

Aug. 19, 1930.

F. S. BARKS

1,773,660

LUBRICATING APPARATUS

Filed March 12, 1928

4 Sheets-Sheet 1

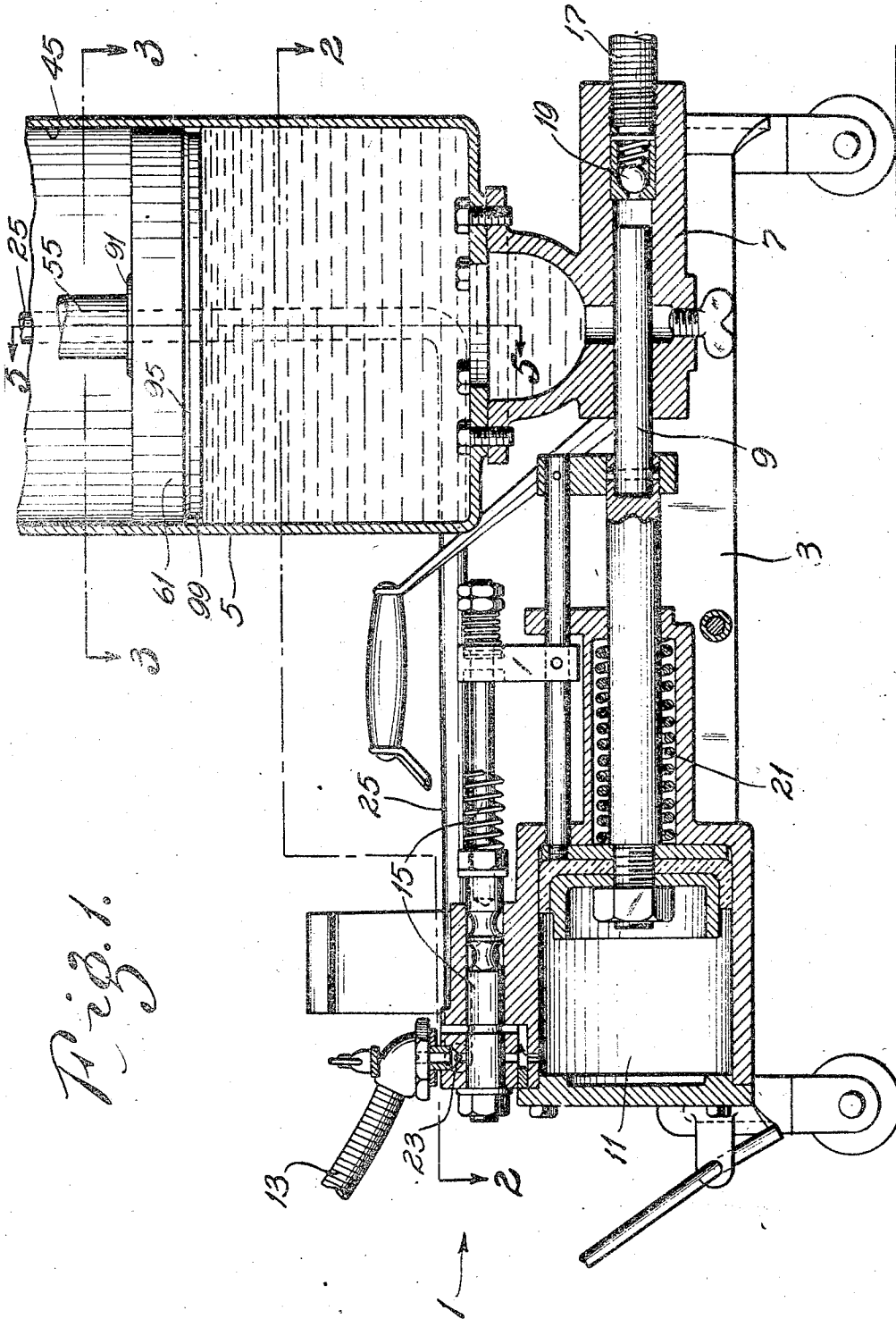


Fig. 1.

