

J. F. LINDBERG.

TANK FOR HYDROCARBONS AND LUBRICATING OILS.

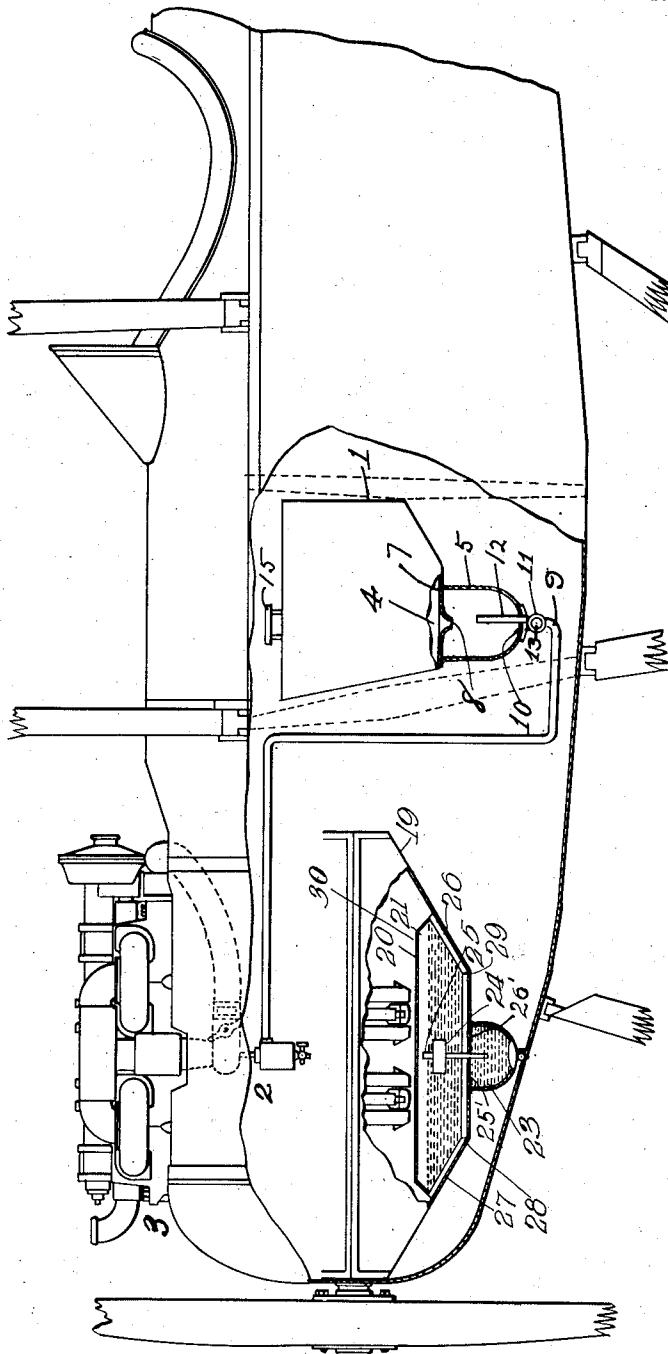
APPLICATION FILED JUNE 17, 1918.

1,364,770.

Patented Jan. 4, 1921.

3 SHEETS—SHEET 1.

FIG. 1.



Witnesses:

Harry C. White.
W. H. Kilroy

Inventor:

