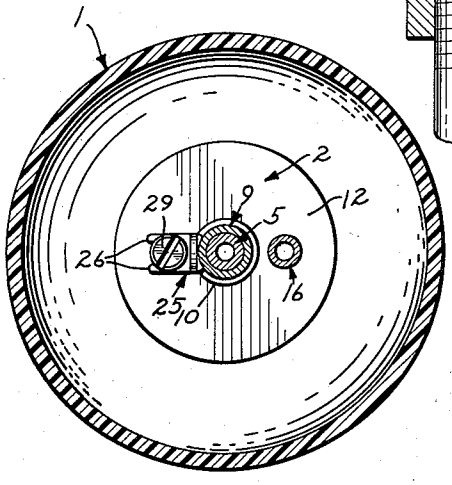

FIG. 2

INVENTOR.
FRANK H. LILJEMARK
BY
Merchant & Merchant
ATTORNEYS

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METERING DEVICE FOR LIQUID LUBRICANT

Frank H. Liljemark, Minneapolis, Minn., assignor to Plews Manufacturing Co., Minneapolis, Minn., a corporation of Minnesota

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3 Claims. (Cl. 184—27)

My invention relates generally to improvements in power operated lubricating devices and more specifically to power operated metering devices for liquid lubricants.

An important object of my invention is the provision of a device of the class described including—a reservoir having a discharge opening in the lower end thereof communicating with a bearing or other object to be lubricated, an output pipe secured to the lower end of the reservoir which communicates at its lower end with the discharge opening and terminates at its upper end above the normal level of fluid in the reservoir, a stationary tubular pump element anchored at its lower end to the bottom of the reservoir in laterally spaced relation to said outlet pipe, a movable pump element telescopically slidably associated with said stationary pump element and projecting upwardly with respect to said stationary pump element, yielding means biasing said movable pump element in an upward direction, and means including a cam engageable with the upper end of said movable pump element for imparting downward movements thereto against the bias of said yielding means—wherein the liquid lubricant is forced directly out of the upper end of the movable pump element and from thence is deposited into the upper end of the outlet pipe through the medium of a downwardly directed spout carried by said movable pump element.

Another important object of my invention is the provision of a device of the class immediately above described wherein a stop flange and a cooperating guide element, one mounted on the bottom of the reservoir and the other mounted on said movable pump element in sliding engagement with said one thereof, serves to constantly maintain the discharge spout associated with the upper end portion of said movable pump element in overlying relationship to the open upper end of said outlet pipe.

A still further and highly important object of my invention is the provision of a device of the class above described wherein said guide element is in the nature of a screw having an enlarged head whereby a definite but adjustable limit to upward movements of the movable pump element may be achieved, independent of said yielding means and cam.

A further object of my invention is the provision of a device of the class above described which incorporates a minimum of working parts, which is relatively inexpensive to produce, which is extremely easy to adjust, and which is fool-proof in its operation.

The above and still further objects of my invention will become apparent from the following detailed specification, appended claims and attached drawings.

Referring to the drawings wherein like characters indicate like parts throughout the several views:

Fig. 1 is a view in side elevation, some parts being broken away and some parts shown in axial section; and

Fig. 2 is a view in horizontal section taken on the line 2—2 of Fig. 1.

Referring with greater particularity to the drawings,

the numeral 1 indicates a cup-shaped reservoir, preferably and as shown formed from transparent material to facilitate viewing of the level of the oil or liquid lubricant A therewithin. At its lower end, the cup is provided with a metallic mounting plug 2 formed from brass or other suitable material and formed to provide a discharge opening 3 in its lower end for connection of a nipple 4 leading to a bearing or other object, not shown, to be lubricated.

An upstanding stationary tubular pump element 5 is shown as having its lower end portion fixedly seated in the plug 2 and projecting axially into the reservoir 1. Adjacent the lower end of the reservoir 1, the stationary pump element 5 is provided with an inlet port 6, whereas its upper end is formed to define an annular valve seat 7 for the reception of a check ball 8. Telescopically slidably received over said stationary pump element 5 is a tubular movable pump element 9, the lower end of which is flared outwardly as at 10 to confine a coil compression spring 11 snugly receivable over the lower end portion of the stationary pump element 5. As shown, the spring 11 is interposed between the upper surface 12 of the plug 2 and flared lower end 10 of the movable pump element 9 and imparts yielding bias to the latter in an upward direction. Fixedly secured within the movable pump element 9, in axially upwardly spaced relation to the check ball 8, is a stub sleeve 13, the upper end portion of which is also formed to provide an annular valve seat 14 for the gravity reception of a check ball 15.

An outlet pipe 16 is secured to the plug 2 in laterally spaced relation to the pump 5, 9. As shown, the outlet pipe 16 communicates with the discharge opening 3 at its lower end and terminates at its upper end above the normal level of fluid lubricant A in the reservoir 1, preferably and as shown the same being there flared to provide an enlarged mouth 17. The extreme upper end of the tubular movable pump element 9 is closed by a dome-shaped cap 18. As shown, the cap 18 is provided with an axial bore 19 which communicates at its lower end with the tubular movable pump element 9 above the level of the check ball 15 and at its upper end with a laterally outwardly and downwardly directed spout 20 which overlies the mouth 17 of the outlet pipe 16.

