W. S. SHERMAN & A. J. WEST.

AUTOMATIC START AND STOP FEED FOR OIL PUMPS.

APPLICATION FILED JUNE 25, 1903. RENEWED JUNE 5, 1906.

986,512. **Patented Mar. 14, 1911.**

2 SHEETS—SHEET 1.

Fig. 1.

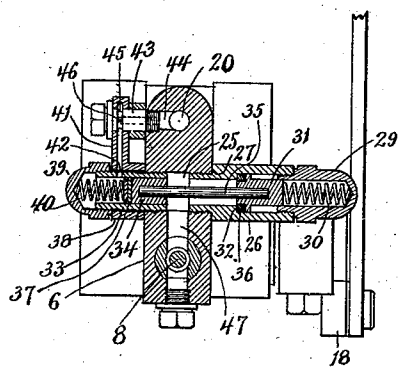


Fig. 2.

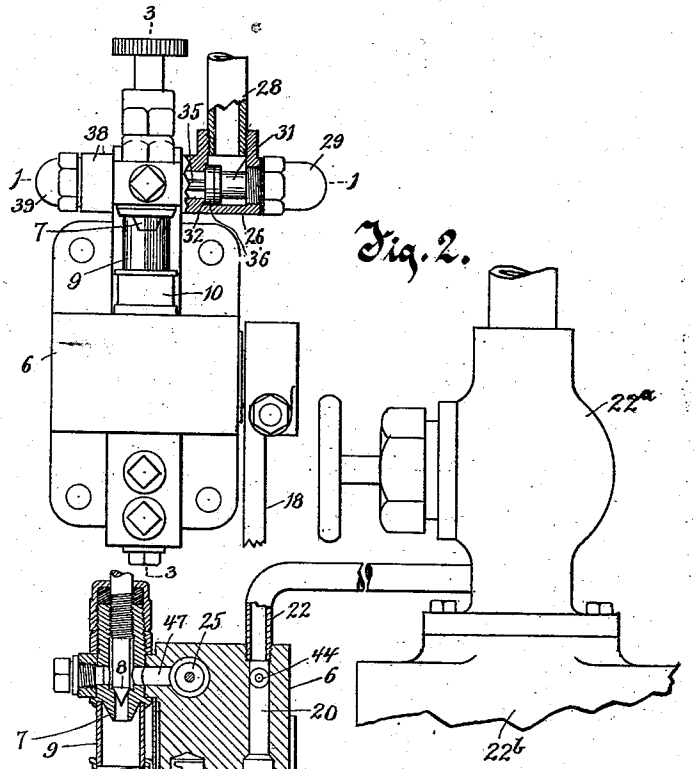
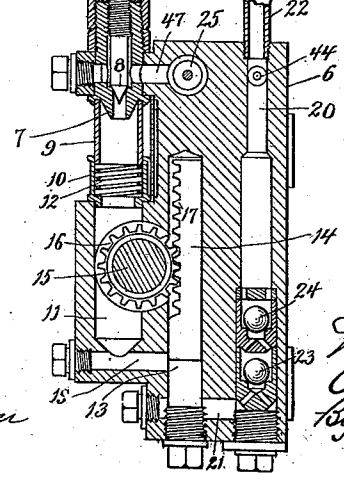


Fig. 3.



Witnesses.

C. N. Keeney.

Anna F. Schmidtbauer

Inventors,

Willis S. Sherman.

Arthur J. West.

By Benedict & Morsell.

Attorneys.

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2 SHEETS—SHEET 2.

Fig. 4.

