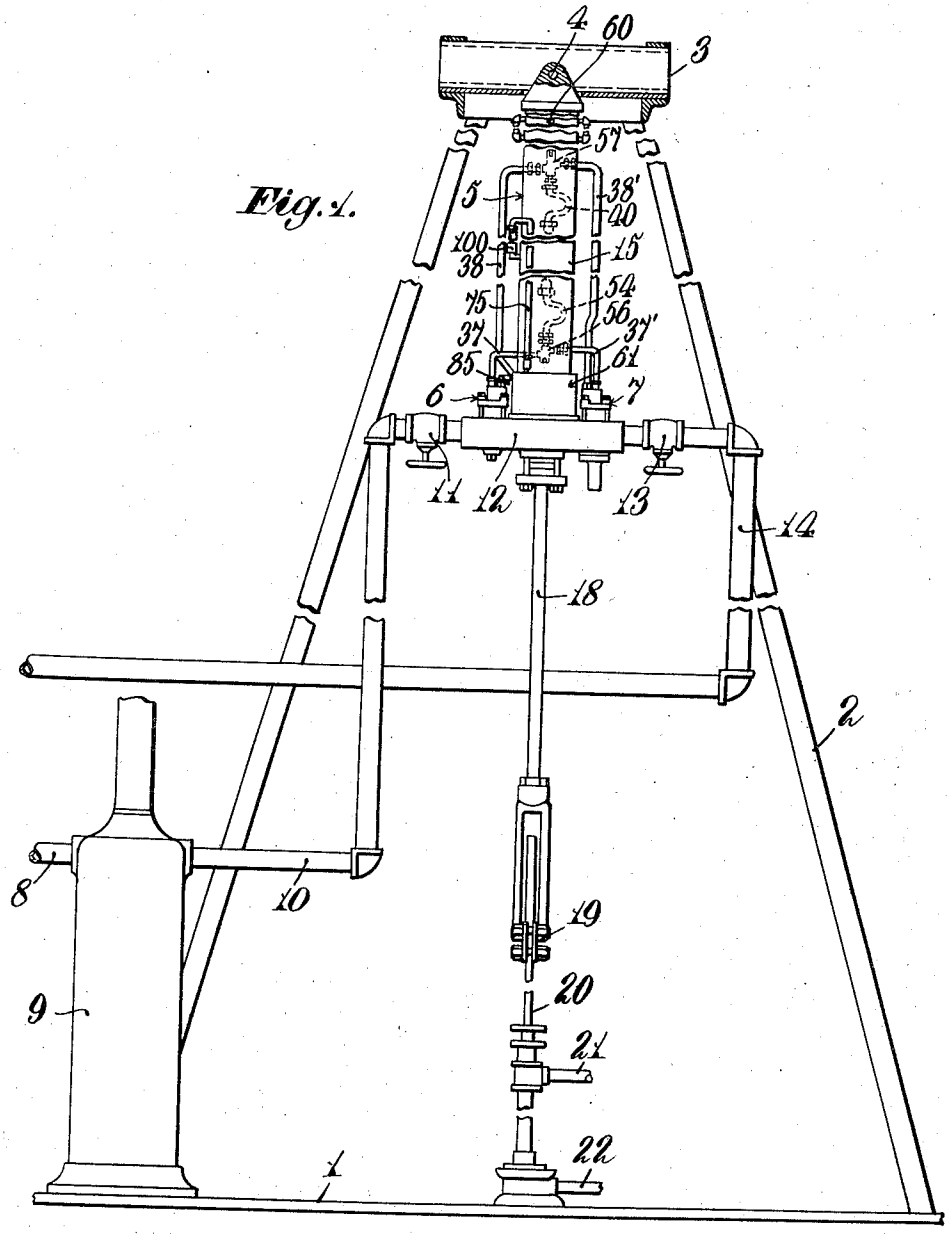
Feb. 13, 1940. W. H. WINEMAN 2,190,581

LUBRICATING APPARATUS

Filed May 4, 1937 4 Sheets-Sheet 1

Fig. 1.



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LUBRICATING APPARATUS

Filed May 4, 1937 4 Sheets-Sheet 2

Fig. 2.

