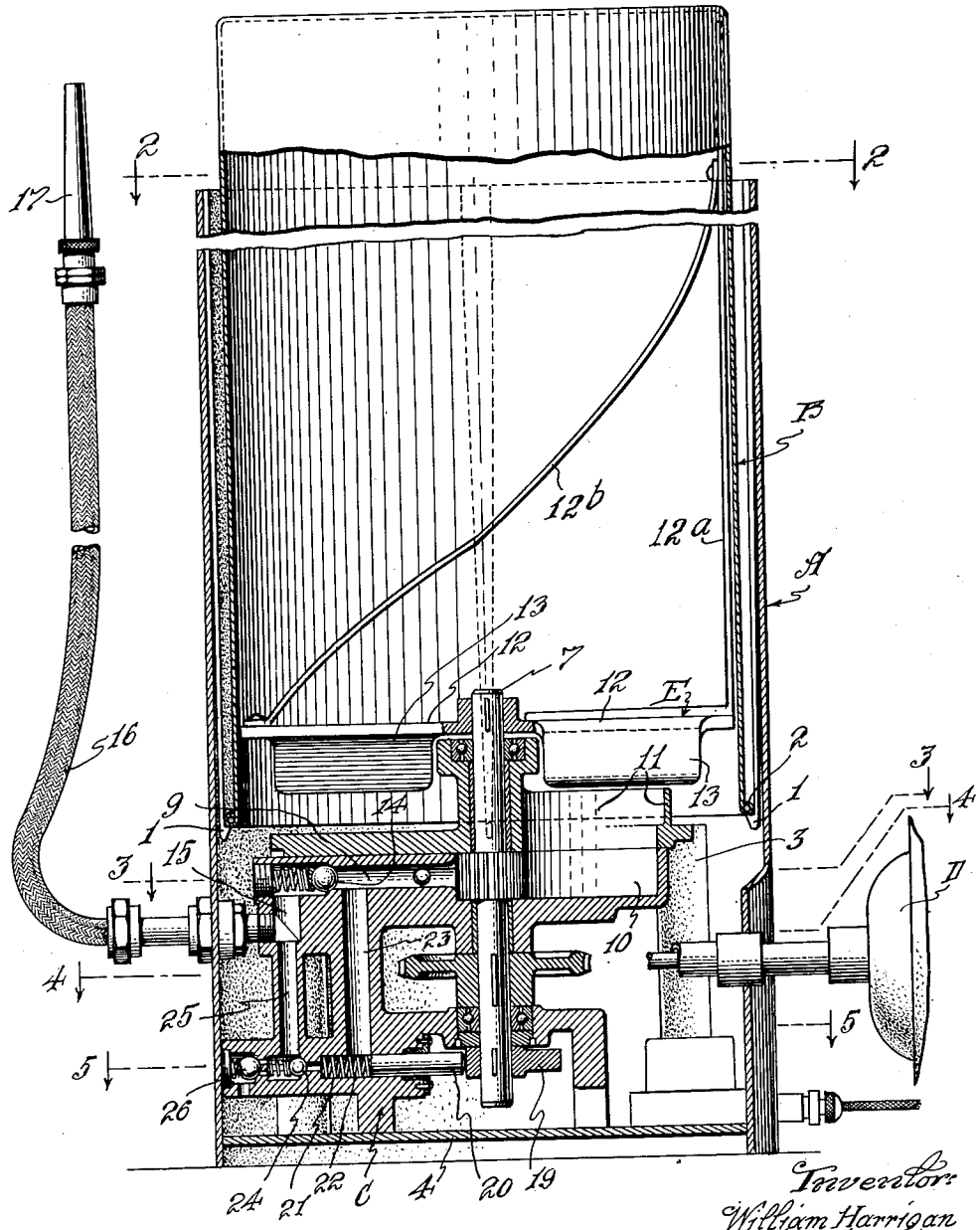
Sept. 4, 1951 W. HARRIGAN 2,566,702

GREASE PUMP WITH HIGH-PRESSURE PULSATING MEANS

Filed March 26, 1949 5 Sheets-Sheet 1

Fig. 1

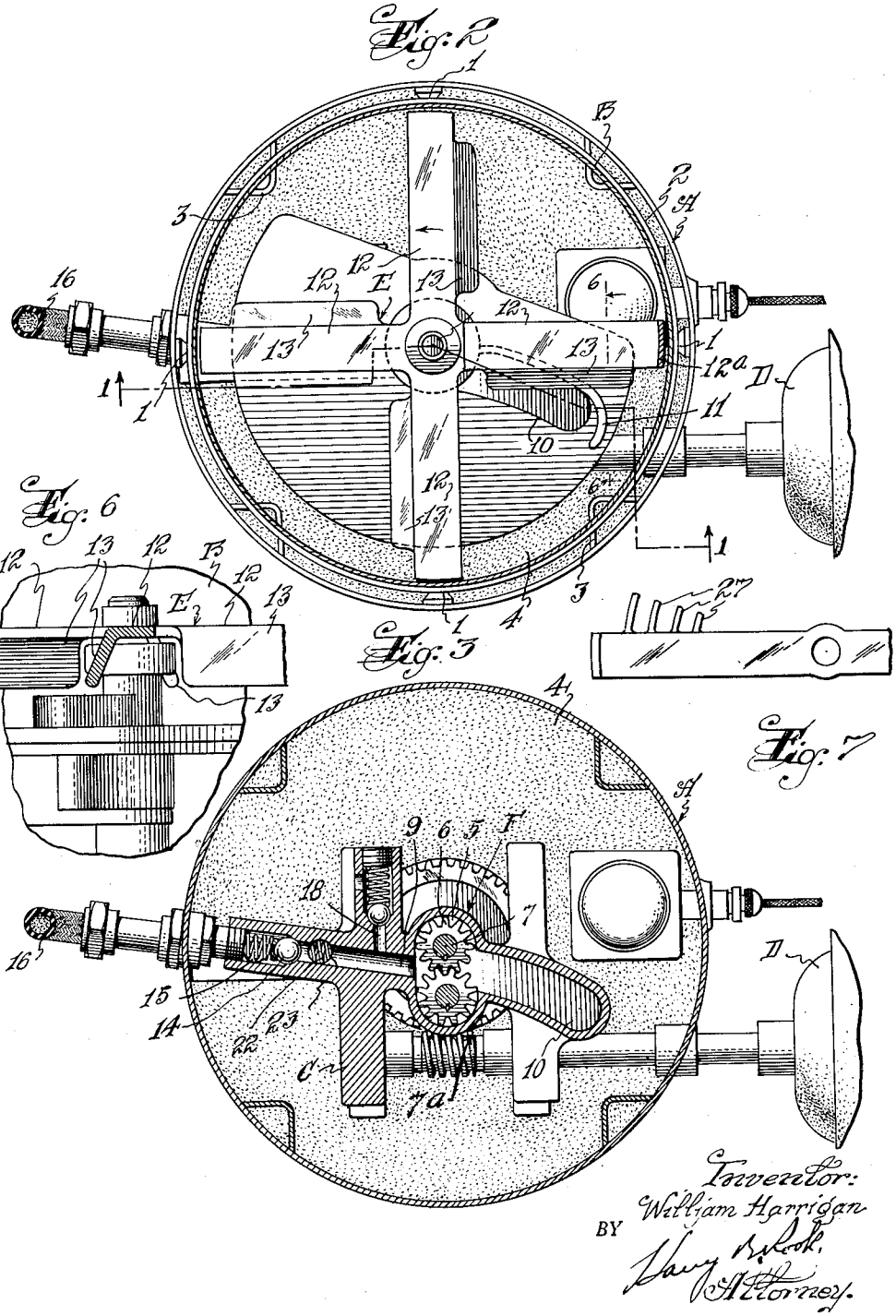


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GREASE