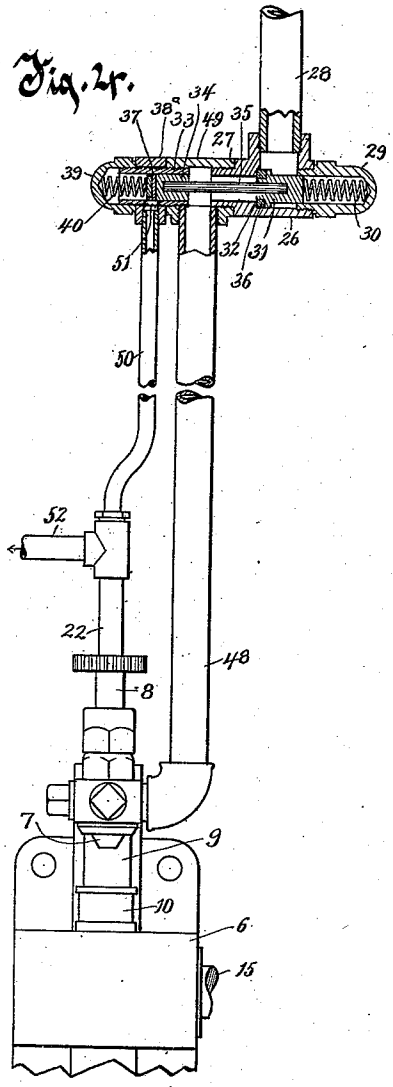
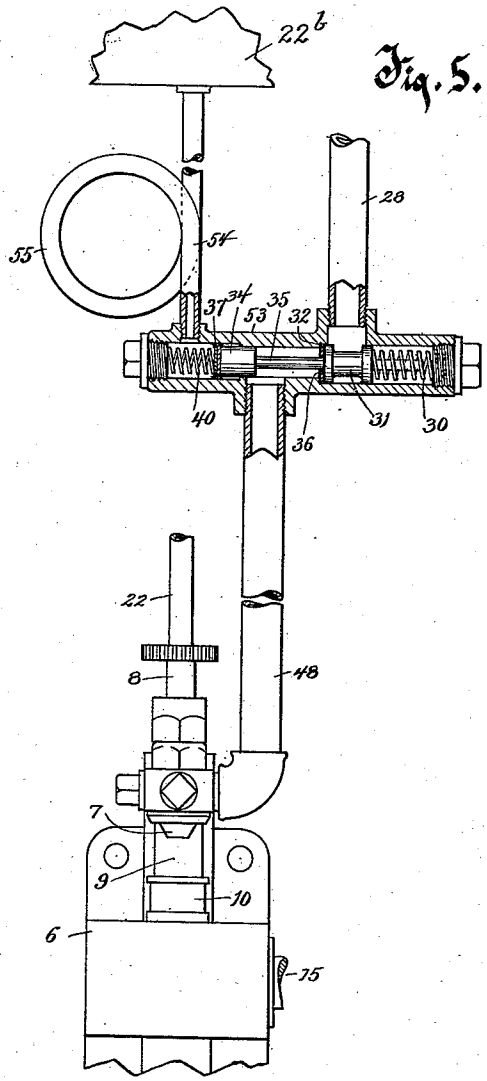


Fig. 5.



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Attorneys.

UNITED STATES PATENT OFFICE.

WILLIS S. SHERMAN AND ARTHUR JACKSON WEST, OF MILWAUKEE, WISCONSIN, ASSIGNORS TO THE RICHARDSON-PHENIX COMPANY, A CORPORATION OF WISCONSIN.

AUTOMATIC START AND STOP FEED FOR OIL-PUMPS.

986,512. Specification of Letters Patent. Patented Mar. 14, 1911.

Application filed June 25, 1903, Serial No. 163,051. Renewed June 5, 1906. Serial No. 320,340.

To all whom it may concern:

Be it known that we, WILLIS S. SHERMAN and ARTHUR JACKSON WEST, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a new and useful Improvement in Automatic Start and Stop Feeds for Oil-Pumps, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

Our invention has relation to an automatic start and stop feed for oil pumps.

In oil pumps as heretofore constructed, so far as we are aware, no means have been provided for shutting off the feed of the oil to the pump other than by the turning of a valve. In some instances, needle valves are employed for regulating the drippings of oil from the nozzles, and these valves are the only means provided for shutting off entirely the feed passage for the oil, when the pump is stopped. It is obvious that the closing of a valve each time the mechanism is stopped, in order to stop the feeding of the oil to the pump, and the subsequent necessity for opening the valve when it is desired to start the feed of the oil, is not only a troublesome expedient, but is also open to the objection that the operator may, through carelessness, or otherwise, neglect to close the valve when the pump mechanism is stopped, and in such case, of course, the oil will be dripped into the pump and fill up the passages thereof at a time when there is no necessity for feeding oil.

The primary object of our invention is to overcome the above pointed out difficulties by providing a construction having the capability of automatically stopping the feed of oil to the pump when the pump mechanism is stopped, and to automatically start the feed of oil to the pump, when the pump mechanism is started, thereby permitting the valve for controlling the amount of drippings to be set to a certain open position to drip a required amount of oil, and remain at such position so long as it is desired to drip such certain quantity.

Having the above in view, the invention consists of the devices and parts, or their equivalents, as hereinafter set forth.

In the accompanying drawing, Figure 1 is a horizontal section of apparatus embodying the invention, taken on the line 1—1 of Fig. 2. Fig. 2 is a front elevation, parts broken away. Fig. 3 is a vertical, sectional view on the line 3—3 of Fig. 2. Fig. 4 is an elevation of a modified form of construction; certain parts being broken away, and Fig. 5 is an elevation of another modified form, certain of the parts in this figure being broken away.

