No. 822,685. PATENTED JUNE 5, 1906.

J. F. McCANNA.

LUBRICATING APPARATUS.

APPLICATION FILED AUG. 1, 1902.

3 SHEETS—SHEET 1.

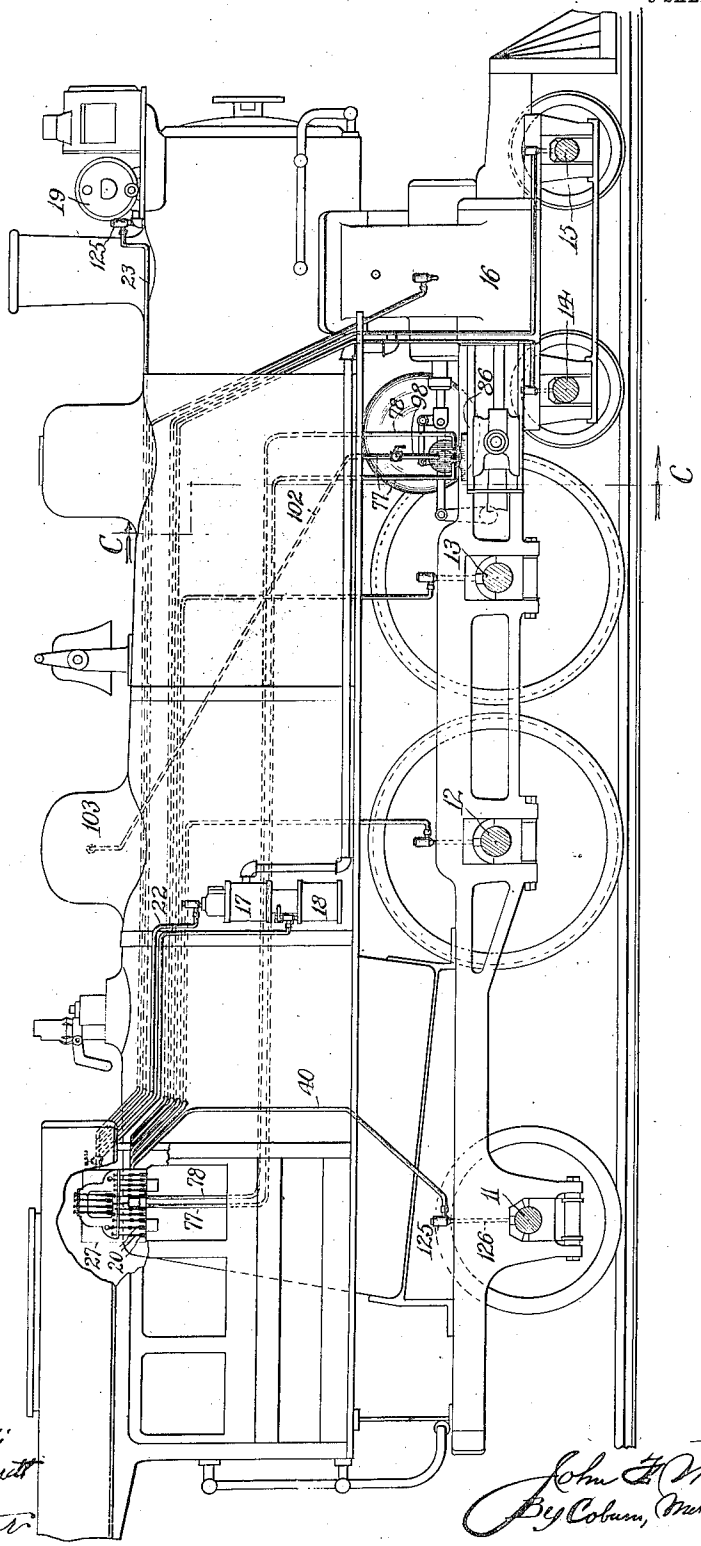


Fig. 1.

Witnesses:
Harold S. Barrett
Lute S. Alter

Inventor.
John F. McCanna,
By Coburn, McRoberts & McElroy
Attys.

No. 822,685. PATENTED JUNE 5, 1906.

J. F. McCANNA.

LUBRICATING APPARATUS.

APPLICATION FILED AUG. 1, 1902.

