Feb. 21, 1933. K. S. CLAPP ET AL 1,898,815

LUBRICATOR PUMP

Filed Oct. 26, 1929 3 Sheets-Sheet 1

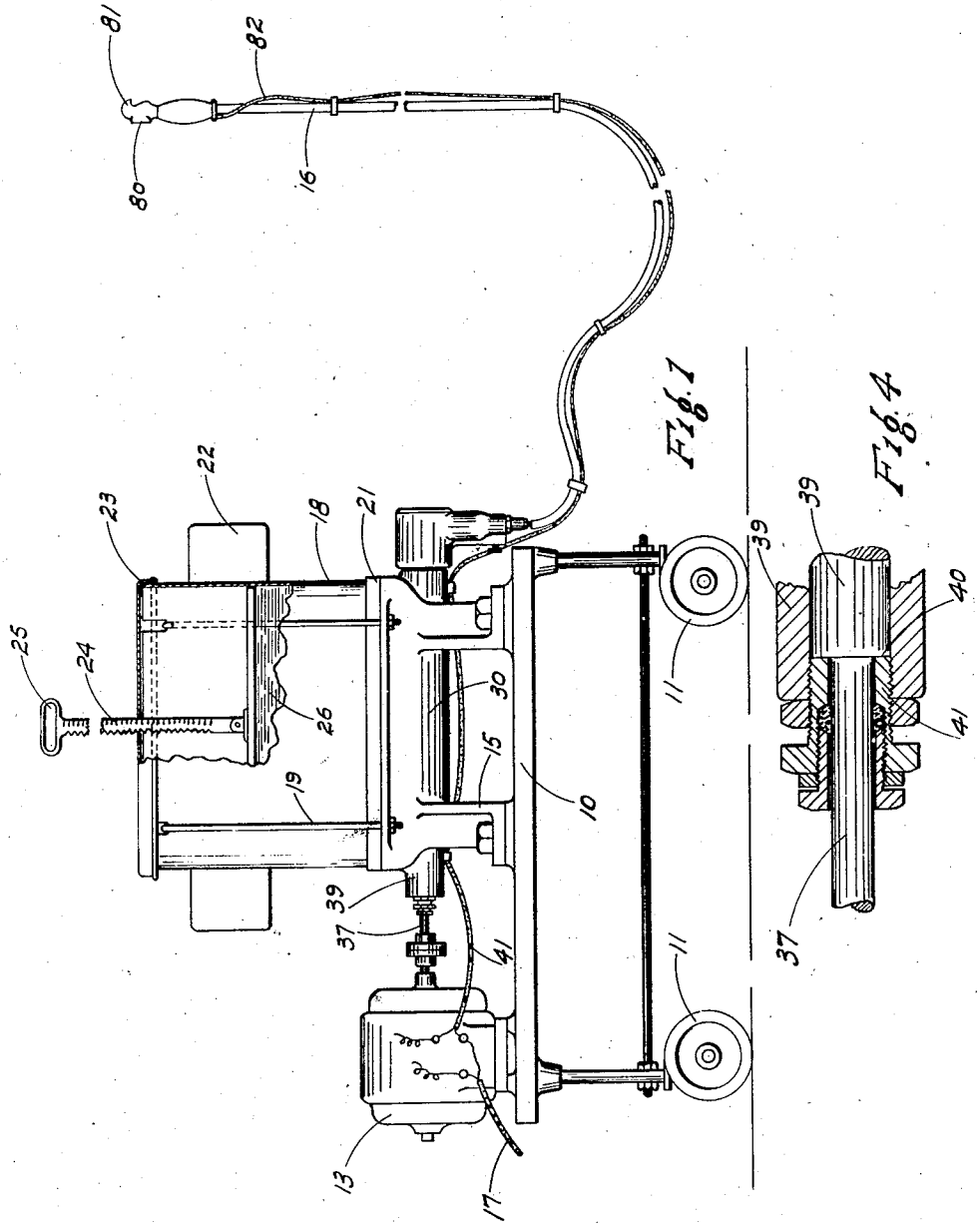


