C. H. ALLEN.

LUBRICATOR.

APPLICATION FILED DEC. 3, 1917.

1,405,375. Patented Jan. 31, 1922.

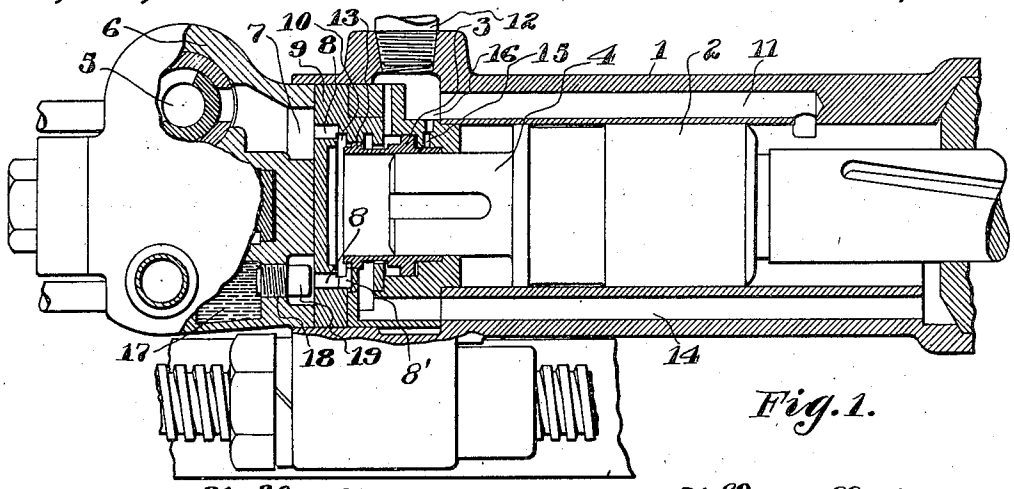


Fig. 1.

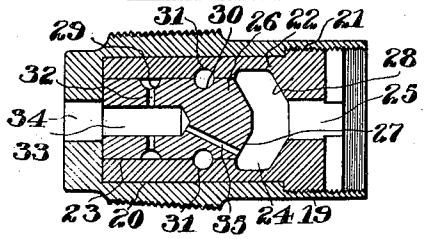


Fig. 2.

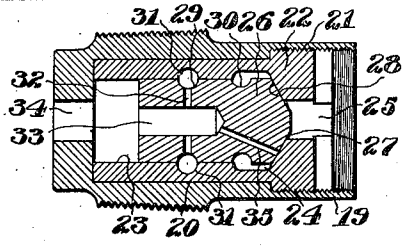


Fig. 3.

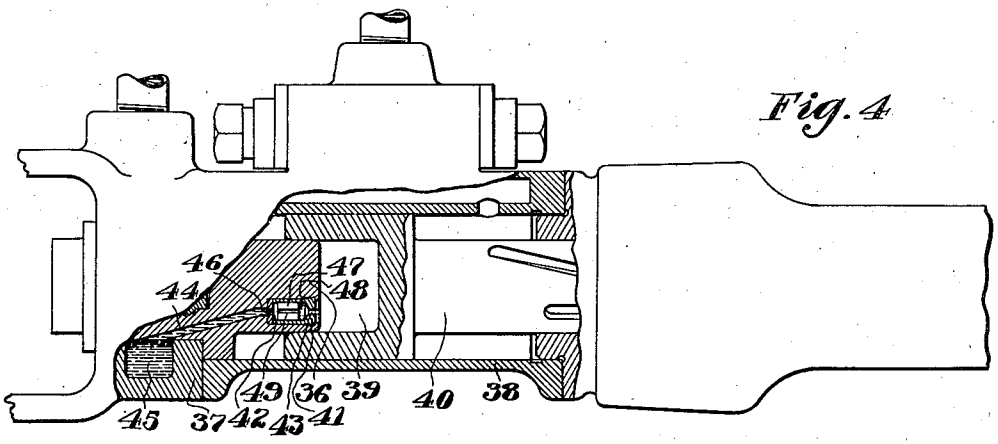


Fig. 4

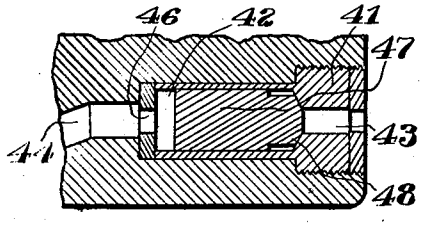


Fig. 5.