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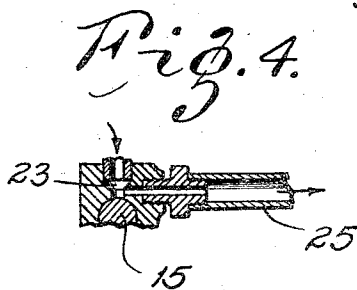
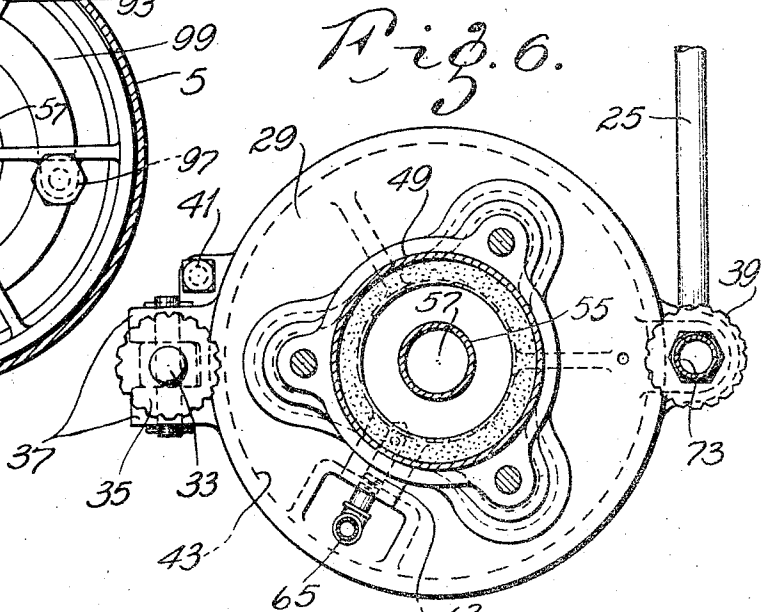
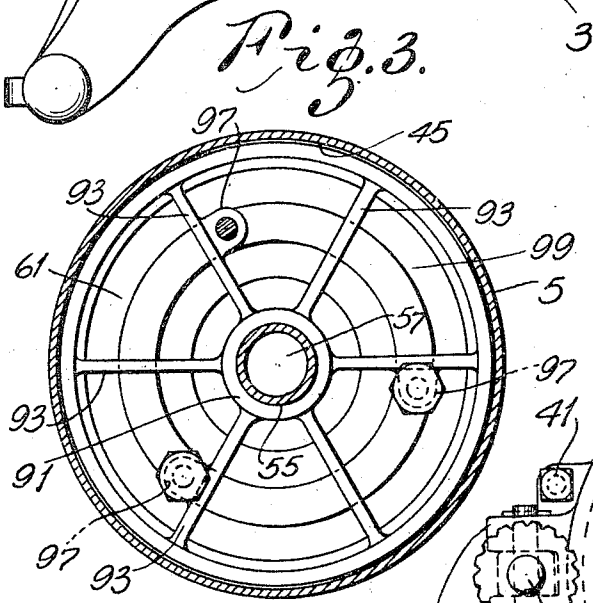