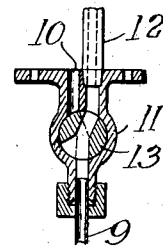
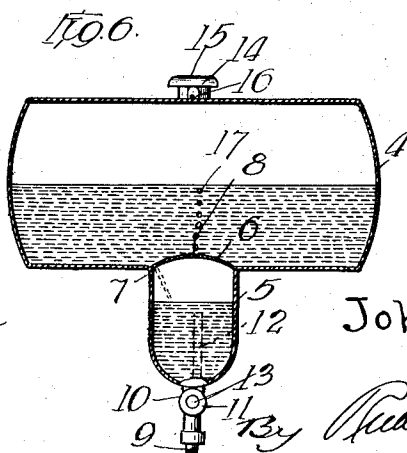
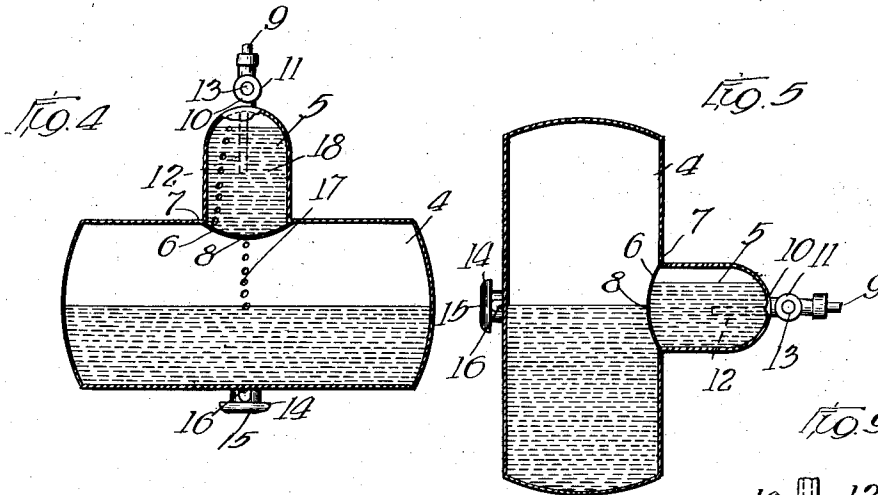
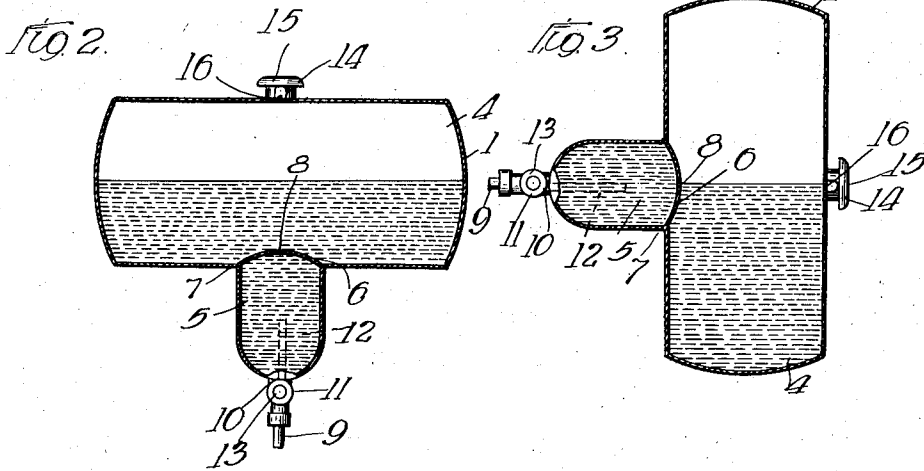
John F. Lindberg
By *Rudolph M. Loz* atty.

J. F. LINDBERG.
TANK FOR HYDROCARBONS AND LUBRICATING OILS.
APPLICATION FILED JUNE 17, 1918.

1,364,770.

Patented Jan. 4, 1921.

3 SHEETS—SHEET 2.



Witnesses
Harry R. White
W. P. Hilroy

Inventor,
John F. Lindberg

Rudolph M. Fox, Atty

J. F. LINDBERG.
TANK FOR HYDROCARBONS AND LUBRICATING OILS.
APPLICATION FILED JUNE 17, 1918.

1,364,770.

Patented Jan. 4, 1921.