PUMP WITH HIGH-PRESSURE PULSATING MEANS

Filed March 26, 1949 5 Sheets-Sheet 2



Sept. 4, 1951 W. HARRIGAN 2,566,702

GREASE PUMP WITH HIGH-PRESSURE PULSATING MEANS

Filed March 26, 1949 5 Sheets-Sheet 3

Fig. 4

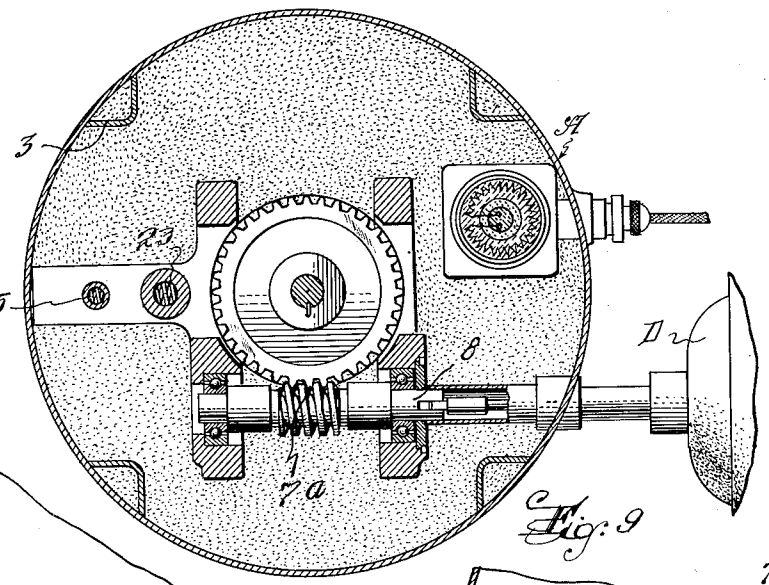