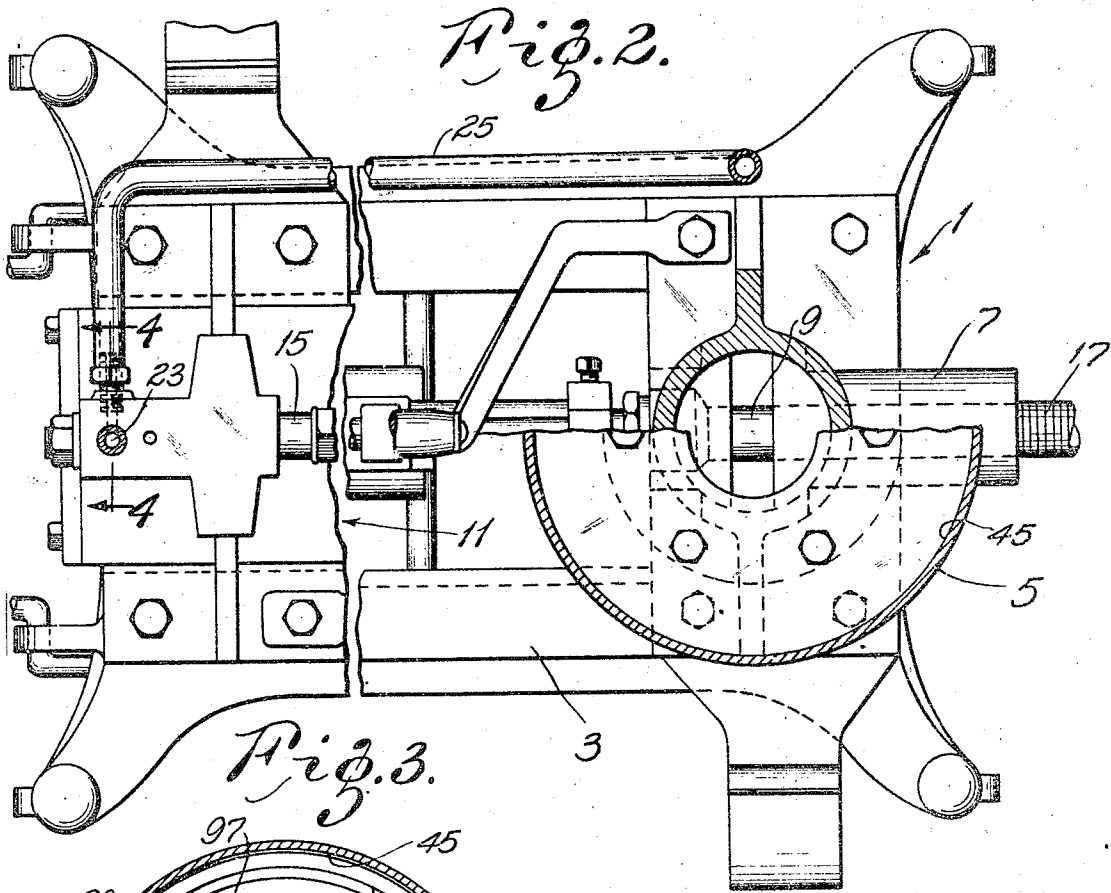
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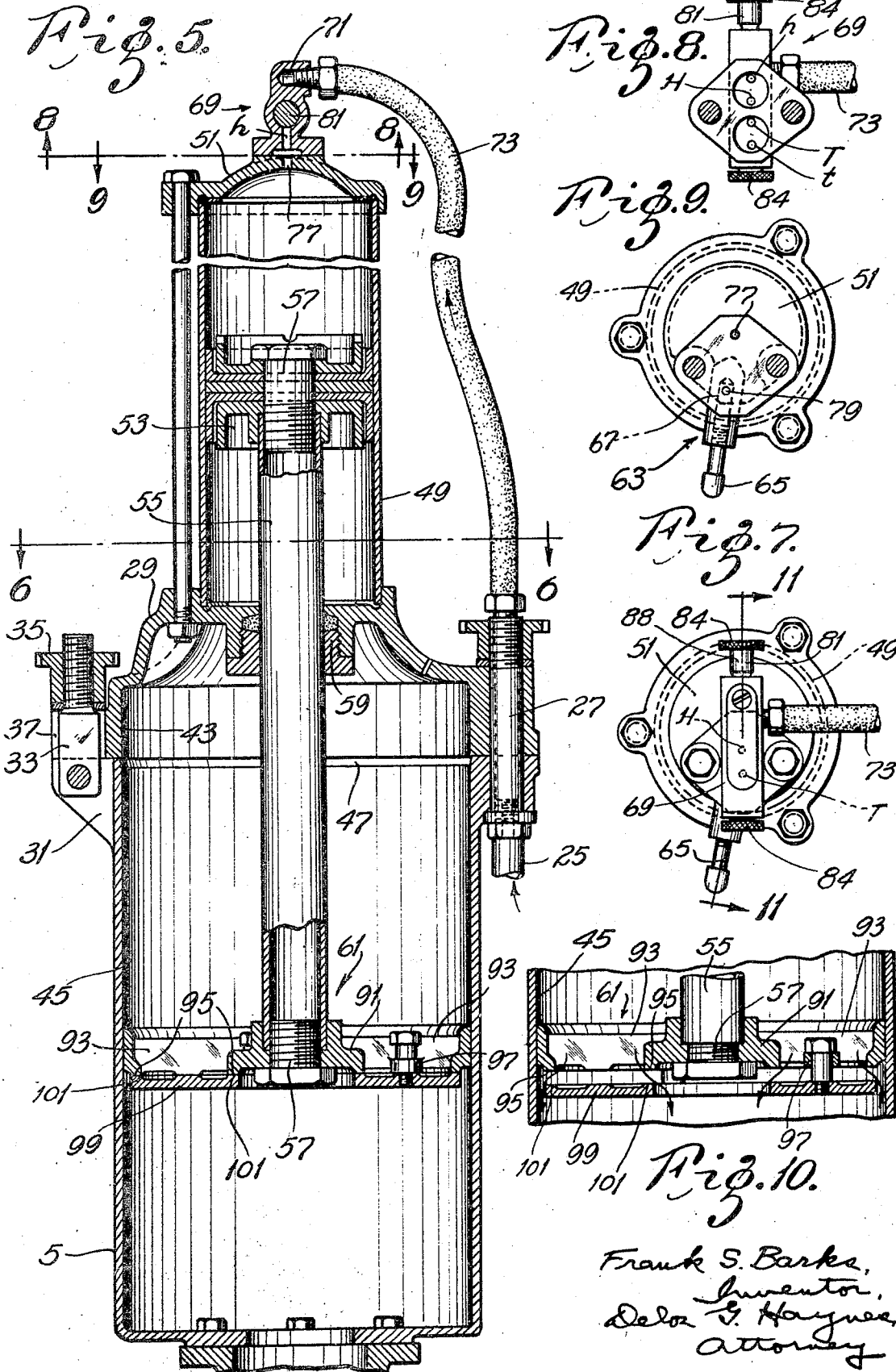
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LUBRICATING APPARATUS