3 SHEETS—SHEET 2.

Fig. 4

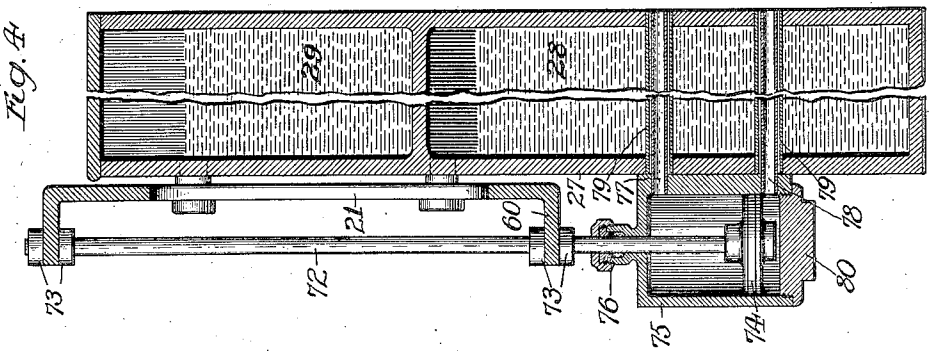


Fig. 3

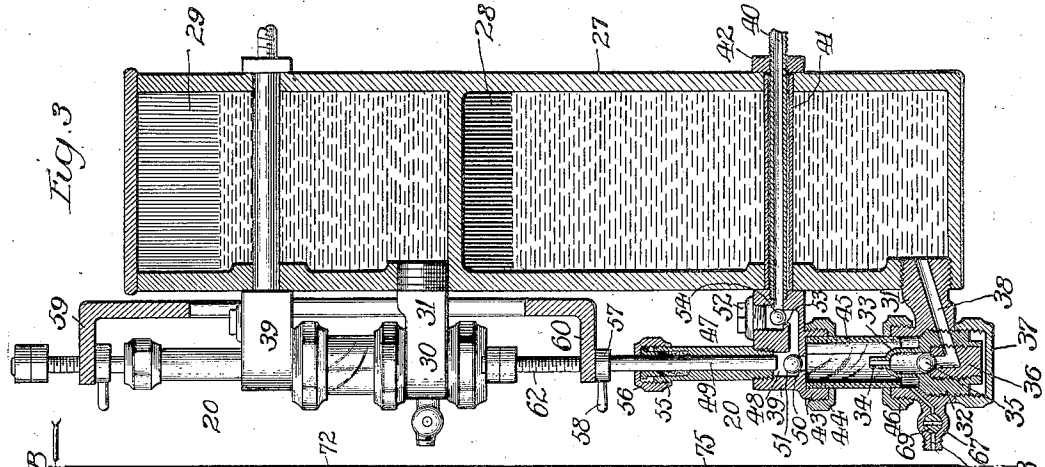
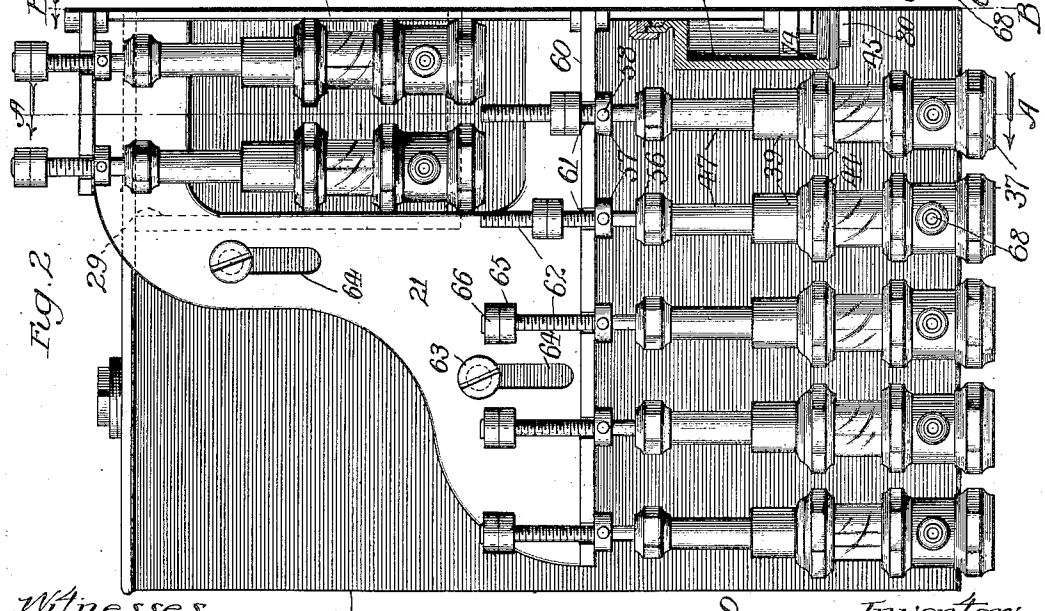


Fig. 2



Witnesses
Harold G. Barrett
Lute S. Alter.