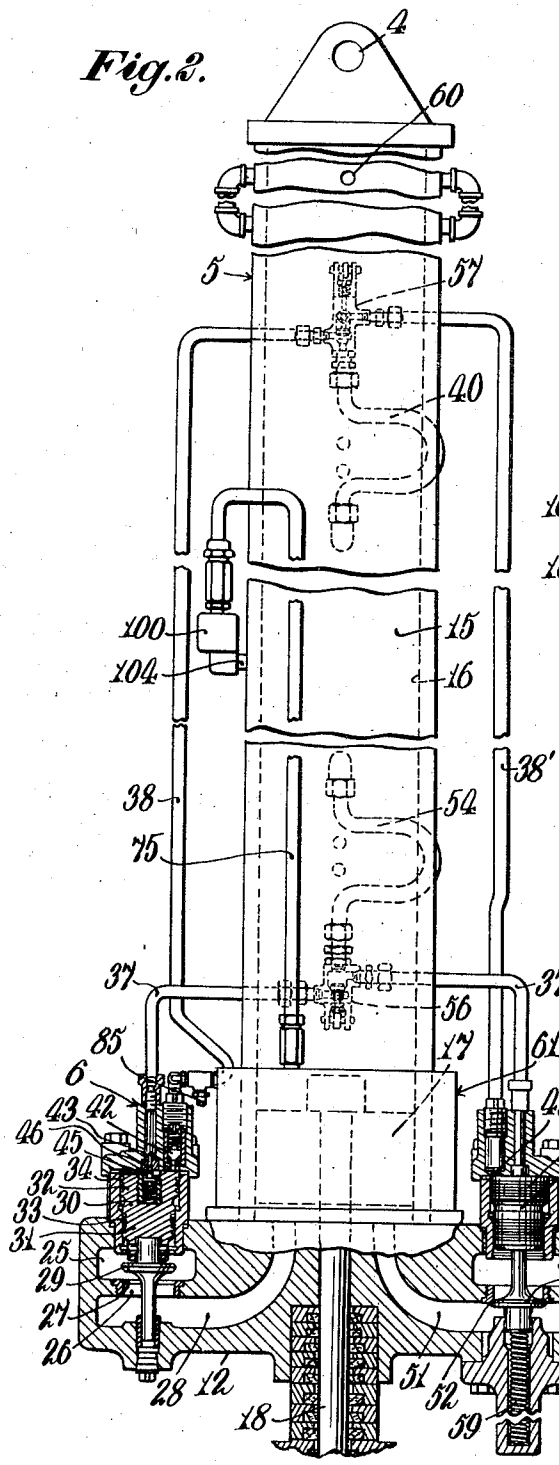


Fig. 4.

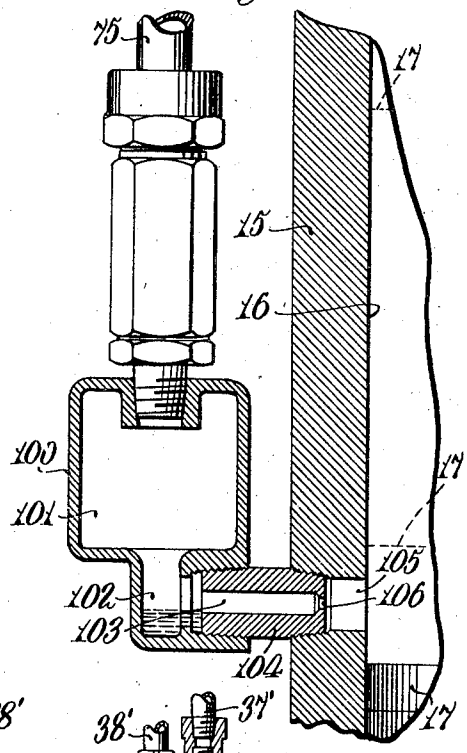
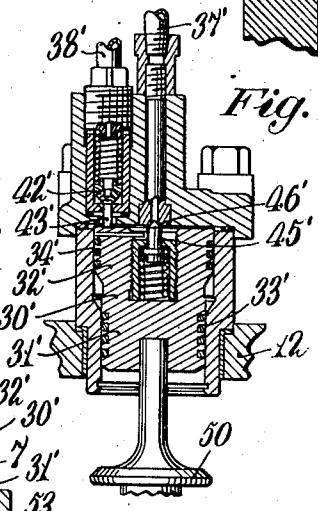


Fig. 3.



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LUBRICATING APPARATUS

Filed May 4, 1937 4 Sheets-Sheet 3

Fig. 5.