3 SHEETS—SHEET 3.

Fig 7

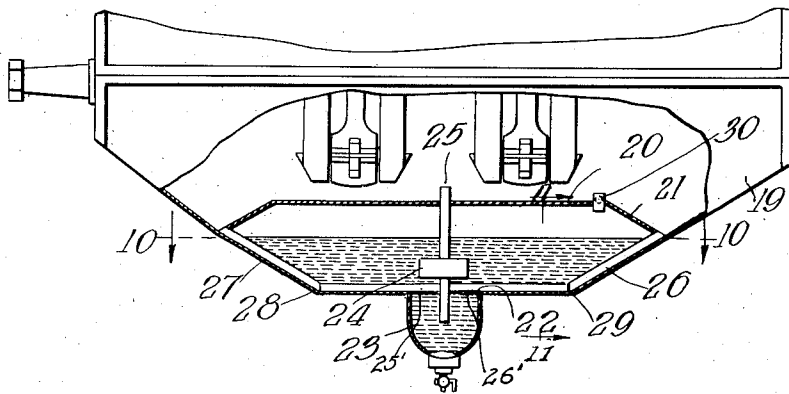


Fig 8

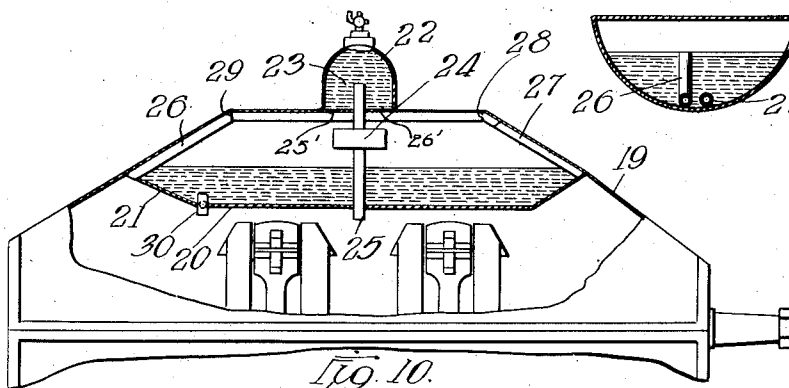


Fig 11

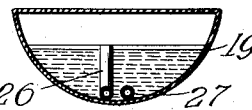
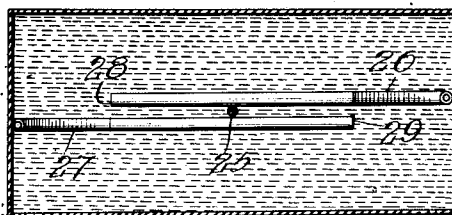


Fig 10



Witnessed

Harry C. White
W. P. Kilroy

Inventor

John F. Lindberg

By *Rudolph Am. & Co. Attys.*

UNITED STATES PATENT OFFICE.

JOHN F. LINDBERG, OF HIBBING, MINNESOTA.

TANK FOR HYDROCARBONS AND LUBRICATING-OILS.

1,364,770.

Specification of Letters Patent.

Patented Jan. 4, 1921.

Application filed June 17, 1918. Serial No. 240,553.

To all whom it may concern:

Be it known that I, JOHN F. LINDBERG, citizen of the United States, residing at Hibbing, in the county of St. Louis and State of Minnesota, have invented certain new and useful Improvements in Tanks for Hydrocarbons and Lubricating-Oils; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in aeroplanes, and more particularly to oil tanks for the same. That is to say, the invention relates particularly to the storage tank for hydro-carbon liquid, and also the engine-crank-case constituting a reservoir for the lubricating oil.

The objects of the invention so far as they relate to the tank or reservoir for the hydro-carbon liquid are:

First: To provide a storage reservoir which will feed the carbureter of the motor regardless of the position of the aeroplane in flight, that is to say, that even though the aeroplane is inverted, is making a nose dive, or is rising at a very sharp angle, the supply to the carbureter will not be interrupted or the uniformity thereof materially disturbed so that a constant supply of fuel to the motor is assured.

Second: To provide a storage tank for hydro-carbons which will permit the last drop of liquid therein contained to be exhausted, if necessary, to permit operation of the motor for a sufficient period after the main supply has been exhausted to enable the aviator to land.

Third: To provide a storage tank of the character defined which will not leak or eject any part of its contents when the aeroplane carrying the same is abnormally positioned at intervals in flight.

So far as the invention relates to the oil reservoir, usually constituting also the crank case of the motor, the invention has for its object to prevent the oil contained in the crank case from running into the cylinders and clogging the same, and sometimes choking the same to the extent of stalling the motor when the plane assumes abnormal positions, as for example, when becoming inverted, making a nose dive or rising at a sharp angle.

To provide a lubricating oil reservoir

which will maintain a constant and uniform feed to the lubricating oil pump regardless of the position of the aeroplane in flight.

Other objects of the invention will be readily understood from the following specification.

The invention consists in the features of construction and combinations of parts hereinafter fully described and particularly claimed.

In the accompanying drawings illustrating suitable embodiments of the invention:

Figure —1— is a view partly in side elevation and partly in section of the body portion of an aeroplane equipped with motor and storage tank, both of which are constructed in accordance with the invention.