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4 Sheets-Sheet 3



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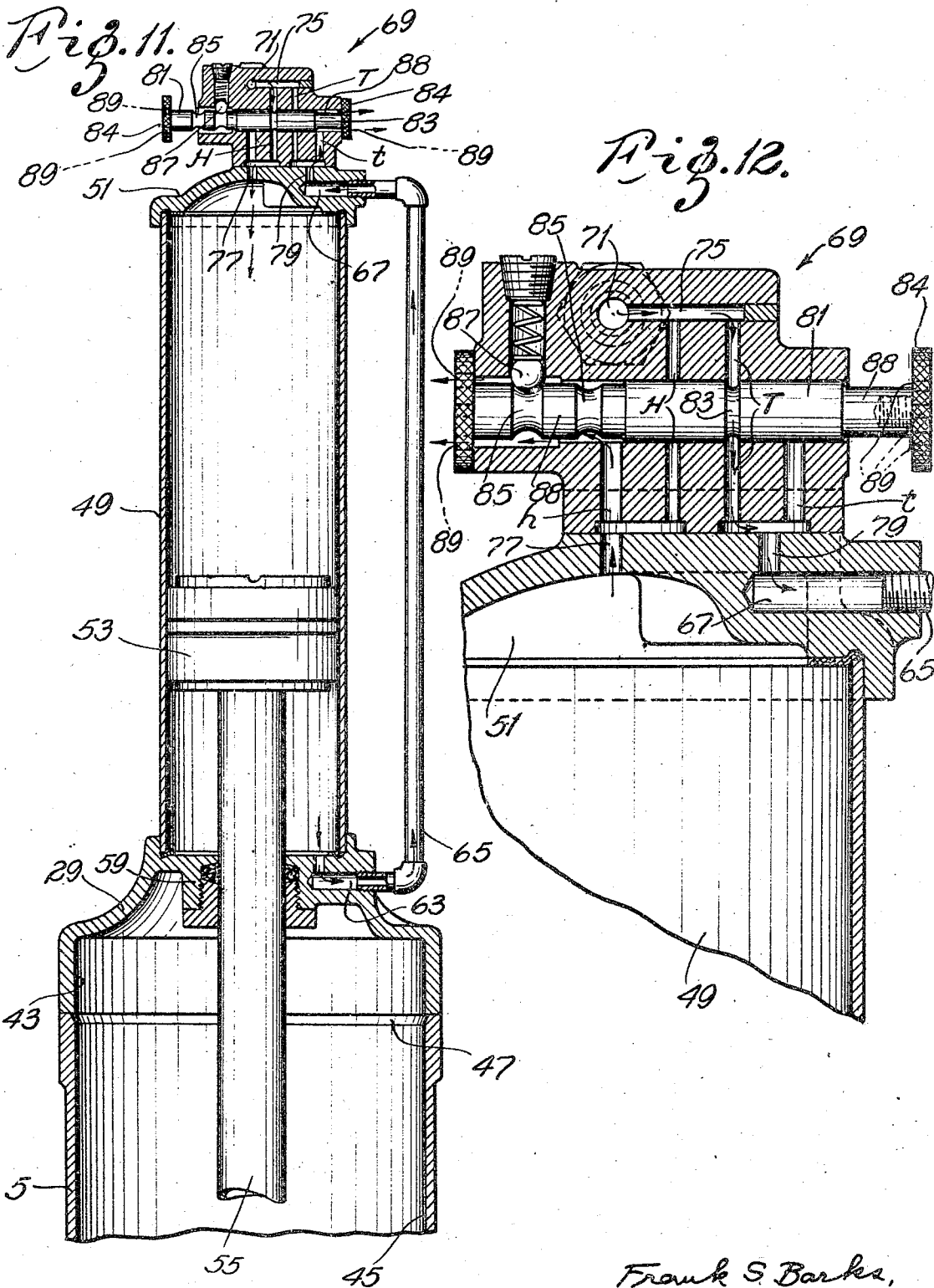
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LUBRICATING APPARATUS