Fig. 8

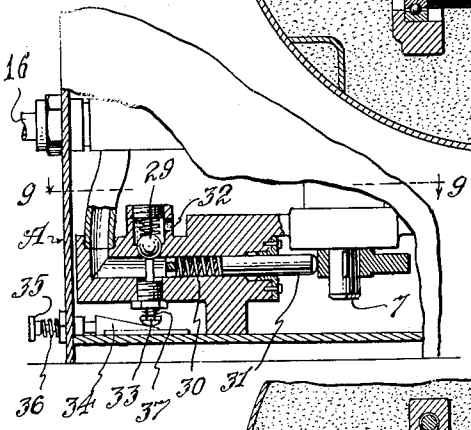


Fig. 9

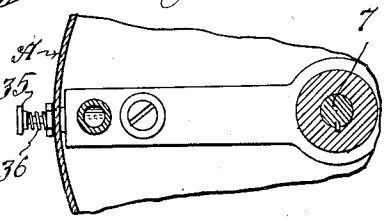
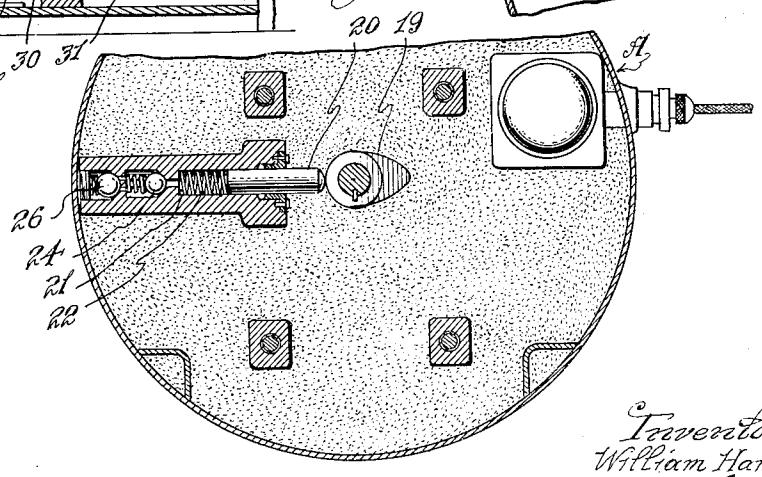


Fig. 5



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Sept. 4, 1951 W. HARRIGAN 2,566,702