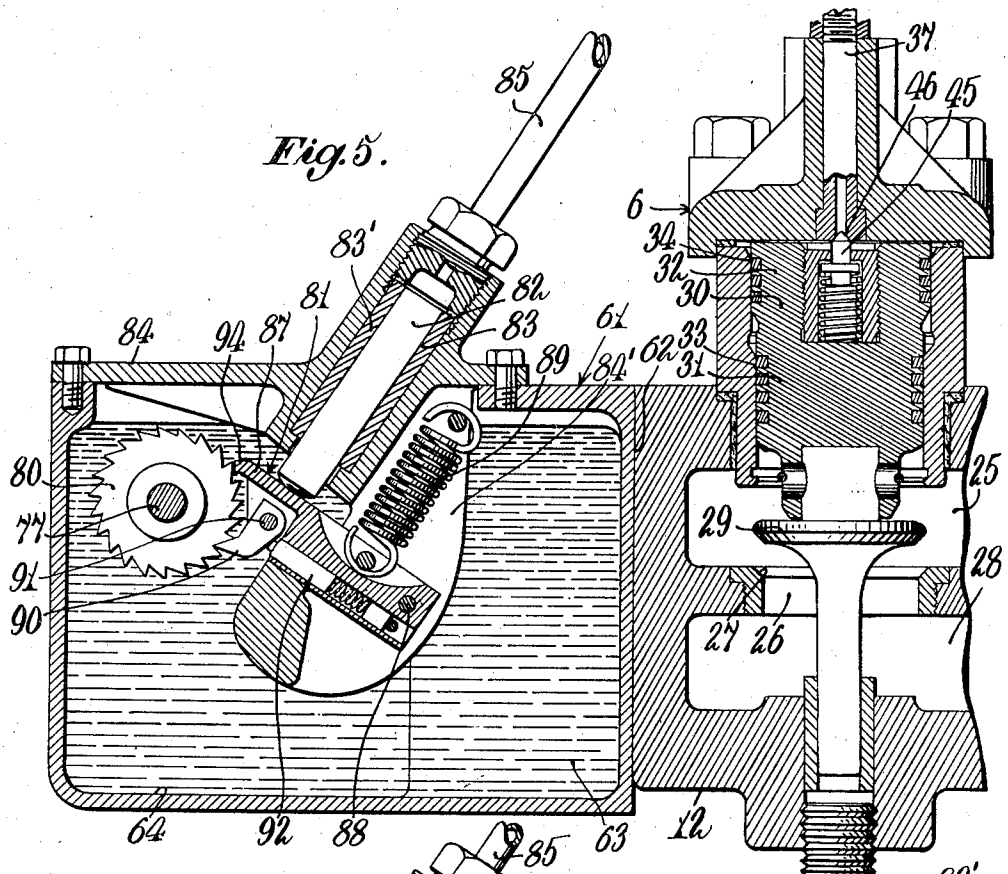


Fig. 7.

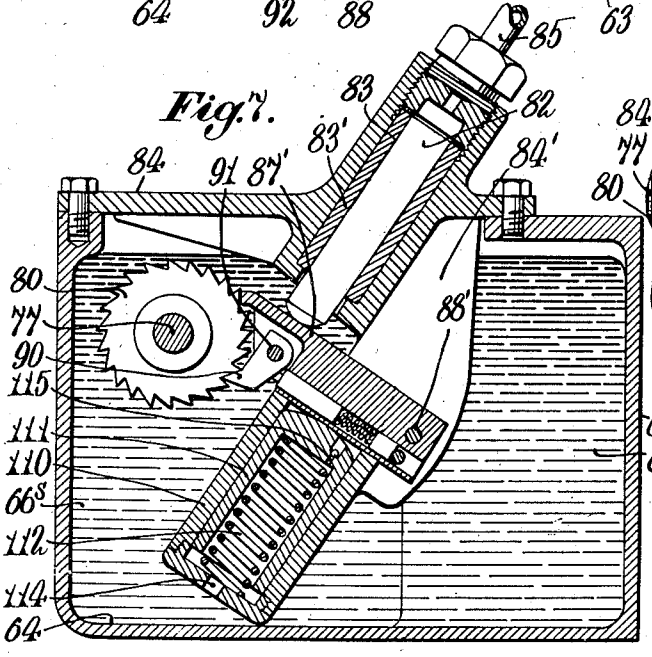
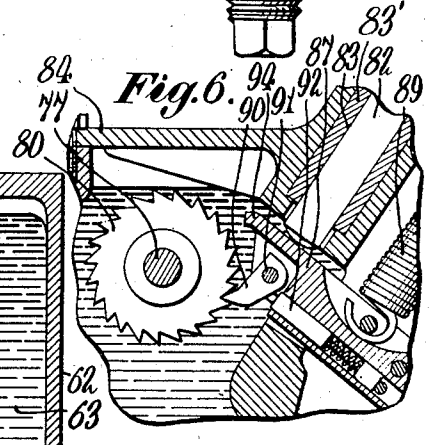


Fig. 6.



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LUBRICATING APPARATUS

Filed May 4, 1937 4 Sheets-Sheet 4

Fig. 8.

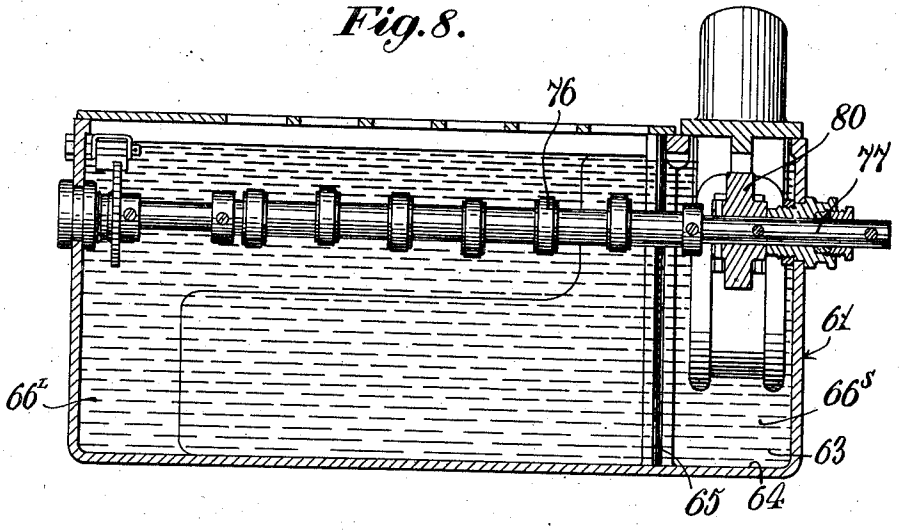
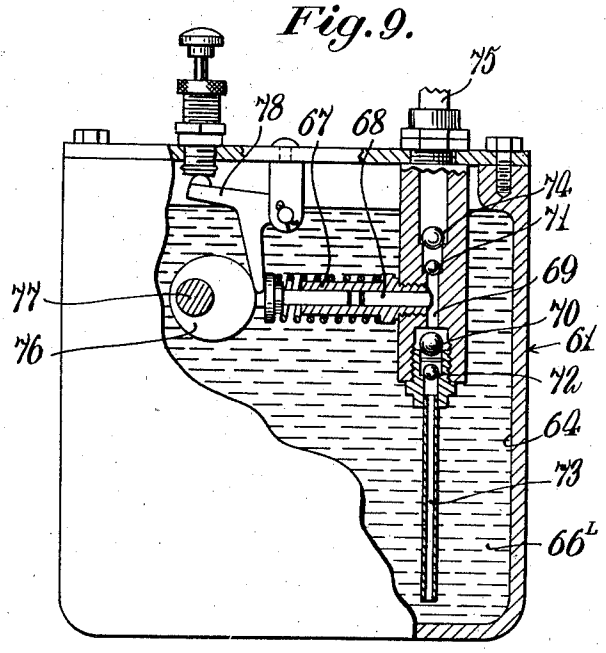