Inventor:
Charles H. Allen.
by Horace L. Cook
Atty.

UNITED STATES PATENT OFFICE.

CHARLES H. ALLEN, OF CLAREMONT, NEW HAMPSHIRE, ASSIGNOR TO SULLIVAN MACHINERY COMPANY, A CORPORATION OF MASSACHUSETTS.

LUBRICATOR.

1,405,375. Specification of Letters Patent. Patented Jan. 31, 1922.

Application filed December 3, 1917. Serial No. 205,214.

To all whom it may concern:

Be it known that I, CHARLES H. ALLEN, a citizen of the United States, residing at Claremont, in the county of Sullivan and State of New Hampshire, have invented certain new and useful Improvements in Lubricators, of which the following is a full, clear, and exact specification.

My invention relates to lubricators.

It has for its object to provide an improved and simplified lubricating means of the pressure actuated type, and one especially adapted to use in connection with pressure fluid actuated devices, wherein the lubricant is automatically supplied in an improved manner as a result of variations in pressure arising in the operation of the device. A further object of my invention is to provide an improved lubricating means of the variable pressure type, which is especially adapted to use in connection with pressure fluid motors, and which is of a compact and unitary construction adapted to be readily and cheaply manufactured and applied at small expense to various standard forms of motors without material changes therein. These and other objects and advantages of my improved construction will, however, hereinafter more fully appear.

In the accompanying drawings I have shown for purposes of illustration two embodiments which my invention may assume in practice, the same being herein illustratively disclosed as applied to two well-known forms of pressure fluid motors.

In these drawings,—

Fig. 1 is a central longitudinal section through one form of motor equipped with my improvement, the lubricator unit being shown in elevation.

Fig. 2 is a detail longitudinal section of the lubricator unit shown in Fig. 1.

Fig. 3 is a central longitudinal sectional view of the unit, the parts being shown in different relation.

Fig. 4 is a central longitudinal section of a modified form of motor equipped with a modified form of lubricating means.

Fig. 5 is an enlarged detail longitudinal sectional view of the lubricator unit shown in Fig. 4.

In the illustrative construction shown in Figs. 1, 2, and 3, I have shown my invention as applied to use in connection with a motor of the Gilman type described and claimed in the George H. Gilman Patent No. 1,250,932, dated Dec. 18, 1917. As illustrated, this motor includes a cylinder 1 having a hammer piston 2 reciprocable therein under the control of a suitable valve 3 which is in turn adapted to receive a reduced end 4 of the reciprocating piston and to be itself automatically reciprocated in a well known manner to direct motive fluid from a suitable source of supply alternately to the opposite ends of the piston. As usual in this construction, it will be observed that with the parts as shown in Fig. 1, i. e., during the forward stroke of the piston 2, the pressure fluid supply received from a suitable valved port 5 in the rear head 6, passes to an annular passage 7 therein, from which it in turn is distributed through a plurality of ports 8 in the rear head block 9 and through a communicating annular passage 10, to the rear surface of the reduced portion 4 of the piston, the exhaust at the opposite end of the cylinder escaping through a ported passage 11 communicating with an exhaust outlet 12. Conversely, when the valve is in its reverse position, i. e., during the rearward stroke of the piston, the pressure fluid in the annular passage 7 will also obviously pass out through the ports 8 and a relatively restricted passage 8′ around a flange 13 on the valve into a ported passage 14 leading to the front end of the cylinder, the exhaust at the opposite end of the cylinder then escaping around the front end of the valve and through passages 15 and 16 leading to the exhaust outlet 12.

In my improved construction, it will be observed that I have provided the rear cylinder head 6 with a lubricant reservoir 17 having a threaded aperture 18 in its front wall communicating with the annular chamber 7, and preferably located at a point adjacent one of the ports 8. In this aperture 18 is carried my improved lubricator unit. As shown, this unit includes a threaded shell or valve casing 19 in the form of a plug threaded into the aperture 18 and having one end extending into the lubricant reservoir 17 and the other preferably extending through the annular chamber 7 to a point adjacent one of the ports 8. It will also be observed that this shell 19 is provided with an axial bore 20 in its rear end and an enlarged threaded axial bore 21 in its front end, and that it carries within the