In the accompanying illustration of our invention we have shown the same in connection with a specific form of pump, such, for instance, as the style of pump illustrated in Patent No. 786,167 for oil pumps granted March 28, 1905, to Sight Feed Oil Pump Co., as assignee of Willis S. Sherman. We wish it understood, however, that we do not limit the invention to this special adaptation, as it will be obvious from the description which follows that the device is equally adapted for use in connection with any other form of lubricator in which is employed mechanism for forcing the oil from a chamber or passage in the lubricator to the machinery to be lubricated.

Referring to the special form of pump mechanism illustrated, the numeral 6 indicates the frame or casting containing the operative mechanism and the different chambers or passages. Fitted in an opening therefor at the front and upper portion of the frame or casting is a drip nozzle 7. This drip nozzle is provided at its lower end with a discharge orifice which is controlled by means of an adjustable needle valve 8. The lower pointed end of this valve, when said valve is adjusted, will enlarge or restrict the discharge orifice of the nozzle, in accordance with the particular adjustment. The upper end of a tranparent sight tube 9 surrounds the discharge orifice of the nozzle, and the lower end of said tube fits in a cup 10 seated upon the metal bordering the upper end of an oil chamber 11. A coiled spring 12 is disposed in the cup 10, and the lower end of the transparent sight tube rests on the upper coil of this spring. Whenever it is desired to remove the sight tube, all that is necessary to be done is to press upwardly on the cup 10 against the action of the coiled spring, until the lower end of the cup clears the upper end of the chamber 11 at which time of course said tube and cup may be easily taken out. Back of the oil chamber, the frame or casting is formed with an upright plunger chamber 13 in which is movably fitted a plunger 14. The plunger is re-

ciprocated by means of a shaft 15 extending across the frame or casting, and provided with teeth 16 therearound, said teeth extending through an opening to the plunger chamber so as to engage rack teeth 17 formed on the plunger. The shaft 15 may be rocked in any desired manner, as for instance, by an arm 18 connected up to any moving part of the mechanism. The lower end of the oil chamber 11 communicates with the plunger chamber by means of a passage 19. In the rear portion of the frame or casting is a vertical outlet passage 20, the lower end of which is connected to the plunger chamber by a short connecting passage 21. To the upper end of passage 20 is connected an outlet pipe 22 which leads to the machinery to be lubricated. In the lower portion of passage 20 are valve mechanisms 23 and 24, respectively, which, while permitting the oil to be forced upwardly in passage 20 yet prevent the oil from flowing backward in said passage.

Referring now to the improved mechanism, and particularly to that illustrated on Sheet 1 of the drawing, the upper portion of the frame or casting is provided with a transverse opening 25 having its opposite ends interiorly threaded. Screwed into one of these threaded end openings is the reduced threaded end of a tube 26, a shoulder 27 being formed by the reduced end portion, and which shoulder bears against the outer side of the frame or casting. The tube 26 has a pipe 28 fitted thereto and leading to the interior thereof, said pipe extending from any suitable source of oil supply. To the outer open end of tube 26 is fitted, preferably by a threaded connection, a cap 29. Within the chamber of this cap is a coiled spring 30, and the inner end of this spring bears against the outer end of a valve 31, and normally forces said valve to the extreme limit of its movement in one direction, as determined by contact of said valve with a shoulder 32 formed on the interior of the tube 26. This normal position of the valve is such as to close off the flow of oil from the oil feed pipe 28 to the pump mechanism, as most clearly shown in Fig. 2. Fitted to the opposite interiorly threaded end of the opening 25 is a tube 33, and slidingly fitted in this tube is a piston 34, which is connected to the valve 31 by means of a rod 35. The face of valve 31 which strikes against the shoulder 32 is preferably provided with a packing 36, and the outer end of piston 34 has fitted thereagainst a packing 37. Slipped over the end of tube 33 is a sleeve 38, and for holding this sleeve in place a cap 39 is screwed on to the outer threaded end of tube 33. This cap also confines a light coiled spring 40, the inner end thereof bearing against the packing 37 and serving to hold said packing in contact with the end of the piston. The sleeve 38 has extending therefrom a short pipe 41 having its outer end closed, and the inner end of this pipe is in communication with the interior of the tube 33 by means of a port or opening 42 in said tube, and with which port or opening the inner end of the pipe 41 registers. The outer end of short pipe 41 is intersected by a tubular screw 43, said screw screwing into a short port 44 leading to the outlet passage 20. The portion of the tubular screw which intersects the bore of the short pipe 41 is provided with an annular groove 45, from which extends inwardly into the bore of the screw a series of small openings 46.