FIG. 1

FIG. 4

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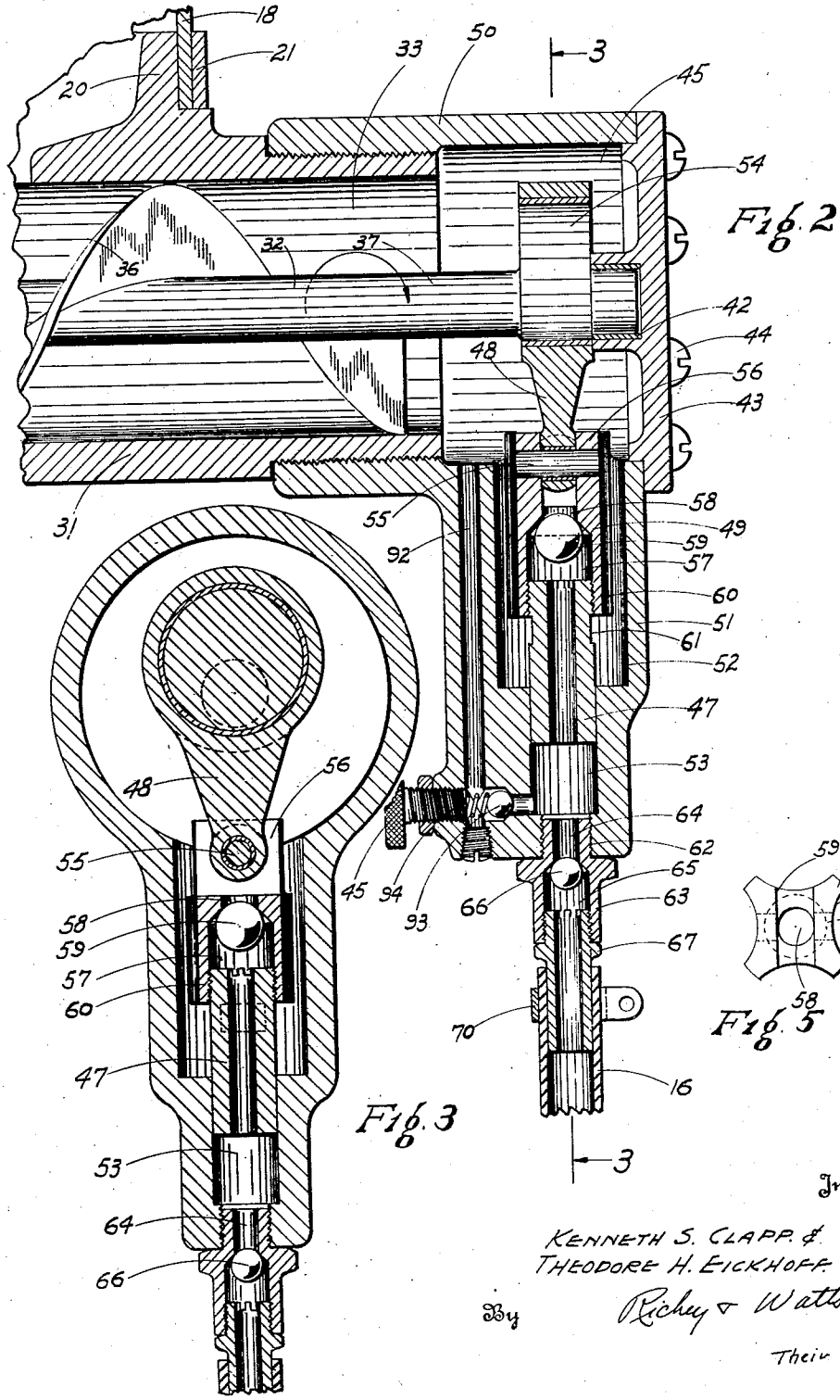