Filed March 12, 1928

4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

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LUBRICATING APPARATUS

Application filed March 12, 1928. Serial No. 260,884.

This invention relates to lubricating apparatus and with regard to certain more specific features, to a pressure lubricating device, for grease and like.

Among the several objects of the invention may be noted the provision of a pressure feed grease pump having maximum safety and economy in the use of the pressure fluid; the provision of a dependable pump of the class described which is rugged in construction and simple in operation having a minimum number of parts adapted to be economically manufactured. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structure hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which is illustrated one of various possible embodiments of the invention,

Fig. 1 is a longitudinal vertical section of the apparatus, parts being broken away;

Fig. 2 is a foreshortened sectional view of the apparatus, portions being broken away, the view being taken substantially on line 2—2 of Fig. 1;

Fig. 3 is a cross section taken on line 3—3 of Fig. 1;

Fig. 4 is a fragmentary section taken on line 4—4 of Fig. 2;

Fig. 5 is a vertical section taken through certain pressure apparatus per se, the view forming a continuation at 90° of the parts broken away in Fig. 1 on line 5—5;

Fig. 6 is a cross section taken on line 6—6 of Fig. 5;

Fig. 7 is a top plan view of a pressure cylinder;

Fig. 8 is a cross section taken on line 8—8 of Fig. 5;

Fig. 9 is a cross section taken on line 9—9 of Fig. 5;

Fig. 10 is a fragmentary vertical section of a two-piece piston, showing a separated relation thereof;

Fig. 11 is a cross section taken on line 11—11 of Fig. 7 and shows an air valve in a down stroke position; and

Fig. 12 is an enlarged vertical section showing said air valve in an up stroke position.

Similar reference characters indicate corresponding parts throughout the several views of the drawings.

Referring now more particularly to Fig. 1, there is illustrated a pump and engine mechanism of the class described more particularly in my Patents 1,654,673 and 1,633,304, dated January 3, 1928, and June 21, 1927, respectively.

Broadly speaking, the above pump and engine mechanism 1 comprises a frame 3 supporting a grease chamber 5 from which grease is adapted to be pumped through a cylinder 7 having a reciprocating piston or ram 9 therein, the latter being operable to be reciprocated by means of an air engine 11.

The air engine 11 receives compressed air by way of an air hose 13 and a full-stroke automatic valve mechanism 15, the latter also functioning as an exhaust. As described in said patents, the operation of the engine is such that air led into the cylinder of the engine pushes the piston thereof to the right (Fig. 1), so that the ram 9 functions to eject grease from the cylinder 7 to a flexible line 17 by way of a check valve 19, that is, when a valve or gun which is placed in line 17 (not shown) is in open position. When said valve is shut, pumping automatically ceases and when it is opened, pumping automatically commences. Automatic return strokes of the air engine are effected by means of a return spring 21 in the engine cylinder.