Inventor:
John F. McCanna,
By Coburn, McRobert & McElroy,
Attys

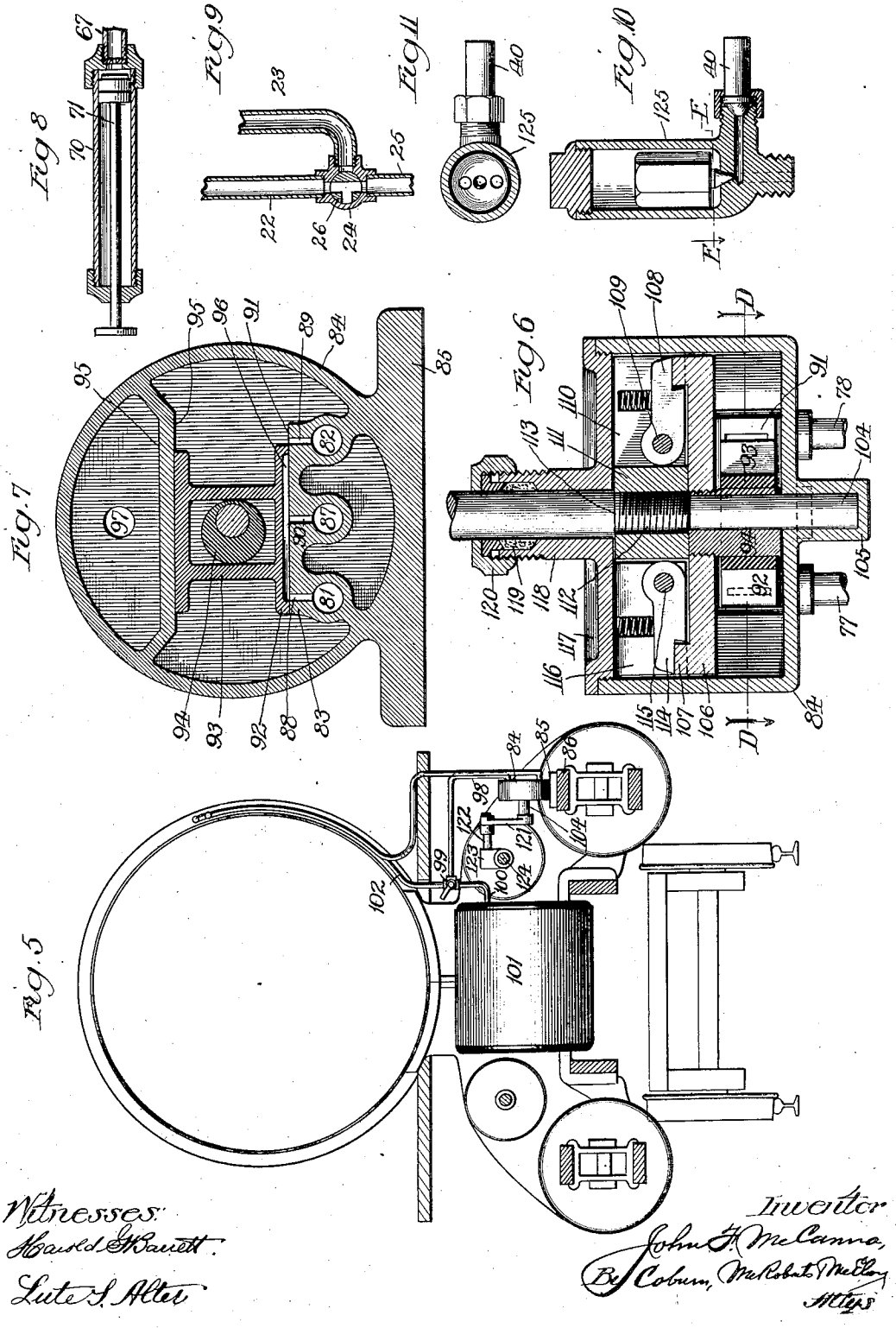
No. 822,685. PATENTED JUNE 5, 1906.

J. F. McCANNA.

LUBRICATING APPARATUS.

APPLICATION FILED AUG. 1, 1902.

3 SHEETS—SHEET 3.



UNITED STATES PATENT OFFICE.

JOHN F. McCANNA, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE JOHN F. McCANNA COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

LUBRICATING APPARATUS.