GREASE PUMP WITH HIGH-PRESSURE PULSATING MEANS

Filed March 26, 1949 5 Sheets-Sheet 4

Fig. 10

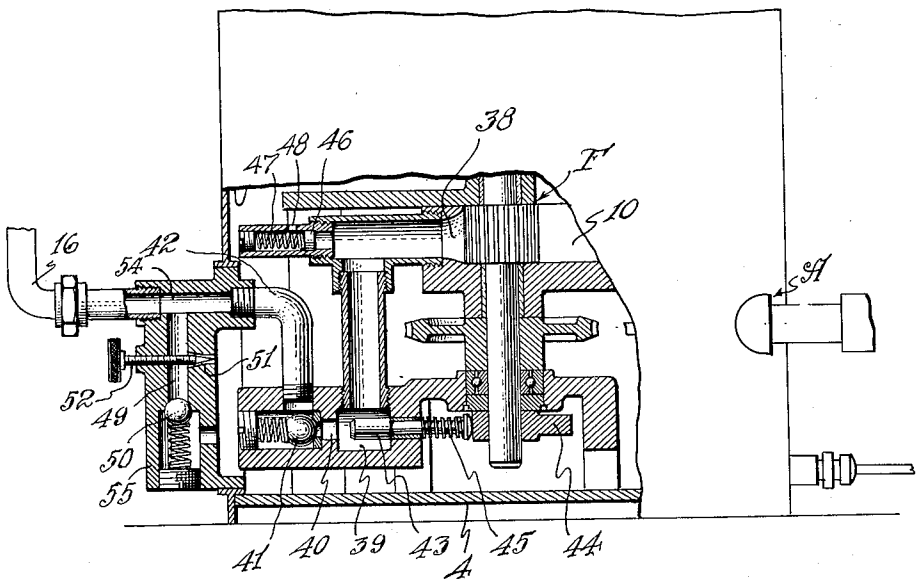
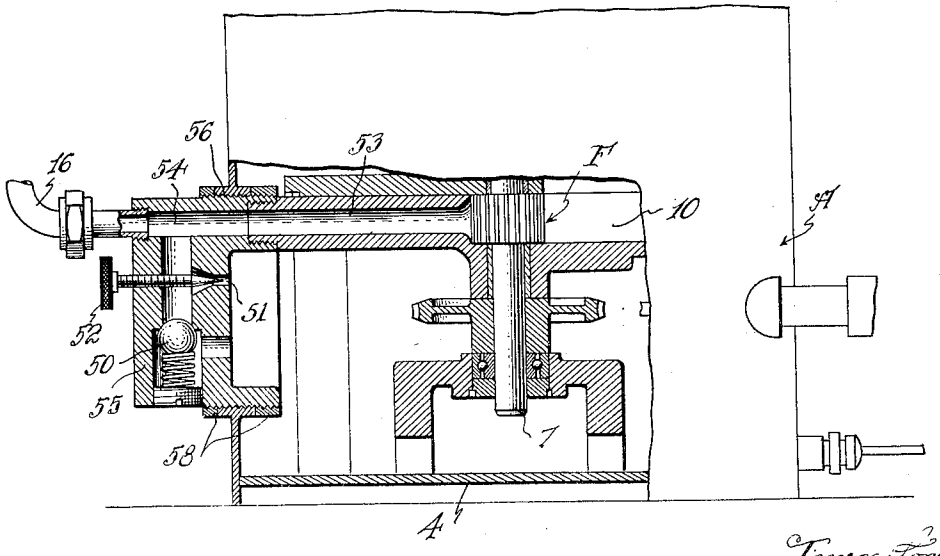