I have redescribed the above elements, for the sake of convenience in reading this description. Further details appear in said patents.

The air line 13 provides a continuous supply of air pressure at a port 23 of the valve mechanism. This port is in continuous communication with an air line 25 (see Figs. 1, 2 and 4). The line 25 can be inflexible and leads into communication with a hollow hinge pin 27, the latter pin forming a pivot

member between said container 5 and a swing head or cover 29 thereon.

The swing cover 29 is adapted to rotate in a substantially horizontal plane on the pin 27 so as to open and close the preferably vertical container 5. Opposite the pin 27, on the container 5, are formed a pair of lugs 31 carrying a hinged draw bolt 33 to which bolt is outwardly threaded a hand wheel 35 for the purpose of engaging and clamping down on an extending fork 37 of the cover 29 when said cover is in closed position over the container.

The hinge pin 27 is likewise provided with a threaded hand wheel 39 for permitting and preventing the swivel action and for drawing down the head. The hand wheel 39 is not necessary and can be a fixed bolt with predetermined clearance for permitting rotation. Washers under the wheels 35, 39 facilitate the operation and reduce wear. A stop pin 41 (Fig. 6) is threaded through a lug on the head 29 and extends downwardly to engage a portion of one of the lugs 31 for purposes of aligning the bore 43 of the head 29 with the bore 45 of the container 5, that is, when they are in enclosed position. A bevel edge 47 at the upper end of the bore 45 serves purposes to be described.

The purpose of the swing head or cover 29 is to carry an air cylinder 49, including a cylinder head 51. Within the air cylinder 49 is slidably carried a piston 53 to which is fastened a piston rod 55. The rod 55 is hollow for purposes of lightness only and does not serve as a passage for fluids. The fastening bolts 57 at both ends are solid. This piston rod 55 passes from the cylinder 49 and through the cover 29 by way of a suitable stuffing gland 59. At the lower end of the rod 55 is carried a lubricant follower 61, the construction of which is new per se and will be described more in particular hereinafter.

Referring to Figs. 6, 9 and 11, it will be seen that the cover 29 carries an air connection 63 communicating with the tail or lower end of the cylinder 49 and also by way of pipe 65, is in communication with an air connection 67 in said cylinder head 51. The connection 67 is in communication with an air valve 69 mounted on the cylinder head 51.

The air valve 69 (Figs. 5, 7, 8, 11 and 12) carries an inlet air connection 71 which is in communication with said hollow hinge bolt 27 and line 25 by way of a flexible air line 73. The line 73 is of such a nature and flexibility that it permits the described swinging action of the cover 29. It always carries an air pressure because it is always in communication with the air line 13 (see numerals 27, 25 and 23).

The valve 69 carries an inlet port 75 in communication with a head end inlet passage H and a tail end inlet passage T for the

head and tail ends respectively of the cylinder 49. There are also exhaust passages *h* and *t* for the head and tail ends respectively of said cylinder 49. The head end passages H and *h* communicate with said head end by way of a passage 77, and the tail end passages T and *t* communicate with said tail end by way of a passage 79, the connection 67, pipe 65 and connection 63.

Lengthwise of the body of the valve is slidably placed a valve stem 81 which carries an inlet recess 83 adapted to open either of the passages H or T, depending upon its position. Alignment of the recess 83 with said passages H and T is effected by suitable heads 84 at the ends or stops of the valve stem which engage the body of the valve. Detent recesses 85 and a spring pressed detent ball 87 are used to hold the valve in its operative positions.

At each end the stem 81 is a reduced portion 88 cut back far enough to form outlet passages to communicate with the exhaust passages *h* and *t* in operative positions of the valve stem. To effect an exhaust the stops 83 are provided with outlets 89.

The stops 83 also function as finger control pieces for effecting manual operation of the valve stem. By pressing the stem to the left (Fig. 11), the recess 83 opens the head end inlet port H and the recess 87 goes out of communication with the head end exhaust port *h*, while the tail end inlet port T is closed and the other recess 87 goes into communication with the tail end exhaust port *t*.