Fig. 2

Fig. 3

Fig. 5

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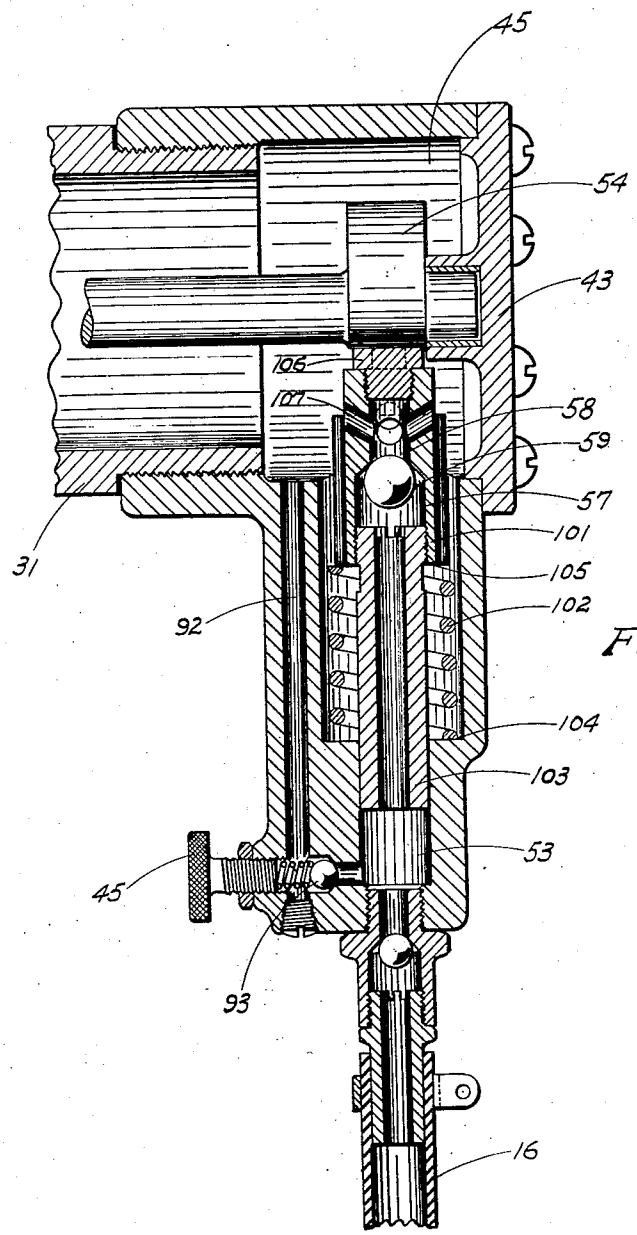


Fig. 6

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UNITED STATES PATENT OFFICE

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LUBRICATOR PUMP

Application filed October 26, 1929. Serial No. 402,768.

This invention in its broader aspects, relates to apparatus and a method for moving fluent materials in situations where the final delivery must be under considerable pressure. In certain embodiments it is of particular value in the handling of plastic compositions, although not inapplicable to liquids, and has among its objects the provision of apparatus of this nature which will be simple in construction, durable and dependable in service, capable of being economically built and operated, and a substantial advance in the art.

The present application is a continuation in part of pending application Serial No. 301,053, filed August 21, 1928, by Kenneth S. Clapp; and application, Serial No. 350,561, filed August 21, 1928, by Kenneth S. Clapp and Theodore H. Eickhoff.

Specifically, the invention as hereinafter described contemplates two interdependent stages for moving lubricant material, the first or primary stage of such means including a conveying screw rotatable in a housing at the bottom of a reservoir, this screw being associated with the apparatus of the secondary stage, which takes the lubricant from the conveyor and drives it to its destination. For convenience the apparatus for accomplishing the first stage is termed feeding means, and that for the second stage is called pressure means, although some latitude is necessary in the interpretation of these terms, for the reason that certain of the elements of our invention may be common to both stages.

When used as a lubricator our invention may be conveniently constructed in the form of a lubricant reservoir, the bottom of which constitutes a housing for the feeding and pressure means. This reservoir bottom and a driving element, which may conveniently be an electric motor, are preferably mounted on a single bed plate, and this in turn may be supported upon a wheeled frame if the apparatus is to be made portable.

A preferred embodiment of our invention is illustrated in the accompanying drawings, wherein

Fig. 1 is a side elevation of the complete apparatus in a portable form;

Fig. 2 is an enlarged fragmentary longitudinal section showing part of the reservoir, screw casing and primary pressure chamber; and a fragment of the screw conveyor together with the secondary pressure apparatus;

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2.

Fig. 4 is a fragmentary longitudinal section through the packing gland and thrust for the conveyor screw.

Fig. 5 is a plan view of the piston crosshead.

Fig. 6 is an enlarged fragmentary sectional view of another embodiment of our invention.

Referring now particularly to Figs. 1 and 2, the present embodiment of our invention includes a bed plate 10, suitably mounted on wheels 11; a lubricant reservoir 12 and motor 13 being secured to the bed plate. The reservoir 12 is herein shown as a rectangular tank having a base 14 in the form of a casting supported by legs 15. A flexible conduit 16 conveys lubricant to the point of application, and a flexible cable 17 connects the motor to a suitable source of current.