Fig. 11



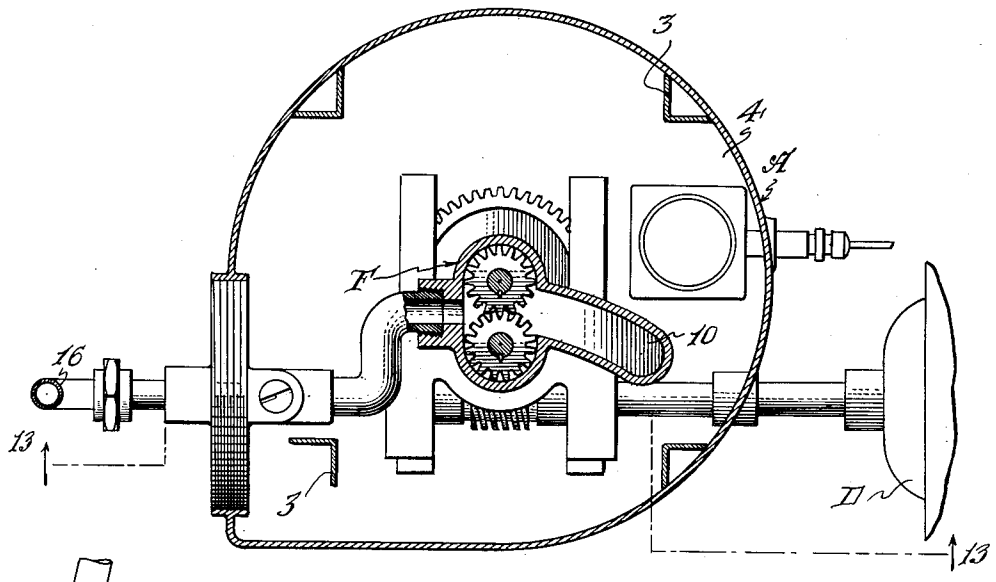
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Sept. 4, 1951 W. HARRIGAN 2,566,702

GREASE PUMP WITH HIGH-PRESSURE PULSATING MEANS

Filed March 26, 1949 5 Sheets-Sheet 5

Fig. 12



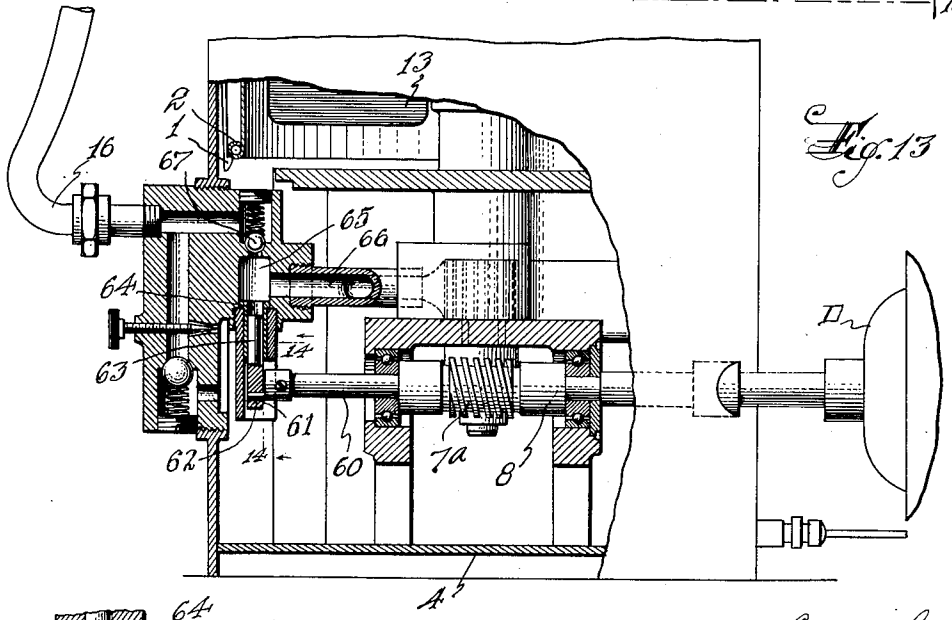


Fig. 13

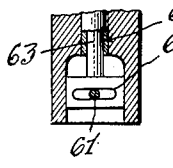


Fig. 14

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UNITED STATES PATENT OFFICE

2,566,702

GREASE PUMP WITH HIGH-PRESSURE PULSATING MEANS

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Application March 26, 1949, Serial No. 83,648

1 Claim. (Cl. 222—254)

1

This invention relates in general to apparatus for supplying under pressure to the desired point of use, liquids or semi-liquid or viscous substances, for example lubricating greases; and more particularly the invention contemplates an apparatus for forcing lubricating grease into machine bearings.

One object of the invention is to provide apparatus of this character which shall be capable of dispensing heavy or extremely viscous lubricants more efficiently than has been possible heretofore.