Figs. —2— to —6— inclusive, are central vertical sections of the fuel tank showing the same in the various positions which it would assume in accordance with the maneuvers of the aeroplane in flight.

Figs. —7— and —8— are views similar to Figs. —1— to —6— inclusive, showing the crank case of the motor in normal position and in inverted position respectively, and serving to illustrate the manner in which the feed of the lubricating oil is maintained constant.

Fig. —9— is a fragmentary detail section showing a two-way valve employed at the exhaust end of the fuel tank.

Fig. —10— is a fragmentary detail section on the line 10—10 of Fig. —7—.

Fig. —11— is a detail plan section on the line 11—11 of Fig. —7—.

In said drawings, 1 indicates the fuel tank for supplying the carbureter 2 of the motor 3 with carbureted air. This tank is usually mounted at a point between the aviator's seat and the motor and at different elevations in various types of aeroplanes. The accompanying drawing illustrates a suitable location for the tank, the means for rigidly mounting the same in that position being omitted from illustration as superfluous.

The tank 1 consists, for example, of a cylindrical or other shaped body portion constituting what I would term the supply chamber 4 which is filled, or partially filled, with the hydro-carbon liquid. Preferably midway between the ends of said main supply chamber and extending downwardly from the bottom thereof is what I term the feed chamber 5, which is partitioned off

from the chamber 4 by means of a suitable plate or head 6. This plate or head is provided with two minute openings 7 and 8 respectively, the former being adapted to cause the fuel to flow from the chamber 4 into the chamber 5, and the displaced air from the latter being adapted to escape through the opening or perforation 8 into the supply chamber 4. The said partition or head 6 constitutes a means for trapping the fuel in the chamber 5, it being obviously necessary that the supply openings 7 to the same be of a number or area or combined area more than sufficient to replace the fuel withdrawn by the carbureter from the discharge pipe 9 which terminates at a point substantially in the center of the chamber 5 and extends to the carbureter 2 of the motor. The number and disposition of the openings 7 may be varied as desired, but preferably, if more than one opening is employed, such plurality of openings will be disposed at respectively diametrically opposite points and in the plane of the longitudinal axis of the supply chamber 4. The opening 8 need obviously not be of quite as great area as the opening or openings 7 for the reason that air is more fluent than liquid and, therefore, a larger volume thereof will escape through a smaller opening in the same space of time.

In the bottom of the chamber 5 there is also a drain opening 10. The latter is made in the valve housing 11 with which the inner end 12 of the discharge pipe 9 communicates. In said valve housing 11 there is a two-way valve 13, shown in detail in Fig. —9—, which may be turned to establish communication between the pipes 9 and 12, or between the opening 10 and the pipe 9 respectively, when it is desired to drain the remnant of fuel disposed in the chamber 5 below the upper end of the pipe 12 when the plane is disposed in substantially normal position.

The escape of fuel from the supply chamber 4 during abnormal positioning of the tank during flights of the aeroplane is prevented by providing the filling cap 14 with a small vent opening 15 which is controlled by a suitable check valve 16, which may be either gravity or spring-actuated, as desired, to maintain the vent opening 15 either normally closed or to automatically effect closure thereof during abnormal positioning as aforesaid.

Figs. —2— and —6— show the tank disposed in its normal position. It will be seen by reference to Fig. —2— that the chamber 5 is completely filled with the hydro-carbon liquid. If now the aeroplane shown in Fig. —1— rises vertically, it will be observed that the fuel in the chamber 4 moves to the left-hand end of said chamber, whereas the

fuel contained in the chamber 5 is retained in the latter and is maintained above the level of the discharge pipe 13, thereby maintaining an uninterrupted feed to the carbureter. Obviously, the aeroplane cannot remain vertically disposed for any long period of time; the average time being possibly a fraction of a minute and seldom, if ever, exceeding a period of two minutes. Hence, the capacity of the chamber 5 will be such that more than the longest space of time that the aeroplane remains in a vertical position in flight will be required to drain off less than one-half of the cubic contents of said chamber. This would take into account the volume withdrawn through the discharge pipe 12 as well as the volume which would leak into the chamber 4 through the openings 7 and 8. If now the aeroplane were making a complete loop or somersault in a substantially vertical plane the next position of the tank would be that shown in Fig. —4— wherein it is shown as completely inverted. During the period of complete inversion liquid would drain from the chamber 5 into the chamber 4, as indicated at 17, and air would enter through the openings 7, as indicated by the bubbles 18. At the same time fuel would be withdrawn from the discharge pipe 12 to the carbureter. Following the position shown in Fig. —4— the tank would assume the position shown in Fig. —5—. In this figure, as well as in Fig. —4—, part of the fuel contained in the chamber 5 is shown as having been drained out. The operation in this position would be exactly identical with that in the position of Fig. —3— and upon righting the plane the tank would assume the position shown in Fig. —6—, which is the same as that of Fig. —2—, whereupon the fuel exhausted from the chamber 5 during this looping period would obviously be automatically replaced by gravity.