Fig. 9.



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Patented Feb. 13, 1940 2,190,581

UNITED STATES PATENT OFFICE

2,190,581

LUBRICATING APPARATUS

Wade H. Wineman, Michigan City, Ind., assignor to Sullivan Machinery Company, a corporation of Massachusetts

Application May 4, 1937, Serial No. 140,680

9 Claims. (Cl. 74—128)

My invention relates to lubricating apparatus, and, more particularly, to an improved lubricator drive, and still more particularly, in certain aspects, to an improved pressure fluid actuated lubricator drive maintained in operation in synchronism with the motor or other device to which it supplies lubricant in an improved manner.

In certain oil producing territory, it has been found necessary to provide for the positive raising of the oil which may remain in large quantities in the formation after the formation pressure has been reduced to such a point as to be inadequate to raise the oil from the sands. In the application of pressure-fluid-operated motors to this end, it has been found necessary to provide especially troubleproof devices to serve as adjuncts to the improved motors which have also had to be developed. As these motors operate out-of-doors, and summer and winter, and in territory which in summer is hot, and in winter, cold, and where there are high winds with danger of grit and sand attaining access to lubricated areas, it is important that a very efficient lubricator and lubrication system be provided; and my invention, while of general application in many of its aspects, was developed particularly to meet the demands of such conditions. It therefore includes in different aspects thereof, the feature of maintaining adequately warm, and so sufficiently fluid, the lubricant in cold weather, the effective lubrication of the walls of relatively long motor cylinders, and the concurrent control of the lubricator drive and the distributing valve mechanism of the lubricated motor, as well as certain particular features of lubricant drive per se. Certain of the aspects mentioned are covered in my copending parent application, Ser. No. 59,428, of which this present application is a division, and in view of the genesis of my improved lubricator and lubricator drive in the particular problems of oil well pumping, I will describe the same as incorporated in conjunction with such a system, although it will be appreciated that the invention in its various embodiments and in certain of its aspects is adapted to extremely wide use.

It is an object of my invention to provide an improved lubricating apparatus. Another object of my invention is to provide an improved lubricant pump. A further object of my invention is to provide an improved force feed lubricator drive. Still another object of my invention is to provide an improved lubricating apparatus for a motor of the expansible chamber type in which, through the provision of an improved lubricator drive, the fluid distribution mechanism of the motor may control the operation of the lubricator per se. Other objects and advantages of my invention will hereinafter more fully appear.

In the accompanying drawings, in which for purposes of illustration one embodiment and a modification of my invention are shown,

Fig. 1 is a side elevational view of an oil pumping system in which an illustrative embodiment of the invention herein claimed is incorporated.

Fig. 2 shows an expansible chamber motor, partially in side elevation and partially in vertical section, with which the improved lubricating means is associated and under the control of whose distributing mechanism the lubricator is actuated.

Fig. 3 is a fragmentary vertical section showing a distributing valve actuating means forming a portion of the motor mentioned.

Fig. 4 is a view partially in elevation and partially in section, showing the details of one device through which the lubricator per se may deliver lubricant.

Fig. 5 is a vertical sectional view through a portion of a distributing valve mechanism of the motor shown in Fig. 2, and the lubricant pump drive proper.

Fig. 6 is a fragmentary view showing a portion of the lubricant pump drive in a different position.

Fig. 7 is a view showing a modified lubricant pump drive.

Fig. 8 is a longitudinal vertical section through a force feed lubricator chamber, with parts omitted.

Fig. 9 is a view partially in end elevation and partially in vertical transverse section, through the force feed lubricator driven by my improved lubricator drive.

As above noted, certain of the aspects of my invention which will be made the subject matter of claims in this application may be embodied in conjunction with a wide range of equipment, for example, a compressor, a double acting expansible chamber motor, a vacuum pump, or, indeed, nearly any apparatus requiring timed lubricant delivery thereto. In view of the origin of my invention in the solution of certain of the problems of pumping oil, the invention is shown here incorporated in a pumping system for oil wells. In Figs. 5 to 9 the structure of the lubricator per se will be observed to be disclosed in detail, with a modified drive also illustrated; and in Fig. 2 the source of the actuating fluid for the

lubricator is indicated. Figs. 1, 2, 3 and 4, whose disclosures will first be described, illustrate largely the setting of the lubricator improvements forming the subject matter of the present claims.