Another object is to provide apparatus for dispensing viscous substances which shall embody novel and improved features of construction whereby the substance to be dispensed, for example a heavy lubricating grease, can be forced to the point of use in a pulsating stream at high pressures so that the pulsating stream will have a hammer-like action on for example "frozen" or rusty bearings, to facilitate the flow of said substance.

A further object is to provide such a dispensing apparatus which shall be so constructed as to supply a continuous stream of grease at a low pressure of for example one-hundred pounds and at the same time cause high pressure pulsations in said stream, for example at three thousand pounds pressure.

A still further object of the invention is to provide a dispensing apparatus for viscous substances which shall include novel and improved means for withdrawing the substance to be dispensed directly from a drum or other container and efficiently feeding it to a dispensing pump.

Other objects are to provide in dispensing apparatus of this character, a novel and improved construction and arrangement of valves whereby the pressure of the dispensed substance may be controlled at the will of the operator for regulating the dispensing pressure and for automatically relieving excessive pressure, so that the apparatus shall be easily controlled and safe; and to obtain any advantages and results that will be brought out by the following description in conjunction with the accompanying drawings in which

Figure 1 is a vertical longitudinal sectional view, partially in side elevation, of a dispensing apparatus constructed in accordance with the invention, approximately on the plane of the line 1—1 of Figure 2;

Figures 2, 3, 4 and 5 are horizontal sectional views approximately on the planes of the lines 2—2, 3—3, 4—4 and 5—5, respectively, of Figure 1;

2

Figure 6 is a fragmentary transverse vertical sectional view approximately on the plane of the line 6—6 of Figure 2;

Figure 7 is a fragmentary plan view of a modified form of the feeding plate for withdrawing the grease from its container and forcing it into the inlet of the dispensing pump;

Figure 8 is a fragmentary vertical sectional view of a modification of the invention;

Figure 9 is a horizontal sectional view approximately on the plane of the line 9—9 of Figure 8;

Figure 10 is a fragmentary partial side elevational and partial vertical sectional view of a dispensing apparatus embodying a modification of the invention;

Figure 11 is a similar view of another modification of the invention;

Figure 12 is a horizontal sectional view similar to Figure 3 showing another form of apparatus embodying the invention;

Figure 13 is a partial side elevational and partial vertical sectional view approximately on the plane of the line 13—13 of Figure 12; and

Figure 14 is a fragmentary sectional view approximately on the plane of the line 14—14 of Figure 13.

Specifically describing the embodiment of the invention illustrated in Figures 1 to 6 inclusive, the apparatus comprises a container or tank A for the substance to be dispensed which has suitable means for supporting within it a can or drum B of the substance to be dispensed, for example heavy lubricating grease. As shown, a plurality of spring hooks 1 are secured to the inside of the walls of the container A to receive the rim 2 of the can or drum B and to support said can or drum in inverted position in the tank. Instead of the spring hooks 1, a plurality of ledges or seats 3 may be secured inside the tank to form seats for the rim of the can or drum B.

Within the container A and supported on the bottom 4 thereof is a pumping apparatus C which includes a frame or casing having a gear pump therein. As shown, this gear pump F includes a pump chamber 5 in which are journaled two gears 6 one of which is mounted on a vertical counter drive shaft 7 which is driven by worm gearing 7a from a drive shaft 8 which is connected to any suitable source of power, for example an electric motor D mounted outside of the container. The pump chamber 5 has an outlet passage 9 and an inlet 10 which faces upwardly into the inverted can or drum D and has an upstanding flange 11 at one side thereof.

Above the pumping apparatus and mounted on the counter shaft 7 is a combined agitator and

feeder E which comprises a plurality of radial arms 12 each of which has a depending flange 13 on the trailing edge thereof, said flanges being of such dimensions as to extend throughout the major portion of the length of the inlet opening 10 and barely clear the horizontal edge of the flange 11 as said arms rotate across the inlet opening.

A vertically disposed scraper arm 12a is secured to the agitator and feeder E and extends upwardly almost to the bottom of the drum B so as to contact with the inner wall of the drum to remove any grease that may tend to adhere to said wall. If desired, a tow rod 12b which is curved so as to conform to the configuration of the cylindrical wall of the drum is provided to give support to the upper end of the scraper arm 12a.