The above setting results in air passing from the line 73 to the region above the piston 53 in the cylinder 49 so as to press said piston down, while the air beneath the piston finds its way out of connection 63, line 65, connection 67 and exhaust port *t*.

When stem 81 is pressed to the right (Fig. 12), the recess 83 opens the tail end inlet port T, while the tail end exhaust port *t* is closed. At the same time the head end inlet port H is closed, while the head end exhaust port *h* is opened.

The above setting results in air flowing beneath the piston 53, while the charge of air thereabove exhausts as the piston rises.

From the above it will be seen that by manual operation of the valve, the piston 53 may be pushed to the upper end of the cylinder 49 or forced down to the lower end thereof. When it is at the upper end the lubricant follower 59 is drawn up into the cover 29 so as to permit swinging of the same to open the container 5. When air is let in above the piston 53, the follower 61 is pushed down against any lubricant which happens to be in the container 5 and tends to press the same into the cylinder 7 when the ram 9 is drawn back. Hence positive charging of cylinder 7 is effected for each plunger stroke.

The follower 61 comprises an open guide

spider 91 (Figs. 3, 5 and 10) having arms 93 and two circular seats 95. Three of the arms 93 carry lugs 97 through which slidably pass headed studs which are screwed into a lower sealing ring 99. This ring 99 is solid and has seats 101 adapted to engage said seats 95 of the spider 91. The studs are designed to permit movement between the spider and ring, the heads of the studs functioning as limiting stops.

The spider 91 slidably fits the cylindrical container 5 in substantially atmospheric tight fashion (with the lubricant) not unlike an ordinary piston. The sealing ring is substantially smaller than the bore of said container 5, or at least is not air or grease tight with respect thereto.

The action is such that when the follower 61 is pressed down on a lubricant in the container 5 by the action of the piston 53, the spider 91 and sealing ring 99 are pressed together at the seats, 95, 101, thereby forming in aggregate a lubricant-tight follower adapted to press grease from the container, the action of the plunger 9 permitting (see Fig. 5).

Whenever the operator deems it necessary to refill the container 5, he reverses the pressure on piston 53 by manipulating the stem 81, thereby raising the piston. If the follower 61 were solid, the result would be, either that an enormous pressure would be required to overcome the downwardly directed suction and adhesion forces on the follower 61, or an abnormally large cylinder 49 would be required, or both. With the present two-piece follower 61, the first action upon retraction (Fig. 10) is that the spider 91 rises, leaving the solid ring 99 behind, adhering to the grease, inasmuch as the limited area between the seats 95, 101 does not provide much adhesive force. As soon as this easy separation is accomplished, air rushes in through the opened seats and breaks what would otherwise become a vacuum beneath the follower, were it solid. The ring 99 being substantially smaller than the container 5 and having an opening in the center thereof when it is subsequently raised permits air to enter therebeneath. Hence the retracting action is easily accomplished without abnormal air pressure and without a large cylinder 49. The ring and spider have lost motion engagement.

The following advantages accrue to this construction:

(1) The large capacity grease container, which is ordinarily a large cylinder, needs not carry air pressure. The small supplementary cylinder 49 is better adapted to safely carry this air pressure. In other words air is confined to a small and safe operating cylinder and the grease container is not a pressure container.

(2) Weight is also conserved, because it

requires more weight to make safe the large container 5, than to add the small cylinder 49.

(3) The improved form of follower 61 permits of the use of a minimum size of cylinder 49. This cylinder 49 needs not be designed any larger than to give the desired pressure on the lubricant. If a solid follower were used the cylinder 49 would need to be made larger, merely for the purpose of temporarily lifting the follower against vacuum and adhesive forces, although such a larger cylinder would not be needed for pressure purposes on the lubricant or for lifting after said forces had been broken.

(4) By drawing the follower into the head 29 and swinging the whole pressure mechanism clear, the operator can easily refill the container. When the device is again closed automatic alignment is had because of the guiding of the follower into the container 5 from the head 29.