The reservoir may conveniently comprise sheet metal sides 18 held down to the base 14 by hooked tie rods 19, the bottoms of the sides surrounding an interior base flange 20 and being clamped there to by straps 21. In the form shown, tool boxes 22 are fastened to each side of the reservoir to provide convenient holding places for wrenches, spare fittings and similar articles.

A cover 23 as shown is centrally apertured for the passage of a gauge rod 24, the top of which is finished with a sturdy handle 25 so that the cover and a follower plate 26 are always removed together. This plate 26 is a heavy piece of metal, with the gauge rod 24 secured to its center. The gauge rod may be conveniently graduated in pounds or otherwise, as is most desirable. The plate 26 is adapted to lie upon the material in the reservoir in such a manner that the material will always fall evenly without air pockets forming therein.

The bottom 30 of the base 14, may slope

down to a median line, below which a lengthwise lubricant channel in the nature of a tube 31, open along most of its upper side, crosses the bottom. Thus the lubricant flows by its own weight and that of the follower plate 26 into the channel 31, in which it is kneaded and stirred and through which it is carried by a screw conveyor 32 into the chamber 33.

Referring particularly to Figs. 2 and 4 it will be seen that the screw channel 31 is closed on all but the upper part of its circumference. At the other side of the opening, the bottom of the reservoir is also carried somewhat over the screw channel, so as to retard any tendency of the grease to work up and out of the channel forming together with the screws a primary compression mechanism.

The feed screw 32 comprises a coarse pitched thread 36, having a sufficient edge to provide a bearing surface, around a central shaft 37. The rear end of this shaft carries a hub 38 of the same diameter as the thread. The shaft extends rearwardly beyond the base, terminating in a connection to the power shaft. The hub 38 rotates in a rearward extension 39 of the screw channel and bears at its end against a shoulder 40 in the bottom of the bore, thus sustaining the end thrust of the conveyor 32. The rear extension of the shaft 37 passes out through a grease-tight stuffing box 41. The forward end of the screw shaft is journaled in a bearing 42 carried by the cover plate 43 which is secured to the end of the channel 31 by screws 44.

A housing 50 is screw-threaded on the end of the channel 31 and includes a cylindrical chamber 45 which aligns with the channel 31. The end of the chamber is closed by an end plate 43 which has a bearing 42 adapted to rotatably support the end of the shaft 32.

The housing is provided with a downwardly extending tubular member 51, which houses the ultimate pressure mechanism, which is provided with progressively reduced cylindrical chambers 52 and 53.

The secondary pressure mechanism consists of a pump, which includes a hollow piston 47, adapted to be reciprocated in the reduced cylindrical chamber 53, by a cross head 49 and connecting rod 48. The connecting rod is mounted on an eccentric cam 54 which is carried by the shaft 32 spaced from the end. The cam 54 may also be formed integral with the shaft 32.

The cross head is slotted at 56 into which the end of the connecting rod 48 is pivotally secured by a pin 55, and is adapted to be reciprocated in the chamber 52. A plurality of channels 90 are provided on the cross head which eliminates any pressure which otherwise might be caused by the reciprocation of the cross head. The remaining semi-cylindrical portions 91 of the channel are guided by the cylinder wall, relieving any strains that otherwise might be placed on the piston. An axially disposed cylindrical chamber 57 is provided in the cross head which is maintained in fluid communication with the slot 56 by a duct 58. The other end of the chamber 57 is screw-threaded to receive the piston 47. A ball valve 59 is disposed in the chamber 57 and adapted to seat under certain conditions later more fully described, against the converging end walls leading to the duct 58, to seal the same.

The piston 47, which fits snugly within the chamber 53, includes a bored cylinder having a threaded end 60 to engage the threads of the cross head. A pair of flattened surfaces 61 are provided to which a suitable wrench may be applied for screwing the same into the cross head.

The end of the extension 57 is provided with an inwardly extending threaded annular flange 62 which receives a flanged coupling 63. The coupling 63 has a duct 64 and an enlarged bore 65. A ball valve 66 is retained within the enlarged bore by a nipple 67 which is screw-threaded into the end of the coupling and is adapted to close the opening to the duct 64, under certain conditions.