With this construction, it will be observed that when the motor D is running, the gear pump 5, 6 will be operated so as to draw the substance from the drum B into the inlet opening 10 and force said substance through the pump outlet 9. At the same time, the arms 12 and flanges 13 of the feeding device E will draw the substance from the drum and force it against the flange 11 and into the inlet 10 with a mashing or agitating action on said substance.

The pump outlet passage 9 is connected through an outwardly opening check valve 14 to a discharge passage 15 to which is connected a hose 16 for conducting the dispensed substance to the desired point of use, for example to a machine bearing, the hose having a suitable valved nozzle 17. Thus, when the pump is operated, grease will be forced in a continuous stream through the outlet hose 16 so long as the nozzle 17 is open. After the nozzle is closed or some other obstruction to the flow of the substance through the hose is encountered, the excessive pressure caused thereby is relieved or by-passed into the container by a check valve controlled passage 18 (see Figure 3).

Generally the pump gears rotate at slow speed, for example 34.5 R. P. M. so as to ensure a steady flow of the substance without danger of cavitation in the pump passages, and the dispensing pressure is about 100 lbs. In order to provide a higher pressure and at the same time make the stream of substance pulsate, I may provide a cam 19 on the counter shaft 7 and a reciprocating piston 20 actuatable in one direction by the cam and mounted in a cylinder 21 in the casing of the pumping apparatus, a spring 22 being provided to actuate the piston in the other direction. The cylinder 21 communicates with the outlet passage 9 of the pump through a by-passage 23 so that substance in the passage 9 is supplied to the cylinder 21 when the piston 20 is withdrawn therefrom as shown in Figure 1. The cylinder 22 has a check valve controlled outlet 24 which communicates through a duct 25 with the discharge passage 15 at the outlet side of the check valve 14. Thus, when the pump is operating, the piston 20 will be rapidly reciprocated and force the substance being dispensed into the hose 16 with a pulsating action and at relatively high pressure, for example 3,000 lbs. In case excessive pressure should be developed in the duct 25, it will be relieved through a check valve controlled relief port 26. It will be understood by those skilled in the art that with this construction, a continuous stream of grease might be supplied to a bearing and at the same time hammer-like pulsations could be set up in said stream so as to loosen or free "frozen" or rusty bearings and permit the grease to enter the bearings.

In Figure 7 I have shown a modification of the feeding device E wherein a plurality of comb-like fingers 27 are provided instead of the flanges 13. These fingers will more thoroughly agitate or break up the substance dispensed.

A modification of the apparatus is shown in Figures 8 and 9 where instead of the outlet check valve 24 and the relief valve 26, an adjustable relief valve 29 is provided for relieving the pressure from the cylinder 30 of the reciprocating piston 31 that corresponds to the piston 20. The valve 29 is shown as a spring seated ball check valve which controls the relief from the cylinder 30 back to the container A through a port 32. This valve is adjustable and as shown a plunger 33 abuts the ball 29 and may be moved in one direction to unseat the ball by a sliding wedge 34 operable in one direction by a finger piece 35 and in the other direction by a spring 36, the plunger 33 being retractable from the ball by a spring 37. With this arrangement the pressure generated in the cylinder 30 may be regulated and if desired the pressure may be substantially completely relieved during operation of the piston 31 while the outlet nozzle 17 is closed.

Another form of the invention is shown in Figure 10 where only a pulsating stream at relatively high pressure is produced, the gear pump serving to supply the substance being dispensed to a reciprocating pump which dispenses the substance at high pressure and in a pulsating stream. Here the gear pump and its driving mechanism will be the same as that hereinbefore described, but the pump outlet 38 communicates with an inlet chamber 39 for a pump cylinder 40 the outlet of which is controlled by an outwardly opening check valve 41 which controls the flow from the cylinder to a discharge pipe 42. Cooperating with the pump cylinder 40 is a reciprocating piston 43 like the piston 20 which is slid in one direction by a cam 44 like the cam 19 and in the opposite direction by a spring 45.