(5) The use of a pressure follower is more advantageous than to pump air directly into the container, because it prevents the usual tendency of the air to form a crater in the lubricant and short circuit directly to the cylinder 7. This short circuiting action has caused prior pressure pumps to continually lose their prime before all of the grease had left the container. Packing between the pressure tank and its head is eliminated.

It is to be understood that the use of this machine is not limited to greasing operations but that it may be applied and used with other plastic materials, such as wet insulating material, putty or the like.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in carrying out the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. Lubricating apparatus comprising pumping means, a relatively large lubricant container in communication with said pumping means, a swingable cover on said container carrying a relatively small pressure cylinder, a piston in said cylinder, a rod extending from the piston through said cover and carrying a follower adapted to be pressed into the container when the cover is closed and means permitting the follower to clear the sides of the container when the follower is withdrawn and the cover swingably opened, said follower having means for reducing the adhesive forces between said follower and lubricant when the follower is

retracted from said lubricant, said last-named means enabling the use of said relatively small air cylinder on said swingable cover.

5 2. Lubricating apparatus comprising
pumping means, a relatively large lubricant
container in communication with said pump-
ing means, a swingable cover on said con-
tainer carrying a relatively small air cylin-
10 der, a piston in said cylinder, a rod ex-
tending from the piston through said cover
and carrying a follower adapted to be
pressed into the container when the cover is
closed, means permitting the follower to
15 clear the sides of the container when the
follower is withdrawn and the cover swing-
ably opened, and means for reducing the
forces tending to hold the follower against
the lubricant upon retraction of the follower.

20 3. Lubricating apparatus comprising
a relatively large lubricant container for de-
livering lubricant, a cover on said container
carrying a relatively small separate air cylin-
der, a piston in said cylinder, a follower
25 in the container, means connecting the piston
and follower, means for delivering air to
said cylinder to advance and retract said
piston whereby the follower is advanced and
retracted and means for reducing the forces
30 tending to resist the retraction of the fol-
lower whereby said air cylinder may be and
is made smaller.

4. Lubricating apparatus comprising a
lubricant container for delivering lubricant,
35 a swingable cover on said container carrying
a separate air cylinder, a piston in said cylin-
der, a follower in the container, means con-
necting the piston and follower, means for
delivering air to said cylinder to advance and
40 retract said piston whereby the follower is
advanced into and retracted from said con-
tainer, means permitting the follower to clear
the container when retracted, means for re-
ducing the forces tending to resist the retrac-
45 tion of the follower, a hollow hinge between
the cover and the container and a flexible air
line from said hinge to said air delivery
means.

5. Lubricating apparatus comprising a
50 lubricant container for delivering lubricant,
a swingable cover on said container carrying
a separate air cylinder, a piston in said cylin-
der, a follower in the container, means con-
necting the piston and follower, means for
55 delivering air to said cylinder to advance and
retract said piston whereby the follower is
advanced into and retracted from said con-
tainer, means permitting the follower to clear
the container when retracted, means for re-
60 ducing the forces tending to resist the retrac-
tion of the follower, a hollow hinge between
the cover and the container, a flexible air line
from said hinge to said air delivery means,
pumping means for receiving lubricant from
65 the container and ejecting the same, air de-

livery means for said pumping means and an
air connection between said last-named de-
livery means and said hinge.

6. Lubricating apparatus comprising a
lubricant container for delivering lubricant, 70
a cover on said container carrying a separate
air cylinder, a piston in said cylinder, a fol-
lower in the container, means connecting the
piston and follower, means for delivering air
to said cylinder to advance and retract said 75
piston whereby the follower is advanced into
the container or retracted therefrom, means
permitting the follower to clear the container
when retracted, means for hinging the cover
to the container, said last-named means in- 80
cluding an air transmitting member and a
flexible line connecting said air transmitting
member and the air delivery means.

7. In lubricating apparatus, a relatively
large lubricant container having an exit, 85
means for forcing lubricant to said exit com-
prising a piston, means for operating said
piston including a relatively small air cylin-
der and an air piston therein operatively con-
nected to the lubricating piston, said air pis- 90
ton being double acting and means for reliev-
ing atmospheric pressure on the piston when
it is retracted from the lubricant.

In testimony whereof, I have signed my
name to this specification this 10th day of 95
March, 1928.

FRANK S. BARKS.

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