The invention may also be carried out in the manner illustrated in Figs. —7— and —8—, wherein the crank case 19 of the motor is provided internally with a partition wall 20, the end portions 21 of which are somewhat angularly disposed. The bottom of the crank case is usually substantially semicircular in shape, and the top and end walls constitute, together with the crank case bottom, the lubricating oil reservoir. The top and end walls of the oil chamber will follow the contour along their edges of the bottom wall of the crank-case. Extending below the crank-case is the feed chamber 22 into which the suction pipe 23 of the lubricating oil pump 24 projects, said suction pipe terminating substantially in the center of the chamber 22. The latter is fed from the main portion of the oil reservoir through openings 25' and 26', corresponding

to the openings 7 and 8, shown in Figs. —2— to —6— inclusive, thus causing the said chamber 22 to be filled by gravity during normal positions of the aeroplane in flight, thus assuring a constant and uninterrupted supply of lubricating oil to the suction pipe of the pump. The latter is only diagrammatically shown, and may be located and operated in any desired manner.

10 The discharge pipe 25 of the oil pump may lead, as desired, to any and all bearings and cylinders of the motor, and the parts actuated thereby in any usual and well-known manner.

15 Oil poured into the crank-case finds its way into the main reservoir through two pipes or passages 26 and 27, the former of which extends along the bottom of the crank-case from the right-hand end or wall 21 of the oil reservoir to the point 28 and the pipe 27 extends from the left-hand side, similarly, to the point 29. In the top wall of the reservoir is a valve-controlled vent 30 which may be an ordinary ball-check valve, or the like, which will permit air displaced by the inflowing oil to escape from the reservoir, but will prevent the escape of oil from said reservoir. Consequently, the oil reservoir will fill to the same depth or level as the crank case, but will trap nearly all of said oil, leaving only a small quantity thereof disposed at opposite ends of the oil reservoir in the crank-case, *per se*. If now the aeroplane should assume a vertical position either in rising or making a nose dive, the oil in the oil reservoir will flow into one end of the latter and only that portion which is then disposed above the end 28 of the pipe 26, or vice versa, the end 29 of the pipe 27 will escape from the oil reservoir into the crank case. This small quantity of oil cannot possibly find its way into any of the cylinders to an extent to completely fill or choke the same or interfere in any way with the proper operation of the motor, but at the same time the lubrication of all the bearings and cylinders by means of the oil pump 24 remains constant and uninterrupted for the entire period of abnormal positioning of the aeroplane as explained in connection with the fuel tank illustrated in Figs. —2— to —6—. In this way not only is excessive leakage of oil and fuel prevented, but the operation of the motor is rendered steady and uniform, and all danger of stalling the same, for reasons well understood in the art, is obviated.

The oil trapping means illustrated in Figs. —7—, —8—, —10— and —11— may be applied to the fuel tank and vice versa, as will be obvious.

Obviously while I have shown suitable embodiments of the invention in the accompanying drawings the constructions illus-

trated and described may be considerably changed and varied without departing from the invention as defined in the appended claims.

I claim as my invention:

1. A container for liquid for supplying the motors of aeroplanes comprising a main chamber and an auxiliary chamber connected therewith and adapted to fill with liquid by gravity when the container is disposed in substantially normal position and to retain substantially all of its contents during periods of abnormal position of the said container, said auxiliary chamber connected with means for forcibly withdrawing the contents thereof and feeding the same to the motor.

2. In an aeroplane, the combination with the motor, of a container for oil comprising a main chamber and an auxiliary chamber normally disposed at a lower end than the main chamber and connected with means for forcibly feeding oil to the motor, a normally open port connecting said chambers for permitting passage of oil from the main chamber into the auxiliary chamber faster than the oil is fed to the motor, said port arranged to retain sufficient oil in the auxiliary chamber to maintain the constancy of supply to the motor during periods of abnormal positioning of the container during flight.