No. 822,685. Specification of Letters Patent. Patented June 5, 1906.

Application filed August 1, 1902. Serial No. 117,966.

To all whom it may concern:

Be it known that I, JOHN F. McCANNA, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Lubricating Apparatus, of which the following is a specification.

My present invention is concerned with a novel lubricating apparatus which I have devised primarily for use in connection with a locomotive-lubricating system of the same general type as is shown in my application Serial No. 25,107, filed July 28, 1900, and which may be employed in connection with the lubrication of a stationary engine or other mechanism in connection with which fluid pressure is employed.

The main feature of my present invention is a novel apparatus by which fluid-pressure is employed to furnish the power required for the operation of the pumps and is controlled from the place where the mechanism is located that automatically regulates their operation in accordance with the needs of the apparatus being lubricated.

Other features of my invention are certain novel structures and mechanisms, all of which will be described at length in the body of the specification and specifically pointed out in the claims annexed thereto.

My novel system and mechanism as applied to locomotive lubrication enables me to lubricate not only the cylinders, but also the journal-bearings for the wheels, and that without any additional complication of the mechanism other than the mere application of parts necessitated by the employment of a pump for each cylinder or bearing to be lubricated.

To illustrate my invention, I annex hereto three sheets of drawings, in which the same reference characters are used to designate identical parts in all the figures, of which—

Figure 1 is a side elevation of a locomotive-engine, partly in section, having my invention applied thereto. Fig. 2 is a front elevation, on an enlarged scale, showing half of the reservoir and the pumps connected therewith. Fig. 3 is a section of the same on the line A A of Fig. 2. Fig. 4 is a similar view in section, but on the central line B B of the reservoir. Fig. 5 is a sectional view through the engine on the line C C of Fig. 1, but on a slightly-enlarged scale. Fig. 6 is a central horizontal sectional view through the controlling-valve mechanism. Fig. 7 is a vertical section through the same on the line D D of Fig. 6. Fig. 8 is a central longitudinal section through a small force-pump employed in connection with the apparatus. Fig. 9 is a horizontal sectional view through a portion of the pipe connections. Fig. 10 is a vertical sectional view through the gravity vacuum-valve employed in connection with the apparatus, and Fig. 11 is a plan view of the same on the line E E of Fig. 10.

Before beginning a detailed description of the apparatus it may be stated that I have shown it as employed in connection with a locomotive-engine and arranged to lubricate the journals 11, 12, 13, 14, and 15 of the wheels on each side of the engine, together with the driving steam-cylinder 16 on each side of the engine, the air-pump steam-cylinder 17, the air-pump 18, and the headlight dynamo 19, making a total of fifteen parts to be lubricated, for which I employ fourteen pumps 20, which are exactly alike and associated together adjacent the reservoirs, and operated by a single yoke 21, the air-pump steam-cylinder 17 and the headlight dynamo 19 being served by a single pump, their pipes 22 and 23, respectively, being joined by the union 24 to the pipe 25, which leads to the pump, a two-way valve 26, as best shown in Fig. 9, being employed, so that the oil can be thrown to the air-pump steam-cylinder or to the dynamo, whichever may be desired.

The reservoir is, as best seen in Figs. 2 to 4, of a substantially rectangular shape, and consists of two parts, the lower main receptacle 28, which is of a U shape, surrounding on three sides, the smaller receptacle 29, formed in the central and upper portion thereof. The receptacle 28 contains the lubricating-oil of the proper grade for use in connection with the journals of the wheels, and it will be seen that the ten pumps 20, devoted to these journals are arranged in a row on the lower portion of the reservoir, five on each side of the center. The upper and smaller reservoir 29 contains the finer grade of lubricating-oil necessary for use upon the steam-cylinders, and

it will be seen that the four pumps 20, which supply the three steam-cylinders, the air-pump, and the dynamo are located on the side of the reservoir adjacent to the receptacle 29 in a row with two on either side of the center.