Referring now to Fig. 1, it will be noted that upon a platform 1 a derrick 2 having a suitable top 3 is mounted. From a pivot 4 a pumping motor, generally designated 5, is suspended. Motor 5 is herein of the single acting type, and is provided with an inlet valve mechanism 6 and an exhaust valve mechanism 7. Operating fluid is supplied through a connection 8, first to a preheater 9, and then through a pipe 10 under control of a stop valve 11 and a valve chest 12. After its use in the motor, the fluid is exhausted under the control of the exhaust valve mechanism 7, past the stop valve 13, and through a line 14 in which a substantial back pressure is maintained, and is returned to the intake side of the compressor which raises the pressure of the operating fluid again to the necessary degree. Motor 5 has a cylinder 15 whose bore 16 contains a piston 17. Piston 17 is reciprocable under the control of the distributing valve mechanism heretofore mentioned. Piston 17 has a piston rod 18 connected at 19 to a pump rod line 20. The latter operates a suitable pump located in a well. Oil raised by the pump is delivered through a line 21 to any desired place, and casing head gas may be led away from the well by a suitable connection 22.

The motor distributing valve mechanism will be described in no more detail than seems advisable in order that the actuation of the lubricator per se may be made clear. Valve chest 12 comprises a chamber 25 to which operating fluid is delivered under a pressure of two or three hundred pounds per square inch, say, and at a temperature of some hundreds of degrees, Fahrenheit. Accordingly, the walls of the valve chest are hot, which enables the maintaining of the lubricant free-flowing, even in cold weather, in view of the mounting of the lubricator in the hereinafter described adjacency to the hot valve chest. A port 26 surrounded by a suitable valve seat 27 leads to an admission passage 28 opening into the bottom of the cylinder bore 16. An admission valve 29 is adapted to cooperate with the seat 27 in controlling admission and cut-off. The valve is governed in its movements by a differential piston mechanism 30 comprising a lower head 31 of substantially the same diameter as the passage 26 through the valve seat, and an upper, somewhat enlarged head 32. These heads move in bores 33, 34 respectively, and the space below the head 32 in the bore 34 is constantly vented to atmosphere. When the admission valve 29 is closed, it is subjected to the cylinder pressure in a direction tending to open it, and when it is opened, it is also subjected to the same pressure substantially that exists in the cylinder. The upper end of the bore 34 is adapted to be connected with the bore of the cylinder through passages formed by pipes 37, 38, the former opening into the cylinder bore in such a position that its mouth is uncovered by the downwardly moving piston as the latter nears the bottom of its stroke, while passage 38 opens into the bore of the cylinder at a point which is uncovered by the lower end of the upwardly moving piston as the latter nears the desired top limit of its stroke. Through suitable means, indicated on Figs. 1 and 2 by 40, the point of communication of the connection 38 with the cylinder may be varied. Reference may be had to my already granted Patent No. 2,004,146 for the further disclosure of the device 40. Communication of the connection 38 with the top of the bore 34 is controlled by a ported valve 42 which is arranged to be moved to open position by a plunger 43 engageable by the head 32 when the admission valve 29 is in full open position. When the head 32 is in the position corresponding to the closed position of the valve 29, the valve 42 is seated and prevents communication between the space at the top of the bore 34 through the connection 38 and the cylinder bore. The communication of the cylinder bore by way of passage 37 with the space within the bore 34 is controlled by valve 45, the latter resiliently supported by the head 32 and cooperating with a valve seat 46 surrounding the mouth or lower end of the passage 37. This construction makes communication through the passage 37 between the cylinder bore and the space above the head 32 within the space 34 possible only when the valve 29 is moved away from its full open position.

The exhaust valve 50 which controls communication between the lower end of the cylinder bore through a passage 51 and through a valve seat 52 with the exhaust chamber, is controlled by somewhat similar mechanism to that described with respect to the admission valve, and corresponding parts are provided with corresponding numbers, save that the parts of the operating mechanism for the exhaust valve bear primed numbers. It should be noted that the exhaust valve 50 is not pinned to its control piston 31', but simply has its stem in end abutment with and guided by the piston 31', as shown in Figure 3; and the exhaust valve is caused to follow said piston in the upward movements of the latter by a spring 59 hereinafter more fully described.

The connection 37' is adapted to communicate with the bore of the cylinder at a point above the point of communication of the cylinder bore with connection 37, and mechanism 54 is provided to permit a variation in the locus of communication. For further details with respect to the mechanism 54, reference may be had to my Patent 2,004,146 above mentioned. Connection 38' opens into the cylinder bore at a point above the point of normal communication of the connection 38. Mechanisms diagrammatically illustrated only and designated 56 and 57 respectively, may be provided after the manner of the construction shown in Letters Patent 2,004,146 above deferred to, for the purpose of effecting communication of passages 37, 37' at the same point, if desired, with the cylinder bore, and communication of passages 38, 38' at the same point, if desired, with the cylinder bore. The exhaust valve will be noted to have a spring 59 arranged beneath the same, and it is this spring which causes the exhaust valve 50 normally to occupy the position with respect to the piston device 30' which is indicated in Fig. 3. It may further be noted that the upper end of the cylinder bore 16 is suitably vented, herein by means of a vent port 60, spaced substantially above the uppermost limit of normal piston travel.