same a screw or plug member 22 threaded at its front end in the bore 21 and having a reduced barrel received in the bore 20. As shown, this plug member 22 is likewise provided with an axial bore or cylinder 23 in its rear end, as well as a communicating relatively deep annular groove 24 intermediate its ends and a communicating smaller axial passage or bore 25 in its front end, the construction being such as to receive a valve or piston 26 controlling the flow through the passage 25. This valve or piston 26 is, as shown, provided with a head 27 adapted to seat in a correspondingly shaped seat 28 formed in the front wall of the groove 24 and a plurality of longitudinally spaced annular grooves 29 and 30, one adapted to register intermittently with a similar groove 31 provided in the inner wall of the bore 23 and near the front end of the latter, while the other constantly communicates through a plurality of radial passages 32 with an axial bore 33 in the rear end of the valve or piston, which, in turn, communicates with the reservoir 17 through a coaxially disposed opening 34 in the rear end of the plug 19 and with the space in front of the head 27, through an angularly and longitudinally disposed reduced passage 35 adapted to be closed or opened as the member 26 is reciprocated.

In the operation of my improved construction, it will be observed that it is possible to take advantage of the variations in pressure in the annular passage 7 in such a manner as to cause the valve or piston 26 to be reciprocated and thereby pump lubricant from the reservoir 17 into the passages leading to the motor. More specifically, let us assume that the valve 3 is in the position shown in Fig. 1, wherein there is a free flow of pressure fluid to the end surface of the reduced portion 4 of the piston, and that the valve or piston 26 is in the position shown in Fig. 3, no lubricant having as yet been supplied from the reservoir. The pressure in the passage 7 is then at its minimum, and all communication between the passage 7 and the reservoir 17 is closed, the passage 35 being closed by the valve seat 28. When, however, the valve 3 is reversed in such a manner as to interpose its flange 13 in the path of the pressure fluid passing to the motor and thus restrict the flow of the same, the pressure in the passage 7 will build up. As a result, the valve or piston 26 will be reciprocated from the position shown in Fig. 3 to the position shown in Fig. 2, in such a manner as to open communication between the annular passage 7 and the reservoir 17 through the bore 25 and passage 35 and the bores 33 and 34, thereby permitting the pressure to act upon the surface of the lubricant in the reservoir and force lubricant through the bores 34, 33 and the passages 32 into the groove 29. In the next operation of the valve 3, the valve or piston 26 will move from the position shown in Fig. 2 to the position shown in Fig. 3, in such a manner as to cause the annular groove 29 therein to come opposite the annular groove 31 in the member 22 and thus permit the transfer of the lubricant in the groove 29 to the groove 31. In the next operation of the valve 3, the valve or piston 26 will move to the left from the position shown in Fig. 3 to the position shown in Fig. 2 and thereby transfer the lubricant from the groove 31 to the groove 30 so that when the valve or piston 26 is next reciprocated the lubricant may be carried forward in this groove 30 and discharged therefrom into the groove 24 communicating with the air supply leading to the motor through the bore 25. Obviously, after the first charge of lubricant has thus been withdrawn from the reservoir 17, a new charge of lubricant will automatically be delivered to the groove 24 each time that the valve or piston 26 assumes the position shown in Fig. 3, i. e., at one end of each cycle of operation of the piston 2, so that the latter will be thus automatically supplied with a sufficient amount of lubricant to keep the motor in the desired condition.

I have also found some conditions, for example, where the pressure range is relatively great within the space with which the bore 25 communicates, when the lubricant supply with this device is in excess of what is required and that I can dispense with the conveying grooves entirely and still secure a sufficient supply of lubricant through the port 35. This I attribute, in part, to the inertia action of the lubricant, but mainly to the inertia of the piston itself which makes necessary a material drop in pressure in chamber 24 below that in the reservoir before the piston will start to move. This results in a slight time lapse, to which must be added the period of the piston's transit. There is thus a small, but material, time interval between the instant when the pressure in chamber 24 first becomes less than in the reservoir and the instant when the port 35 is closed by surface 28, during which there is an outflow of lubricant through the port 35 due to the higher pressure in the reservoir.