For the purpose of imparting vertical reciprocal pumping movements to the movable pump element 9, I provide a cam element 21, shown as being mounted for rotation on a vertical shaft 22 extending through a cover element 23 and associated with an electric motor, not shown, but concealed within a housing 24 carried by said cover element 23. Also concealed within the housing 24 are suitable reduction gears to impart the desired speed of rotation to the shaft 22 and cam 21 to vary the interval of pumping movement imparted to the movable pump element 9, as the amount of lubrication of a given object to be lubricated may require.

To retain the spout 20 in overlying relationship to the mouth 17 of the outlet pipe 16 during vertical reciprocal pumping movements of the movable pump element 9 with respect to the stationary pump element 5, I provide a stop flange 25 which projects laterally outwardly from the lower end portion of the movable pump element 9. As shown, the stop flange 25 is provided with a bifurcated outer end portion 26 for the slidable reception of the reduced intermediate portion 27 of a stop screw 28. At its upper end the stop screw 28 is provided with an enlarged head 29, whereas the lower end thereof has screw threaded reception with the plug 2, in laterally spaced relationship to the stationary pump element 5, as indicated at 30.

It should be obvious that when rotation is imparted to the shaft 22, that the cam element 21 carried thereby

will impart depressing movements to the movable pump element 9 by engagement thereof with the dome-shaped head of the cap 18, against the bias of the coil compression spring 11. Such downward movements obviously force any oil accumulated above the check ball 8 upwardly through the passageway 31 in the sleeve 13, thus upsetting the check ball 15 and forcing oil thereabove out through the spout 20 and into the outlet pipe 16 through the open mouth 17 thereof. Upward movement of the movable pump element 9 under the yielding bias of the coil compression spring 11 causes fluid within the reservoir 1 to enter into the stationary tubular pump element 5 through the inlet port 6, thus upsetting the check ball 8 on the seat 7 and again filling the chamber 32 between the check balls 8, 15, the latter obviously being now seated under the action of gravity. As this action is repeated, a drop or squirt of oil is periodically caused to enter the outlet pipe 16 to be discharged through the nipple 4 to the object to be lubricated.

Aside from retaining the spout 20 in vertical alignment with the mouth 17 of the outlet pipe 16 during reciprocal pumping movements of the pump element 9 with respect to the stationary pump element 5, the stop flange 25 and cooperating guide screw 27 provide a positive but adjustable means of limiting upward movement of the movable pump element 9, independent of any adjustment which may be imparted to the cam 21 with respect to the shaft 22 upon which it is mounted, and independent of the length and extent of yielding bias of the coil compression spring 11. This arrangement provides for extremely accurate control of the pumping stroke whereby uniform pumping operation is achieved. Further, with the above described arrangement, the necessity for extreme control of the length and yielding bias of the springs ceases to be a critical factor.

My invention has been thoroughly tested and found to be completely satisfactory for the accomplishment of the above objects, and while I have shown a preferred embodiment thereof, I wish it to be understood that same may be capable of modification without departure from the scope and spirit of the appended claims.

What I claim is:

1. In a device of the class described, a reservoir having a discharge opening in its lower end, an outlet pipe secured to the lower end of said reservoir, said outlet pipe communicating at its lower end with said discharge opening and terminating at its upper end above the normal level of fluid in said reservoir, an upstanding stationary tubular pump element anchored at its lower end to the bottom of said reservoir in laterally spaced relation to said outlet pipe and having an inlet port adjacent said reservoir bottom, check valve means in the upper end of said stationary pump element, a tubular movable pump element telescopically slidably received over said stationary pump element and having an outlet in its upper end terminating in a downwardly directed spout overlying the open upper end of said outlet pipe, second check valve means in said movable pump element between the outlet therein and said first mentioned check valve means, yielding means biasing said movable pump element in an upward direction, means including a cam engageable with the upper end of said movable pump element for imparting downward pumping movements thereto against the bias of said yielding means, a stop flange and a cooperating guide element one mounted on the bottom of said reservoir and the other mounted on said movable pump element in sliding engagement with said one thereof, said guide element having an enlarged head engageable with said flange to limit upward movements of said movable pump element.

2. The structure defined in claim 1 in which said stop flange is mounted on said movable pump element and in which said guide element is in the nature of a screw having threaded engagement with the bottom of said reservoir whereby to vary the limit of upward movement of said variable pump element.

3. The structure defined in claim 1 in which said yielding means is in the nature of a coil compression spring encompassing said stationary pump element intermediate the bottom of said reservoir and the lower end of said movable pump element, and in which the extreme lower end of said movable pump element is outwardly flared to form a socket for the reception of the upper end of said coil spring.

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