The flexible conduit 16 may be secured to the end of the nipple 69 by a suitable clamp 20.

I find that a device constructed as described is particularly efficient in dispensing extremely viscous and plastic lubricants which are ordinarily unmanageable when used in the type of grease dispensing devices commonly in use.

In operation the lubricant is placed in the reservoir 12 and the cover replaced in such a manner that the plate 26 rides on top of the lubricant. The lubricant will descend into the channel 31 where it is thoroughly mixed and conveyed by the screw 32, which is rotated by the motor 13, into the primary chamber at the end of the channel 31. The lubricant is placed under sufficient constant pressure in the primary pressure chamber, so that when the cross head reciprocates, the lubricant is forced through the slot 56 in the cross head and through the duct 48, into the chamber 57 and bore of the piston 47. This occurs on the upward stroke of the piston.

On the downward stroke the ball valve 59 is moved by the lubricant flow, closing the duct 58, preventing escape of the lubricant from the chamber 57 and bore of the piston. Continued operation causes the lubricant to flow through the piston into the chamber 53 where it is expelled through the coupling 63 and nipple 69 into the dispensing hose 16. The lubricant is prevented from returning to the chamber 53 on the upward stroke of the piston by the ball valve 66 which closes the duct 64.

The pumping operation is controlled by the switch 80 which is disposed on the end of

the dispensing nozzle 81 in such a manner that when the nozzle is connected to couplings upon the part to be lubricated, a single pressure on the end of the nozzle makes fluid contact with the receiving coupling and operates the switch to start the motor through the completion of the electrical circuit by way of the cable 82.

It will be understood that other fittings might be substituted for the nozzle 81, according to the nature of the material to be handled. For example, it is within the purview of this invention to use our apparatus for applying paint, whitewash, insecticides, putty, and the like, inasmuch as the conveyor, either with or without an enclosure along its entire length, keeps the material uniformly mixed. For such use a suitable spray nozzle or the like would of course be provided.

A relief duct and valve may be provided for bi-passing excess fluid pressure back into the chamber 45 and includes a passage 92 in communication with the chamber 45 and connected to the lower end 53 of the pressure chamber. An adjustable ball valve 93 is interposed in the duct maintaining the passage 92 closed to the chamber 53. The pressure at which the valve may bi-pass the fluid is determined by a thumb screw 95 and helical spring 94 which normally holds the valve in a closed position. The relief valve eliminates the chance of rupture of any of the parts such as the conduit 16 should an unusually large pressure be built up by failure of the fluid to pass through the part which is being lubricated.

Although a certain amount of pressure is built up in the primary pressure chamber by the screw conveyor, it may be readily seen that such a pressure is limited, but is sufficient to feed the same into the chamber where it is picked up by the secondary pressure means, sometimes called a booster and delivered under extremely high pressure, depending upon the amount of restriction encountered by the lubricant flow. The pressure may vary as before stated depending upon any restriction encountered between a few pounds and several thousand.

It may be readily seen, that in a device of the class described, that each element is dependent upon the other for the efficient operation, the conveyor screw supplying the lubricant constant pressure to a chamber where it is picked up and fed forward under pressure.

In Fig. 6 another embodiment of our invention has been illustrated which is quite similar to that of the preceding embodiment except that the connecting rod has been eliminated. In this instance the booster mechanism of the prior embodiment has been replaced by a crosshead 101 which is adapted to bear against the eccentric or cam 54 and is retained in spring pressed relation against the cam by a helical spring 102 which is disposed about the piston 103 with one end bearing against the shoulder 104 of the chamber 52 and the other end bearing against the lower face 105 of the cross head.

A plug 106 is provided in the upper end of the cross head in contact with the cam and may be readily replaced when it becomes worn. A pair of slanting ducts 107 extend laterally from the ducts 58 providing fluid communication from the chamber 45 to the duct 58 and chamber 57 in the cross head. A ball valve 59 may be provided for a similar purpose to that previously described. The piston 103 is substantially the same as that used in the other embodiment except that it may be made longer and the cross head shorter to accommodate the spring 102.