As best shown in Fig. 3, it will be seen that each pump 20 is supported at the lower end thereof by a block 30, which is provided with a shank 31, the inner end of which is screwed into a recess opening into the side of one of the receptacles 28 or 29. The general outline of the block 30 is circular, and the lower end thereof is closed by a circular plug 32, screwed into the under side thereof, so as to close it and make a liquid-tight joint. On the top of the plug 32 is formed a cap 33, terminating in the nozzle 34, from which the oil escapes a drop at a time. The cap 33 forms a cage for the check-valve 35, which preferably consists of a ball which has its seat formed in the top of the plug 36, screwed into the center of plug 32 and closing the bottom thereof. When the plugs 32 and 36 are screwed in place, a cap 37 is screwed onto the outside of the lower portion of the plug 32, so as to seal the parts and make a neat finish. When the parts are assembled, an angular channel 38 is formed by the coincidence of channels formed in each of the three parts 30, 32, and 36, so that the oil in the reservoir passes through the channel 38, past the valve 35 and up through the nozzle 34. The valve-casing 39 is secured against the side of the reservoir above the block 30, by means of the pipe 40, which passes snugly through a pipe 41, which in turn passes through the front and rear walls of the reservoir and has its ends expanded or otherwise secured to said walls to form a liquid-tight passage through the reservoir. The end of the pipe 40 is screwed into the valve-casing 39, and a nut 42, screwed onto the outer side of the pipe 40 and against the rear wall of the reservoir, serves to draw the valve-casing 39 tightly against the front wall of the reservoir. The pipe 40 thus supports the valve-casing 39 and at the same time serves as a discharge-passage for the oil from the pump. These pipes 40, as seen in Fig. 1, are extended adjacent to the different parts to be lubricated, being carried as far as possible beneath the jacket of the engine to keep the oil from congealing in cold weather. The valve-casings 39 are of a generally rectangular shape having a preferably rounded front end and provided with the downwardly-projecting enlargement 43 from the bottom of the front portion, which is exteriorly screw-threaded to receive the cap 44, which is employed in holding the short tubular sight-feed glass 45 in position, the lower end of which passes into the correspondingly-shaped recess in the top of the block 30 and is secured in place by the cap 46, screwed onto the top of said block. The valve-casing 39 has the tubular pump-barrel 47, screwed into the top of the outer portion thereof and a U-shaped channel 48 is formed in the body of the casing, the pump-piston 49, which reciprocates through the barrel 47, passing into one of the vertical arms of the channel 48, which is above the sight-feed glass 45 and which opens into it through the valve-seat 50, which is closed by the valve 51, which is preferably of the customary ball construction. The top of the other vertical arm of the channel 48 is closed by the screw-plug 52, and the channel in the end of the block 39, into which the pipe 40 is screwed, opens into this arm above the valve-seat 53, which is closed by the preferably-spherical check-valve 54, so that it will be seen that as the pump-piston 49 is reciprocated the oil will be drawn up from the sight-feed glass into the valve-casing and thence forced out through the pipe 40 to the part to be lubricated. The top of the pump-barrel 47 is closed by the customary stuffing-box 55 and cap 56. The pump-piston 49 has rigidly secured to it above the cap 56 a collar 57, which is preferably provided with a stem 58, by which the pump can be operated independently of the regular actuating mechanism when it is desired to give any part an extra lubrication, as might occur if the feed should be too small and the bearing become heated. As previously stated, the operation of all these pumps is controlled by the reciprocation of the yoke or cross-head 21, which is of the shape shown to accommodate itself to the various pumps and has the upper horizontal flange 59 and the lower similar flange 60, these flanges being provided, respectively, with four and ten U-shaped recesses 61, through which pass the upper screw-threaded portions 62 of the pump-pistons 49. This yoke is supported and guided by the four studs 63, screwed into the front wall of the reservoir and passing through the elongated vertical slots 64, formed in the yoke. Above the flange 59 and 60 each pump-piston is provided with the set-nut 65 and a jam-nut 66, by which it is secured in position. As the yoke is reciprocated through a uniform vertical distance at each movement it will be apparent that by adjusting the position of the set-nuts 65, which, together with the collars 57, form the working abutments to vary the amount of lost motion the length of stroke given to each pump-piston can be accurately adjusted to regulate the amount of oil that shall be fed to each bearing according to its needs.

The arrangement by which the oil is supplied to each of the pumps, together with the sight-feed glass 45, furnishes an accurate indication to the engineer, so that he can determine the rate at which the oil is being pumped to each part and regulate it, as may be necessary. The chamber inside of the

sight-feed glass 45 is filled with water, glycerin, or some other clear liquid that is heavier than the oil, and as the oil is drawn from the chamber drop by drop the oil to take its place escapes drop by drop from the nozzle 34 and rises through the liquid in the sight-feed glass, thus furnishing to the engineer an accurate and always-operating sight-feed. As the liquid in the sight-feed glass may gradually escape, I provide means for replenishing it by forming a small cock 67 on the front of each block 30, which has a channel 68 therein leading to the sight-feed chamber and ordinarily closed by the valve 69. The outer end of the cock 67 is preferably screw-threaded, and the engineer is provided with a small hand-force pump 70, (shown in Fig. 8,) which is first filled with the liquid and then screwed onto the end of the cock 67, the valve 69 opened, and as much of the liquid is then forced into the sight-feed chamber by operating the piston 71 as may be necessary to replace any liquid that is lost.