With this construction, the substance is constantly supplied by the gear pump to the pump inlet 39 of the reciprocating pump cylinder 40, and the piston 43 is rapidly reciprocated to force the substance from said cylinder into the discharge pipe 42 at high pressure, the dispensed stream thus issuing from the hose with hammer-like pulsations. To compensate the constant feed by the gear pump and the momentary stoppage of flow from the chamber 39 while the piston 43 is in the cylinder 40, a reciprocating relief valve 46 is connected to the outlet passage 38 of the gear pump, said valve being normally spring pressed by a spring 47 against the pressure of the gear pump. Should the pressure become excessive, the valve 46 will be forced past a relief duct 48 to permit the relief of the pressure from the pump outlet into the container A.

Another feature of the invention is a regulatable relief for the discharge passage, and this comprises a by-pass 49 from the discharge pipe 42 back to the container, a check valve 50 for controlling said by-pass, and an auxiliary relief duct 51 into the container controllable by a needle valve 52. This needle valve may be closed by the operator when the pump is started and may be opened during temporary closing of the outlet nozzle 17, for example during a lubricating job, to relieve the load on the electric motor when no discharge is required in the nozzle 17. This valve may also be "cracked" when the pres-

sure generated by the reciprocating pump is too high for a particular job and a lower pressure is desired.

Figure 11 shows a similar regulatable relief valve combined with the gear pump alone and without the high pressure reciprocating pump. In this apparatus, the outlet passage **53** of the gear pump is connected directly to the discharge passage **54** which corresponds to the passage **42** of Figure 10, but the relief valves **50** and **52** are identical with those shown in Figure 10 and connected to the outlet passage and to the container A in the same manner.

It will be understood that in both forms of Figures 10 and 11 the relief valves are embodied in a plug-like fitting **55** which is secured in an opening **56** in the container A. In Figure 10 the fitting is welded into the container wall while in Figure 11 the fitting is screw-threaded into the container wall and locked by nuts **58**.

In the apparatus shown in Figures 1 to 10 inclusive, the cams for operating the reciprocating pump pistons are connected to the slow speed counter drive shaft of the gear pump so that the pump piston reciprocates at low speed and the pulsations in the stream of the dispensed substance are at low frequencies. Should it be desired to increase the frequency of the pulsations, the operating cam may be connected directly to the main drive shaft **8** as shown in Figures 12 and 13. Here the shaft **8** is extended as indicated at **60** and has an eccentric pin **61** on one end thereof which is disposed in a slot **62** in the head of a reciprocating pump piston **63** which is mounted in a cylinder **64** the outlet of which communicates with a discharge passage **65** with which also communicates the outlet passage **66** of the gear pump F. Communication between the discharge passage **65** and the outlet hose **16** is controlled by an outlet check valve **67**.

In operation of this form of the invention, the substance from the container A is pumped at relatively low pressure by the pump F into the discharge chamber **65** and through the outlet check valve **67** through the hose **16**. At the same time, the piston **63** is reciprocated at high speed so as to set up pulsations in the stream of substance being discharged by the pump F.

While I have shown and described several embodiments of my invention, it should be understood that this is primarily for the purpose of illustrating the now preferred forms of the apparatus and that many modifications and changes can be made in the details of construction of the apparatus within the spirit and scope of the invention.

I claim:

Dispensing apparatus comprising a container for a fluent substance, a gear pump for discharging said substance from said container in a continuous stream under pressure having an inlet opening into said container and also having an outlet, a discharge passage communicating with said outlet, a cylinder whose outlet communicates with said discharge passage, and a piston reciprocable in said cylinder for causing pulsations in said continuous stream of substance, a check valve between said cylinder outlet and the discharge passage and a check valve between said discharge passage and said outlet of the pump, whereby said substance may be discharged in a continuous stream at low pressure through said discharge passage and said piston will cause intermittent pulsations of relatively high pressure in said stream.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,698,023	Mathewson	Jan. 8, 1929
1,879,221	Harrigan	Sept. 27, 1932
1,898,815	Clapp	Feb. 21, 1933
1,908,117	Clapp	May 9, 1933
1,991,341	Aycock	Feb. 12, 1935