In the form of my invention shown in Figs. 4 and 5, it will be observed that I have located the lubricating element in a plug 36 projecting forwardly from the rear head 37 and into the cylinder 38, the construction being such that this plug is adapted to be received in a suitable aperture 39 in the rear end of the piston 40 when the latter is moved rearward under the control of a suitable valve (not shown). In this construc-

tion, it will be observed that the lubricating means is responsive to variations in pressure in the cylinder and instead of delivering the lubricant into the pressure fluid supply before the same reaches the motor, delivers the same more directly into the motor cylinder and at a point adjacent the rear surface of the piston thereof. In this construction, it will also be observed that a threaded plug 41 is provided having a suitable enlarged bore or cylinders 42 intermediate its ends communicating with the cylinder space through a restricted axial outlet 43 and with a single passage 44 leading to the reservoir 45 through another restricted passage 46. In this construction, it will also be observed that a valve or piston 47 is reciprocably mounted in this bore 42 and adapted to control the supply of pressure fluid and lubricant through the bore 43. It will here, however, be noted that instead of the axially perforated piston and plural annular groove construction above described, this member 47 is provided with a reduced portion 48 on its front end and longitudinally disposed slots 49 on its opposite sides forming a communication between the reduced portion 48 and the opposite end of the bore. In the operation of this construction, it will be observed that the sequence of operation is substantially the same as that described above. However, in this instance, attention is directed to the fact that the lubricant passes in through the passages 44 and 46, the bore 42, and the slots 49, to the space surrounding the reduced portion 48 on the member 47, so that when the latter is next reciprocated in the opposite direction the lubricant in the space surrounding this reduced portion is thus free to pass through the outlet 43 to lubricate the motor.

In the use of my improved construction, it will be observed that it is possible to utilize a single connection between the motor and the reservoir, which connection acts intermittently as a means of supplying pressure fluid to the lubricant in the reservoir and as a means of supplying lubricant from the reservoir to the motor parts, thereby enabling an exceedingly compact and simple construction to be produced which may be readily applied to use in the limited space available in the usual percussive motor. Attention is also directed to the fact that while this construction is automatic and accurate in its operation through its dependence upon the variations in pressure arising from the operation of the motor, the same is also of a construction which is exceedingly rugged and adaped to long continued use in service, all springs being eliminated and substantial wearing surfaces being provided which are also protected against wear by the film of lubricant passing through the device. It will also be observed that the construction is such that the lubricator may be inserted or removed as a unit when desired, and that the same may be very readily and cheaply manufactured. These and other advantages of my improved construction will, however, be clearly apparent to those skilled in the art.

While I have in this application specifically described two embodiments which my invention may assume in practice, it will be understood that these forms of the same are used for illustrative purposes and that the invention may be modified and embodied in various other forms and adapted to various other uses than those shown herein, 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, a source of variable pressure, a lubricant reservoir, and a lubricator having a single connection with said source of variable pressure and a single connection with said lubricant reservoir, said lubricant reservoir being otherwise closed and said lubricator comprising means for intermittently conveying lubricant from said lubricant reservoir to said source of variable pressure and including a port adapted to connect said source and reservoir when said means is in one position.

2. In a lubricator, a source of variable pressure, a lubricant reservoir, and lubricant conveying means disposed between the same and having a single communication with each of the same, said lubricant reservoir being otherwise closed.

3. In a lubricator, a source of variable pressure, a lubricant reservoir, a connecting passage therebetween, and pressure actuated means for alternately supplying pressure fluid and conveying lubricant through said passages, said lubricant reservoir being closed except for said connection with said variable pressure source.

4. In a lubricator, a source of variable pressure, a lubricant reservoir, means for connecting said source and said reservoir including a passage, and lubricant pumping means including a reciprocable element having lubricant conveying pockets thereon and being responsive to pressure variations in said source of variable pressure transmitted thereto through said connecting means.

5. In a lubricator, a source of variable pressure, a lubricant reservoir, a valve casing communicating with said source and said reservoir, and a pressure responsive valve in said casing controlling the flow therethrough and having a port therethrough for the supply of pressure to said reservoir.

6. In a lubricator, a source of variable pressure, a lubricant reservoir, each having a communicating passage and said lubricant

reservoir being otherwise closed, a cylinder connecting said passages, and a pressure responsive piston movable in said cylinder and provided with means to convey lubricant therethrough.

7. In a lubricator, a source of variable pressure, a lubricant container, a valve casing communicating with said source and said container, and a ported valve in said casing operative when in one extreme position to close communication between the interior of said casing and one of the same, and when in its other extreme position to interconnect the same through said valve casing.

8. In a lubricator, a source of variable pressure, a lubricant reservoir, each having a communicating passage, and a valve having a longitudinal port and located in said passage and movable to open and close communication between the said source of pressure and reservoir through said port in response to variations in pressure.

9. In a lubricator, a source of variable pressure, a lubricant reservoir, a casing communicating with each of the same through a single port, and valve means in said casing for alternately supplying pressure and conveying lubricant in opposite directions.