The immediate means by which the yoke 21 is reciprocated is best shown in Fig. 4, where it will be seen that a piston-rod 72 is secured at its top and toward its bottom to the flanges 59 and 60 by the set nuts or collars 73. The lower end of the rod 72 is provided with the piston-head 74, which reciprocates in the cylinder 75, passing through the stuffing-box 76, formed on the top thereof. The cylinder 75 is secured to the front plate of the reservoir 27 by the inlet and outlet pipes 77 and 78 in just the same way that the pipe 40 is screwed into the pump-block 39 and passed through the pipe 41, and thus secures the block 31 in place. The bottom of the cylinder 75 is closed by the screw-threaded plug 80.

The inlet and outlet pipes 77 and 78, as seen in Fig. 1, after passing out of the back of the reservoir are passed along the side of the engine, preferably underneath the jacket, as indicated by the dotted lines, and open into the channels 81 and 82, formed in the block 83, cast into the body of one side of the cylindrical shell 84, mounted with its axis horizontal on the base 85, which is secured on the guide-bar 86 of the engine. The block 83 has formed therein between the channels 81 and 82 a third channel 87, opening into the air, and these channels 81, 82, and 87 are connected by the ports 88, 89, and 90, respectively, with the horizontal upper bearing-surface 91 of the block 83, upon which a slide-valve 92 reciprocates. This slide-valve consists of the upper and lower plates connected by the two vertical uprights 93, forming a rectangular aperture in which the eccentric 94 rotates to throw the valve first in one direction and then in the other. The bearing for the upper portion of the slide-valve is formed by the rib 95 projecting inward from the face of the cap 84, as does the block 83. The under-side of the slide-valve has formed therein the channel 96, which as the slide-valve reciprocates alternately connects the exhaust-port 90 with the inlet and outlet ports 88 and 89, while the same ports are alternately brought into communication with the interior of the shell 84, so that the steam, compressed air, or whatever form of fluid energy is employed passes through the pipes 77 and 78 and acts alternately on opposite sides of the piston-head 74 to force the yoke 21 positively in both directions. The supply of fluid pressure enters through the aperture 97 from the pipe 98, which, as seen in Fig. 5, is connected by a two-way cock 99 with the pipe 100, connected to the compressed-air reservoir 101 for the engine-brakes or with the pipe 102, which, as seen in Fig. 1, passes to the steam-dome 103, so that the lubricating apparatus can be actuated by live steam from the engine or by compressed air from the reservoir, as may be desired.

The movement of the slide-valve 92 and the consequent operation of the pumps is controlled by the operation of the engine by the following mechanism: The eccentric 94 is mounted to rotate on the reduced end of a rock-shaft 104, the bearing for one end of which is formed in the cup 105, formed on the face of the cylinder 84. The eccentric 94 has rigidly secured on its rear end a disk 106, which has formed on the rear face thereof at its periphery an annular series of ratchet-teeth 107, which are engaged by a spring-pressed dog 108, which is pivoted, as at 109, between a pair of ears 110, projecting from a collar 111, screwed upon and rigidly secured to the portion 112 of the shaft 104, resting against the shoulder 113, formed on said shaft. As the shaft is rocked it will be apparent that the dog 108 will move the disk 106 forward with the shaft; but it is held from a rearward movement therewith by means of a spring-pressed detent-dog 114, pivoted at 115 between a pair of ears 116, projecting inward from the face of the disk 117, constituting the back of the cylinder and screwed into it. The sleeve 118, formed in the center of this disk 117, forms the other bearing for the shaft 104, the sleeve being provided with a stuffing-box 119 and cap 120 to prevent the escape of the fluid under pressure from the cylinder 84. The rear end of the rock-shaft 104, as best seen in Fig. 5, has secured thereto the arm 121, which is connected by a pivoted link to the rod 122, which in turn is rigidly secured to and projects outwardly from the block 123, which is rigidly secured to the valve-stem 124, so that as the engine is running the rock-shaft 104 will be reciprocated at a rate corresponding to that at which the steam is supplied to the engine, thus giving a supply of lubrication in proportion to

the work being performed by the engine, as fully explained in my prior application, Serial No. 25,107, above referred to.