While a somewhat more detailed description of the mode of operation of the motor is desirable and will be given, it may be noted that this motor is provided with independent admission and exhaust valves, each of which has associated therewith means for exerting thereon pressures acting in opposite directions by which the movements of the valve are controlled, including a pressure area—that at the top of the piston mechanisms

30, 31' respectively—subjected to the working pressure in the cylinder to effect valve movement in one direction (closing movement for the admission valve and opening movement for the exhaust valve) and connected with the vented end of the cylinder, i. e. the upper end thereof, during reverse valve movement, and having associated therewith connecting means (the passages 37, 37' and 38, 38') for transmitting working cylinder pressure thereto and venting such pressure therefrom including controlled connections respectively with the space within the cylinder towards opposite ends of the latter.

In the position of the parts shown in Fig. 2 and with the valve 11 open, motive fluid enters the lower end of the cylinder bore 16, past the valve 29, and through the passage 28, and starts the piston 17 upon its upward traverse. As the piston moves upward, it uncovers the cylinder end of the connection 37, but this is without effect upon the valve 29 because the valve 45 is resting upon the seat 46 and prevents access of working cylinder pressure to the upper end of the bore or chamber 34. In like manner, when the piston moves above the cylinder end of the connection 37', nothing happens because the valve 45' is seated upon its seat 46'. When, however, the piston uncovers with its lower edge, that is, passes above, the point of communication of the connection 38 with the cylinder bore, fluid flows past the ported valve 42 and enters the chamber 34 and acts upon the piston 32 and starts the latter to moving downwardly. Before sufficient downward movement of piston 30 can take place to permit closure of valve 42, valve 45 is withdrawn from its seat 46 and the cylinder pressure then passes through connection 37 and forces the piston 30—32 downwardly and closes the admission valve 29. Shortly thereafter the exhaust valve 50 is moved to open position in a similar manner. This results in release occurring, and the piston 17 will be moved downward by its weight and the weight of the supported parts against the back pressure in the pipe 14. During a considerable portion of the downward travel of the motor piston, the position of the valves 29 and 50 remains unchanged, for notwithstanding the fact that the connection 38' is placed quite soon in communication with the vented end of the cylinder, and the connection 38 either shortly afterwards or concurrently with venting of the connection 38', no fluid can escape through the connections 38, 38' for in the depressed positions of the pistons 30, 30' the valves 42, 42' are seated and prevent escape of fluid from the bores 34, 34'. When the upper end of the piston passes below the connections 37', 37, the exhaust valve will be permitted to close and the admission valve permitted to open because the pressure which has been holding them in their former positions will be vented through the valve seats 46', 46, and the connections 37', 37, and the upper end of the cylinder and the vent port 60, and the parts will be restored to the relative positions shown in Fig. 2. This cycle of operation which has been described will then be repeated, and so long as fluid is supplied and there is no derangement of the mechanism from abnormal causes, the motor will operate upon the working cycle explained.

With this explanation and description of the setting of the lubricator, this may now be described in detail. Referring more particularly at this time to Figs. 5 to 9 of the drawings, it will be observed that a force-feed lubricator, generally designated 61, is secured against a heated surface 62 formed on the admission valve chamber, whereby the lubricant 63 within the chamber 64 of the lubricator is maintained hot and free-flowing. It will be understood that if the device is operated with steam as the motive fluid, the steam will provide the heat which the preheating makes available in the case of the air operated pump motor. The chamber 64 is partially divided by a partition 65 into a space 66^S in which an actuating mechanism is located, and a larger space 66^L, in which the several pumps are arranged. The lubricator may comprise a number of individual pumps each distributing to a separate point of use, but for simplicity only one pump has been shown, this being illustrated in Fig. 9. A pump cylinder 67 contains a plunger 68 moving into a space 69 between a suction check valve 70 and a delivery check valve 71. A second check valve 72 controls the suction connection 73, while a standing valve 74 is arranged above the delivery check valve 71 and prevents reflow through a delivery line 75 which may be led to a desired point of delivery. Herein this particular delivery line leads to a lubricating device which will shortly be described. Other delivery lines, not shown, will be led from other pumps, not illustrated, but actuated by eccentrics 76 carried on an eccentric shaft 77 within the space 66^L. Of course, one of the eccentrics 76 serves as the actuating means for the pump which I have specifically described. Manual means 78 is provided for enabling a few shots of lubricant to be provided at a more rapid rate, if desired, or even when the motor is stopped. The shaft 77 is rotated, in the form of the invention illustrated in Figs. 5 and 6, by a ratchet wheel 80 which is secured to it and by a pawl type driving mechanism generally designated 81. This mechanism includes a plunger 82 reciprocably mounted in a bore 83 provided by a liner member 83' suitably mounted on a cover plate member 84, and having a motive fluid supply connection 85 branching from the connection 38 as shown in Fig. 2. Obviously, now, fluid will be admitted to the line 85 when the main motor piston nears the top of its working stroke, and will be vented from the connection 85 soon after each down-stroke of the motor commences. The plunger 82 is arranged to act upon a pawl carrier 87 pivotally mounted at 88 upon a depending support portion 84' carried by the cover plate 84. The pawl carrier 87 is normally held in raised position by a spring 89. A pawl 90 pivotally supported at 91 on the pawl carrier is normally pressed by a spring actuated plunger 92 into a ratchet-engaging position. The pawl carrier carries a projection 94 which serves as an anti-coasting device, moving in between a pair of teeth on the ratchet wheel 80 as the latter turns, and acting to prevent spinning of the ratchet wheel. It will be noted that the pawl is carried at the side of the pawl carrier 87 nearer the ratchet wheel, and the anti-coasting projection 84 at the other side of the pawl carrier.