10. In a lubricator, a source of variable pressure, a lubricant reservoir having a passage communicating therewith, and a longitudinally ported valve controlling the flow through said passage alternately actuated by the variable pressure and the pressure in said reservoir, said reservoir being closed except for said passage.

11. In a lubricator, a lubricator casing having openings in its opposite ends, and a valve member therein controlling the flow through said casing and having a longitudinal passage intermittently opened or closed as said valve is moved whereby to connect or disconnect said casing ends.

12. In a lubricator, a lubricator casing having openings in its opposite ends, and lubricant pumping means therein including a reciprocable ported lubricant valve movable to establish or interrupt communication between said openings for the transmission of pressure through said lubricator casing.

13. In a lubricator, a lubricator casing having a plurality of lubricant receiving passages therein and openings in its opposite ends connected respectively to a source of lubricant supply and the point of delivery thereof, and a pressure actuated valve carried in said casing and movable therein to transfer lubricant from said passages.

14. In combination, a pressure fluid motor including a cylinder and a piston, a lubricant reservoir having a single passage intermittently communicable with a variable pressure space in said motor, but otherwise closed, and means having a longitudinal passage therethrough and responsive to variations in pressure in said space for supplying lubricant through said connection.

15. In a lubricator, a lubricator casing having passages only in its opposite ends and connected thereby to a source of lubricant and to a variable pressure space respectively, a reciprocatory valve member carried in said lubricator casing controlling the flow in opposite directions through said passages and movable to close one of said passages, and means whereby lubricant is delivered to said passage upon the opening of the same.

16. In combination, a pressure fluid motor including a cylinder and a piston, a lubricant reservoir having a single passage communicable with a variable pressure space in said motor and otherwise closed, and means including a single movable ported valve member responsive to variations in pressure in said variable pressure space for supplying lubricant through said connection.

17. In combination, a pressure fluid motor including a cylinder and a piston, a valve controlling the movement of said piston, a lubricant reservoir having a single outlet communicating with a variable pressure space of said motor, and means having a longitudinal passage therethrough controlling said outlet operable in one position of said valve to supply pressure to said reservoir and in another position of said valve to supply lubricant to said piston.

18. In a lubricator, a lubricator casing having a plurality of lubricant receiving passages therein and openings in its opposite ends one of which communicates with one of said passages, and a valve communicable with either of said openings and movable to deliver lubricant to one of said passages and subsequently transfer the same therefrom to the other passage.

19. In a lubricator, a lubricator casing having openings in its opposite ends and a plurality of spaced lubricant passages therein, and a valve movable in said casing having a longitudinal passage communicable with said openings and a plurality of cooperating spaced non-communicating passages one communicating with said longitudinal passage and adapted to communicate with one of the passages in said casing and the other adapted to communicate with either of the passages in said casing.

20. In a lubricator, a lubricator casing having passages only in its opposite ends and connected thereby to a source of lubricant and to a variable pressure space respectively, and a reciprocatory valve member in said casing controlling the flow in opposite directions through said passages and movable to close one of said passages.

21. In a lubricator, a lubricator casing having passages only in its opposite ends

and connected thereby to a source of lubricant and to a variable pressure space respectively, and a reciprocatory valve member therein having a port extending longitudinally thereof and closed in one position by said casing.

22. In a lubricator, a lubricator casing having passages only in its opposite ends and connected thereby to a source of lubricant and to a variable pressure space respectively, and a reciprocatory valve member controlling the flow in opposite directions through said passages and alternately opening and closing one of said passages and located in said casing.

23. In a lubricator, a lubricator casing having passages only in its opposite ends and connected thereby to a source of lubricant and to variable pressure space respectively, and a reciprocatory valve member having a port extending longitudinally thereof and carried in said lubricator casing and movable to close one of said passages and said longitudinal port.

24. In a lubricating device for attachment to a variable pressure chamber, a lubricant reservoir, a casing communicating at opposite ends with said chamber and said reservoir, a valve seat at one end of said casing, and a valve reciprocable in said casing and having a longitudinal opening therethrough adapted to be closed upon seating of said valve.

25. In a lubricator, a lubricator casing having passages in its opposite ends, a reciprocatory valve member carried in said lubricator casing and movable to close one of said passages, and means whereby lubricant is delivered through said valve to said passage upon the opening of the same.

In testimony whereof I affix my signature.

CHARLES H. ALLEN.