The mechanism operates in a similar manner to the prior embodiment as the cam 54 presses the cross head with the piston downward against the pressure of the spring 102 at one stage of the cycle and allows the same to return at the other stage. On the downward stroke the lubricant or material is pushed out of the chamber 53 into the conduit 16 and the constant fluid flow into the chamber 45 maintains the same full of lubricant. On the upward stroke the crosshead is forced into the lubricant and the lubricant into the cross head past the valve 57 after which the downward stroke causes the valve 57 and the cycle is continued as described.

Having thus described our invention in embodiments thereof, we are aware that numerous and extensive departures may be made therefrom without, however, departing from the spirit thereof.

We claim:

1. In a lubricating device, a container, means to remove lubricant therefrom including a screw conveyor and a booster operated by the end of the conveyor, the booster including a piston pump, a cam and connecting rod supported by said conveyor to operate said pump.

2. In a lubricating device, a container, means to remove lubricant therefrom including a screw conveyor and a booster operated by the end of the conveyor, a chamber at the end of the conveyor, a piston in the chamber, a duct in the piston, a valve in the duct, a cam on the conveyor and a connecting rod on the cam connected to the piston.

3. In a lubricating device, a lubricant container means to dispense lubricant therefrom including a screw conveyor disposed in a channel at the lower end of the container and a motor to drive the conveyor, a booster mechanism in juxtaposed relation to the conveyor and driven thereby, said booster including a housing on the end of the conveyor chamber, an eccentric on the end of the conveyor, a connecting rod thereon, a booster chamber extending angularly from the hous-

ing and having progressively reduced cylindrical bores, a cross head and a piston disposed in said bores said cross head being pivotally connected to said connecting rod and operating with larger cylindrical chamber and being provided with a duct and a chamber, said duct being in communication with said housing and a valve in said chamber to close said duct, said piston comprising a bored cylindrical member screw-threaded into said cross-head adapted to reciprocate in the smaller cylindrical bore, a coupling disposed in the end of said angular booster chamber provided with a valve and a nipple, a dispensing tube secured to said nipple and a dispensing nozzle on the end of said tube.

4. In a dispensing device, a reservoir adapted to contain a quantity of material, screw conveyor means for removing material from the lower portion of the reservoir, means to maintain the remaining material level, and a cam operated booster driven by said removing means to provide a positive pressure for dispensing the material.

5. In a lubricating device, a lubricant reservoir, means to dispense lubricant therefrom including a screw conveyor and a booster in interdependent relation to each other, said booster including a hollow piston and a hollow cross head, a check valve in said cross head, a cam on said conveyor to actuate said piston and means to maintain said piston and cross head in operative relation to said cam.

6. In a lubricating device including a lubricant reservoir and means to dispense lubricant therefrom comprising a screw conveyor disposed in a channel at the lower end of the reservoir and a booster mechanism interdependably associated with said conveyor, said booster comprising a piston and a cross head carried thereby, a cam on said conveyor for actuating said piston and means to maintain said cross head in operative relation with said cam and a follower plate adapted to rest upon the lubricant in the reservoir to prevent the formation of air pockets in the lubricant and cause the same to descend with the fluid level throughout its upper surface.

7. In a lubricating device including a lubricant reservoir and means to dispense lubricant therefrom comprising a screw conveyor disposed in a channel at the lower end of the reservoir and a booster mechanism interdependably associated with said conveyor, said booster comprising a piston and a cross head carried thereby, a cam on said conveyor for actuating said piston and means to maintain said cross head in operative relation with said cam and a follower plate adapted to rest upon the lubricant in the reservoir to cause the lubricant to descend with the fluid level throughout its upper surface.

8. In a device for dispensing fluent materials, a reservoir, a screw conveyor disposed in the bottom of the reservoir, means cooperating with the conveyor to increase pressure upon the material conveyed thereby including a crank and pitman carried and operated by the conveyor, a piston secured to the pitman and a cylinder for the piston and a valve disposed in the piston to permit material to flow in one direction past the valve and an outlet in the cylinder.

9. In a dispensing device, a reservoir, a channel in the bottom of said reservoir, a longitudinal shaft rotatable therein, a screw conveyor secured to said shaft and disposed within said channel, said shaft having an eccentric portion, a connecting rod mounted on said eccentric portion, a booster pump having a chamber communicating with said channel for ejecting material moved by said conveyor screw operated by said connecting rod.

In testimony whereof we hereunto affix our signatures this 16th day of October, 1929.

KENNETH S. CLAPP.
THEODORE H. EICKHOFF.