3. In an aeroplane, the combination with the motor, of a container for oil comprising a main chamber and an auxiliary chamber normally disposed at a lower end than the main chamber and connected with means for forcibly feeding oil to the motor, and means establishing communication between said chambers whereby the auxiliary chamber is maintained automatically filled during periods of normal position of the container and retains its contents to maintain constancy of supply to the motor during periods of abnormal positioning of the container during flight.

4. A container for oil for feeding motors and the like comprising two chambers, one thereof having an outlet for supplying the motor and constituting the feed chamber, and the other thereof constituting the supply chamber for maintaining the feed-chamber filled, means establishing communication between said chambers whereby said feed chamber is automatically supplied from the supply chamber when the container is normally positioned, said means adapted to maintain said feed-chamber sufficiently filled with oil during intervals of abnormal positioning of the container in flights to maintain an uninterrupted feed to the motor.

5. A container for oil for feeding motors and the like comprising two chambers, one thereof having an outlet for supplying the motor and constituting the feed

chamber; and the other thereof constituting the supply chamber for maintaining the feed-chamber filled, means establishing communication between said chambers
 5 whereby said feed chamber is automatically supplied from the supply chamber when the container is normally positioned, said means adapted to maintain said feed-chamber sufficiently filled with oil during intervals of abnormal
 10 normal positioning of the container in flights to maintain an uninterrupted and normal feed to the motor.

6. A container for oil for feeding motors and the like comprising two chambers, one
 15 thereof constituting the feed chamber for supplying the motor, and the other thereof constituting the supply chamber for maintaining the feed-chamber filled, means establishing communication between said chambers
 20 whereby said feed chamber is automatically supplied from the supply chamber when the container is normally positioned, said means adapted to maintain said feed-chamber sufficiently filled with oil during
 25 intervals of abnormal positioning of the container in flights to maintain an uninterrupted feed to the motor, said feed chamber being of substantially equal length and diameter, and an outlet pipe for oil to feed
 30 the motor terminating substantially in the center of the feed chamber.

7. A container for oil for feeding motors and the like comprising two chambers, one
 35 thereof constituting the feed chamber for supplying the motor, and the other thereof constituting the supply chamber for maintaining the feed-chamber filled, means establishing communication between said chambers whereby said feed chamber is automatically supplied from the supply chamber
 40 when the container is normally positioned, said means adapted to maintain said feed-chamber sufficiently filled with oil during intervals of abnormal positioning of the container in flights to maintain an uninterrupted feed to the motor, said feed chamber
 45 being of substantially equal length and diameter, and an outlet pipe for oil to feed the motor terminating at a point substan-

tially equi-distant from the nearest points in the walls of said chamber.

8. A tank of the character defined comprising a supply chamber and a feed chamber disposed below the same adapted to trap and retain a limited quantity of oil for feeding the motor during periods of abnormal
 55 positioning of the tank in flights, means establishing communication between the supply and feed chambers whereby the latter becomes automatically filled as the tank assumes its substantially normal position, and connection between the feed chamber and motor feeding means leading from a point
 substantially in the center of the feed chamber whereby an uninterrupted and uniform
 65 feed to the motor is assured during periods of abnormal positioning of the motor until substantially one-half the contents of the feed chamber have been exhausted.

9. A tank of the character defined comprising a supply chamber and a feed chamber disposed below the same adapted to trap and retain a limited quantity of oil for feeding the motor during periods of abnormal
 75 positioning of the tank in flights, means establishing communication between the supply and feed chambers whereby the latter becomes automatically filled as the tank assumes its substantially normal position, connection between the feed chamber and motor
 80 feeding means leading from a point substantially in the center of the feed chamber whereby an uninterrupted and uniform feed to the motor is assured during periods of abnormal positioning of the motor until substantially one-half the contents of the feed
 85 chamber have been exhausted, a valve housing in the normally lowest point in the feed chamber connected with the said feed connection and with the motor feeding means, an opening in said valve-housing for completely draining said feed chamber, and a manually operable two-way valve in said
 90 valve housing for connecting either said feed connection or said drain opening with the motor feeding means and shutting off the other thereof.

JOHN F. LINDBERG.