As some of the parts to be lubricated, such as the steam-cylinders and air-pump cylinder, are under pressure, and as practically all of them are at a considerable distance below the reservoir to prevent any possibility of the sucking of the oil into the steam-cylinders or escape by hydrostatic pressure, as fully explained in my aforesaid application, I terminate each of the pipes 40 in a vacuum-valve 125, from which pipes or channels 126. Fig. 1, lead directly to the part to be lubricated. The details of the preferred form of the gravity vacuum-valve which I employ are fully illustrated in Figs. 10 and 11, and I do not herein describe and claim the same, as it forms the subject-matter of my application, Serial No. 81,242, filed November 5, 1901.

While I have herein shown and described my invention as embodied in the forms and arrangements of parts which I at present consider best adapted to carry out its purposes, it will be understood that it is capable of modifications and that I do not desire to be limited in the interpretation of the following claims, except as may be necessitated by the state of the prior art.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a locomotive-engine, the combination with the oil-reservoir, of the pump connected therewith, fluid-pressure mechanism for operating said pump, controlling means for said mechanism actuated by the movement of the engine, pipe connections between said controlling means and the steam-dome and the air-reservoir, and means in combination with the said pipes for connecting either source of fluid-pressure to said controlling means to actuate the pump.

2. In a locomotive-engine, the combination with the oil-reservoir, of the pumps connected therewith, fluid-pressure mechanism for operating said pumps, controlling means for said mechanism actuated by the movement of the engine, pipe connections between said controlling means and the steam-dome and the air-reservoir, and a three-way cock in said connections whereby the pumps may be actuated by steam or air pressure.

3. In a locomotive-lubricating apparatus, the combination with the oil-reservoir, of the pump connected therewith, a fluid-pressure cylinder provided with a reciprocating piston operatively connected with said pump, a pipe connected with said cylinder at each end thereof, a fluid-pressure supply-pipe, valve mechanism connected with the three pipes and adapted to supply fluid under pressure to the opposite sides of the piston in alternation, and means controlled by the movement of the apparatus to be lubricated for actuating said valve mechanism.

4. In a locomotive-lubricating apparatus, the combination with the oil-reservoir located in the cab, of the pump connected therewith, a fluid-pressure cylinder provided with a reciprocating piston operatively connected with said pump, a pipe connected with said cylinder at each end thereof, a fluid-pressure supply-pipe, valve mechanism connected with the three pipes and adapted to supply fluid under pressure to the opposite sides of the piston in alternation, and means controlled by the movement of the apparatus to be lubricated for actuating said valve mechanism and consisting of a slide-valve having an aperture, an eccentric extending through the aperture the rotation of which reciprocates the slide-valve, a ratchet-disk, on said eccentric, a rock-shaft having an operating-dog engaging the ratchet-disk, and connections with a reciprocating part of the apparatus to be lubricated for rocking said shaft.

5. In a device of the class described, the combination with a force-feed lubricating-pump, of an oil-reservoir therefor, and a gravity sight-feed apparatus located between said pump and reservoir and consisting of a gage-glass extending downward from the pump and having an outlet at its upper end, a check-valve in such outlet, a union connecting the gage-glass and the reservoir and having a channel therein, check-valves at both ends of the gage-glass, and a nozzle terminating the upper end of said channel within the gage-glass.

6. In a device of the class described, the combination with a force-feed lubricating-pump, of an oil-reservoir therefor, an updrop sight-feed apparatus located between said pump and reservoir and having an outlet at its upper end, a check-valve in such outlet, and check-valves between the reservoir and the sight-feed apparatus and between the sight-feed apparatus and the pump.

7. In a device of the class described, the combination with a force-feed lubricating-pump, of an oil-reservoir therefor, a gage-glass opening into said pump at its top and extending downward therefrom, a check-valve between the sight-feed and the pump, a union connecting the bottom of said gage-glass and the interior of the reservoir, there being a channel extending through said union, a nozzle terminating the end of said channel in the gage-glass, and a check-valve located in said channel beneath the nozzle; substantially as and for the purpose described.

8. In a device of the class described, the combination with a force-feed lubricating-pump, of an oil-reservoir therefor, an updrop sight-feed apparatus located between said pump and reservoir, a check-valve between the reservoir and the sight-feed apparatus, and means for replenishing the liquid

in the gage-glass of the sight-feed apparatus through which the oil rises.