The mode of operation of this lubricator actuating mechanism will be obvious from what has been said. Each time the motor piston 17 reciprocates the plunger 82 will effect a rotation, through an angle corresponding to a single ratchet tooth, of the drive shaft 77. Since there are in the construction shown twenty-three teeth on the ratchet 80, the drive shaft 77 will be rotated once in each twenty-three reciprocations of the piston 17, which would be the equivalent

perhaps of once a minute, or once every minute and a half, or so, of operation of the pumping motor under normal conditions. The quantity of liquid displaced through the connection 75 will depend, of course, on the displacement of the pump plunger 68.

The connection 75 leads to a lubricant injector device 100 mounted on the side wall of the cylinder 15 in a position more or less midway between the ends of the cylinder, as illustrated in the drawings, but which may obviously be varied widely provided only it be uncovered by the bottom of the piston on the up-stroke of the latter and by the top of the piston on the down-stroke of the latter. The lubricant injector 100 comprises a chamber 101 to which the connection 75 leads, and this chamber has a lower reduced portion 102 which communicates through a bore 103 in a connecting device 104 with an opening 105 in the cylinder wall. The bore 103 is reduced as at 106 at its end nearest the cylinder bore in order to provide increased velocities of flow. The bore 103 communicates with a reduced space 102 substantially above the bottom of the latter. This enables a storage of a certain amount of lubricant in the chamber 102 which would not flow by gravity through the connection 104—a result which is augmented by the reduced size of the opening 106—and accordingly while some lubricant may run down the adjacent wall of the cylinder bore 16, in large part it will be discharged at substantial velocity with outrushing air or other motive fluid, as hereinafter described.

Now the mode of operation of the device as a whole may be readily followed. The motor piston 17 will reciprocate in the manner above described. Once every minute or so of operation of the motor there will occur a stroke of the lubricant-pump plunger 68. During a substantial part of each rotation of the shaft 77, no lubricant will be pumped through the connection 75. However, during a number of main pump-motor strokes intervening the times when no lubricant pumping is taking place, there will be a gradual pumping of lubricant; for the working stroke of the plunger 68 will endure throughout a number of strokes of the working piston 17. The lubricant gradually delivered through the connection 75 to the chamber 101 will enter the reduced chamber 102 and will be blown from that chamber periodically through the connection 103 as follows: On each up-stroke of the motor piston 17, as the piston passes above the opening 105, full cylinder working pressure will pass through opening 106, passage 103 and enter chamber 101, 102. When release occurs, there will be a return to the cylinder of some of this pressure fluid, entraining with it a certain quantity of lubricant, but there will still remain a quite substantial pressure in the chamber 101, 102 at the moment that the piston 17, having reversed its direction of movement, passes downward past the port 105 and places the port 106 in communication with the vented end of the cylinder bore 16. This will involve the creation of a much more effective discharge of pressure from the chamber 101, for the difference in pressure, in terms of compressions, between the chamber and the vented end of the cylinder bore is much higher than the difference in pressure, in terms of compressions, when release occurred. Accordingly, the air will rush from the chamber 101, 102 and through the passage 103, and will entrain a small quantity of lubricant and carry it out in the form virtually of a mist into the cylinder bore, and at such a velocity that it will reach the walls of the cylinder very effectually. Of course this same lubricant projection, although at a lesser intensity, will occur to some extent at "release", as above noted.

Now it will be evident that on each complete reciprocation of the motor piston 17, there will be, when lubricant is available within the chamber 102, at least one spraying of a small quantity of lubricant into the cylinder bore. It will be evident that this lubricant will be most advantageously applied. It will be evident that the quantity may be made adequate without waste. It will be evident that the pumping device employed is most effectually operated by its co-ordinated relation with the main pumping motor. It will be evident that the lubricant will be kept in a free-flowing state due to the heat transferred thereto from the valve chest. It will be clear that the lubricator drive will be certain and definite and not subject to any substantial possibility of derangement, and that the risk of coasting of the lubricator drive is completely eliminated.

In Figs. 7 and 8 I have shown a modified form of lubricator drive in which a plunger guide 110 is arranged within the space 66^S at the opposite side of a pawl carrier 87' from the plunger bore 83. A plunger 111 is guided within the plunger guide 110 and is normally pressed by a spring 112 housed therein against the lower surface of the pawl carrier 87' whose downward movement about its pivot 88' is limited by engagement with the upper end of the plunger guide 110. The bore of the plunger guide 110 communicates at its lower end through the opening 114 with a lubricant space 66^S near the bottom of the latter, and a small check valved passage 115 opens through the top of the plunger 111, whereby a most effectual cushioned action of the apparatus is effected. It may be noted that by selecting the dimension of the check valve controlled opening and of the opening 114, a very exactly regulated cushion action can be secured.