9. In a device of the class described, the combination with a force-feed lubricating-pump, of an oil-reservoir therefor, an up-drop sight-feed apparatus located between said pump and reservoir, a check-valve between the reservoir and the sight-feed apparatus, and means for replenishing the liquid in the gage-glass of the sight-feed apparatus through which the oil rises consisting of a channel leading from the exterior of the gage-glass chamber and provided with a cock and adapted to be connected with a supply of liquid under pressure.

10. In a device of the class described, the combination with a force-feed lubricating-pump, of an oil-reservoir therefor, an up-drop sight-feed apparatus located between said pump and reservoir, a check-valve between the reservoir and the sight-feed apparatus, and means for replenishing the liquid in the gage-glass of the sight-feed apparatus through which the oil rises consisting of a nozzle provided with a channel leading to the gage-glass chamber and having a stop-cock therein, and having its outer end screw-threaded so as to be adapted to be connected with a force-pump for forcing a supply of the liquid under pressure into the gage-glass.

11. In a device of the class described, the combination with an oil-reservoir, of a force-feed lubricating-pump having the valve-casing 39 thereof secured to the face of the reservoir, the block 30 secured to the reservoir beneath the valve-casing 39 and having the channel therein opening into the reservoir, a gage-glass secured between said valve-casing and block, a nozzle terminating said channel and opening into the gage-glass, and a check-valve in said channel beneath the nozzle.

12. In a device of the class described, the combination with an oil-reservoir having a pipe 41, passing through the body thereof, of a pump connected therewith and having the discharge-pipe 40 passing through the pipe 41 in the reservoir, and the nut 42 coöperating with the pipe 40 to secure the pump in place.

13. In a device of the class described, the combination with the reservoir consisting of the U-shaped main reservoir and the auxiliary reservoir located in the central portion thereof; of the lower line of pumps connected at their bases to the main reservoir, and the central upper line of pumps connected at their bases to the auxiliary reservoir; the yoke mounted to reciprocate on the face of the reservoir behind the pumps and having the two notched flanges for actuating the two sets of pumps; and means for reciprocating said yoke.

14. In a device of the class described, the combination with the reservoir consisting of the U-shaped main portion and the auxiliary reservoir located in the central upper portion thereof; of the lower row of pumps connected at their bases to the main reservoir, and the central upper row of pumps connected at their bases to the auxiliary reservoir and having their discharge-pipes passing therethrough; the yoke mounted to reciprocate on the face of the reservoir and having the open central portion about the upper row of pumps and provided with the two notched flanges for actuating the two rows of pumps; and means for reciprocating said yoke.

15. In a device of the class described, the combination with the reservoir consisting of the U-shaped main portion and the auxiliary reservoir located in the central upper portion thereof; of the lower row of the pumps connected at their bases to the main reservoir, and the central upper row of pumps connected at their bases to the auxiliary reservoir and having their discharge-pipes passing therethrough; the yoke mounted to reciprocate on the face of the reservoir and having the hollow central portion about the upper row of pumps and provided with the two notched flanges for actuating the two rows of pumps; and means for reciprocating said yoke consisting of the operating-piston, the cylinder connected to the front of the reservoir and in which the piston reciprocates, inlet and outlet pipes passing through the reservoir and opening into the cylinder on either side of the piston, and means for supplying fluid-pressure alternately to opposite sides of said piston; all combined and cooperating as and for the purpose described.

16. An automatic lubricating system for locomotives or the like, having a lubricating-pump, means for supplying oil to said pump, an air-cylinder connecting by piping to said pump, and a valve controlling the piping to supply air to reciprocate the pump in both directions and automatically operated from the motive power of the locomotive.

17. An automatic lubricating system for locomotives or the like having a lubricating-pump, compressed-air mechanism for operating said pump in both directions, and a valve controlling the air-supply.

18. In an automatic lubricating system for locomotives or the like, the combination with an air-cylinder of a lubricating-pump reciprocated in both directions by the air under pressure, pipes connecting the air-cylinder to the lubricating-pump, and a valve controlling the air-supply automatically operated from the motive power of the locomotive.

19. In a lubricating system for locomotives, a lubricating-pump, pneumatic mechanism for reciprocating said lubricating-pump in both directions, a valve device controlling said pneumatic mechanism, and

means actuated from the motive power of the locomotive for operating the valve device.

20. An automatic lubricating system having a lubricating-pump, means for supplying oil to said pump, a cylinder having a piston connected to the pump-plunger, conduits leading to the opposite ends of the cylinder, and a valve connecting the pressure-supply with the conduits in alternation and automatically operated from the mechanism to be lubricated.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN F. McCANNA.

Witnesses:
JOHN H. McELROY,
E. MOLITOR.