The mode of operation of this form of the invention need not be described in detail in view of the adequate explanation of the structure shown in Figs. 5 and 6, from which the structure of Fig. 7 differs primarily in the modified form of device for cushioning the downward movement of the latter. It may be noted that in both forms, downward movement of the pawl carrier is positively limited by an abutment surface carried by depending web means 84' carried by the cover plate 84.

Obviously the illustrative embodiments of my invention comprise structures which are simple, effective, rugged, durable, positive in action, and well adapted, with appropriate modifications, to substantially any form of expansible chamber motor or compressor or vacuum pump, supplying lubricant at a desired rate, regulated positively both as to maximum and minimum values and in a manner calculated to insure delivery upon the rubbing surfaces in a well distributed form, rather than by dripping or dribbling down one side of a cylinder wall and thereby leaving the lubrication of the far side thereof very haphazard.

While there are in this application specifically described two forms which this invention may assume in practice, it will be understood that these forms are shown for purposes of illustration and that the invention may be further

modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a lubricator drive, a cylinder, a piston reciprocable therein, a driving ratchet wheel, a pivoted pawl carrier movable by said piston, a pawl carried thereby and engaging said ratchet wheel, yielding means for continuously holding said pawl carrier against said piston, and an anti-coasting element moving with said pawl carrier into engagement with said ratchet wheel as said pawl carrier makes its working movement.

2. In a lubricator drive, a cylinder, a piston reciprocable therein, a driving ratchet wheel, a pivoted pawl carrier movable by said piston, a pawl carried thereby and engaging said ratchet wheel, and a lubricant dashpot retarding the working movements of said pawl carrier.

3. In a lubricator drive, a cylinder, a piston reciprocable therein, a driving ratchet wheel, a pivoted pawl carrier movable by said piston, a pawl carried thereby and engaging said ratchet wheel, and means acting in a line parallel to the line of travel of said piston and between the latter line and the pawl carrier pivot for restoring said pivoted pawl carrier to position for actuation by said piston.

4. In a lubricator drive, a cylinder, a piston reciprocable therein, a driving ratchet wheel, a pivoted pawl carrier movable by said piston, a pawl carried thereby and engaging said ratchet wheel, and means including a plunger relatively movable with respect to said piston and acting in a line parallel to the travel of said piston for restoring said pivoted pawl carrier to position for actuation by said piston.

5. In a lubricator drive, a cylinder, a piston reciprocable therein, a driving ratchet wheel, a pivoted pawl carrier movable by said piston to drive said ratchet wheel, a pawl carried thereby and engaging said ratchet wheel, and means including a plunger relatively movable with respect to said piston and arranged at the opposite side of said pawl carrier from said piston and acting in a line parallel to the travel of said piston for restoring said pivoted pawl carrier to position for actuation by said piston.

6. In a lubricator drive, a cylinder, a piston reciprocable therein, a driving ratchet wheel, a pivoted pawl carrier movable by said piston about a point at the end of said pawl carrier farthest from said ratchet wheel, means for limiting the working movement of said pawl carrier, a pawl carried by said pawl carrier at the side thereof nearer said ratchet wheel, and an anti-coasting device carried by said pawl carrier at the other side of the latter for precluding spinning of said ratchet wheel.

7. In a lubricator drive, a ratchet wheel, a pawl carrier swingable about an axis parallel to the axis of said ratchet wheel and having a free end, a pawl carried adjacent the free end of said carrier, a plunger yieldingly pressed longitudinally of said carrier for maintaining said pawl in cooperative relation to said ratchet wheel, a guide submerged in the lubricant to be pumped and disposed transversely to the length of said carrier and adapted to be engaged by said carrier to limit movement of the latter in a ratchet-actuating direction, a spring pressed plunger in said guide for moving said carrier in a return direction, and a cylinder and piston device for actuating said carrier in a ratchet-turning direction, said cylinder and piston device acting on said carrier adjacent the free end of the latter.

8. In a lubricator drive, a ratchet wheel, a pawl carrier swingable about an axis parallel to the axis of said ratchet wheel and having a free end, a pawl carried adjacent the free end of said carrier, a plunger yieldingly pressed longitudinally of said carrier for maintaining said pawl in cooperative relation to said ratchet wheel, a guide submerged in the lubricant to be pumped and disposed transversely to the length of said carrier and adapted to be engaged by said carrier to limit movement of the latter in a ratchet-actuating direction, a spring pressed plunger in said guide for moving said carrier in a return direction, means carried by said guide and by said plunger respectively for regulating the rates of opposite movement of said plunger, and a cylinder and piston device for actuating said carrier in a ratchet-turning direction, said cylinder and piston device acting on said carrier adjacent the free end of the latter.

9. In a lubricator drive, a ratchet wheel, a pawl carrier swingable about an axis parallel to the axis of said ratchet wheel and having a free end, a pawl carried adjacent the free end of said carrier, a plunger yieldingly pressed longitudinally of said carrier for maintaining said pawl in cooperative relation to said ratchet wheel, a cylinder and piston device for actuating said carrier in a ratchet-turning direction, said cylinder and piston device acting on said carrier adjacent the free end of the latter, and means acting in a line parallel to the line of operation of said cylinder and piston device for restoring said pawl carrier to position for actuation by said piston.

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