Before the initial starting of the mechanism above described, a quantity of oil may be poured into the chamber 11, and this oil will settle in the bottom of the plunger chamber 13, a sufficient quantity of oil being poured in to fill up the oil passages in the pump. In Fig. 3 of the drawings, we show the pipe 22 leading to the throttle-valve controlled pipe between the throttle valve and steam chest, the throttle-valve controlled pipe being indicated by the numeral 22^a and the steam chest by the numeral 22^b. The oil is conveniently introduced into the passages referred to by removing the transparent sight tube in the manner herein before fully pointed out. In the regular operation of the pump the oil in pipe 22 is acted on by the steam pressure in the engine, and hence the oil is caused to exert pressure against the piston 34. This causes a movement of the piston toward the right of Fig. 2, and a consequent movement of the valve 31 which is connected to the piston, in the same direction, the force of the oil pressure overcoming the contrary force exerted by the spring 30. This movement of the valve 31 opens up the oil feed pipe 28, and hence permits a quantity of the oil to flow through the tube 26, and opening 25, thence by way of a port 47 to the drip nozzle, the needle valve of said nozzle having been first adjusted to drip the required amount. As the oil drips from this nozzle it enters the chamber 11. The rocking of the shaft is of course started, the said rocking of the shaft being effected by the admission of steam to the steam chest of the engine and this causes a reciprocation of the plunger, and the oil is forced by each successive down movement of the plunger past the valves 23 and 24, thence up the outlet passage 20 and through the pipe 22 to the machinery to be lubricated. It will therefore be seen that while the engine mechanism is operating, and steam pressure thereby exerted, a constant pressure of the oil against the piston 34 is exerted sufficient to hold the valve 31 in an open position, and consequently permit of a supply of oil through the pipe 28 to the drip nozzle. When the supply of steam to the

part with which the pipe 22 is connected is stopped, pressure against the piston is removed, and consequently the recoil of the spring 30 will force the valve 31, and the piston 34 back to normal position, or to the position in which the valve closes off the supply of oil through the pipe 28. It will be understood that the coiled spring 40 is very much lighter than spring 30, and hence the latter spring is permitted to return the valve and piston to normal position when steam pressure is removed, the spring 40 being employed merely for the purpose of holding the packing 37 in place. The spring 40, however, is not absolutely necessary, as the packing will be held in place by the pressure of the oil.

While we have herein shown and described our invention in connection with pump mechanism having only a single plunger and drip nozzle, yet it will be apparent that said invention may be used in connection with a device employing a plurality of oil feeds without any change of the oil starting and stopping mechanism, excepting the lengthening of the rod which connects the piston 34 to the valve 31. This is equally true of the modified forms of construction illustrated on Sheet 2 of the drawings, and which will now be described, excepting that in these modified forms it is not even necessary to lengthen the rod.

Referring to the modified form illustrated in Fig. 4, this differs from the Sheet 1 form of construction principally in locating the mechanism for starting and stopping the feed of oil at a distance beyond the frame or casting 6. In this form, a long pipe 48 leads to the drip nozzle. At the outer end of this pipe is a T-coupling 49. The opposite ends of the tubular member of this coupling are interiorly threaded, and into one threaded end is fitted a tube corresponding to the tube 26 of the Sheet 1 form of construction, and designated by the same reference numeral, and in the opposite end is fitted a tube corresponding to the tube 33 of the Sheet 1 form of construction and designated by the same reference numeral. In conjunction with these tubes are employed the same parts as shown on the Sheet 1 form of construction, the said several parts being designated by the same reference numerals employed on Sheet 1. The sleeve 38^a, however, instead of having a short pipe 41 extending therefrom, has a long pipe 50 extending therefrom, and communicating at its outer end with the interior of the tube 33 through a port 51 in said tube. The inner end of pipe 50 is coupled to the outer end of outlet pipe 22, and said outlet pipe has a branch 52 extending from the coupling and leading to the machinery to be lubricated. In the operation of this form of mechanism, a quantity of oil is initially poured into the pump in order to fill up the passages thereof, for the purpose of delivering lubricant when the pump is first started to the pipe 22, and this is accomplished, as in the other construction, by raising the sight tube 9. The mechanism also works in exactly the same manner as the Sheet 1 form, excepting that the oil is fed to the drip nozzle through the long pipe 48, and is forced outwardly from the frame or casting through the outlet pipe 22, thence by way of branch outlet pipe 52 to the machinery to be lubricated. This feeding of the oil of course stops when the engine mechanism is stopped and the steam pressure thereby removed, as said piston and the valve are at such time returned to normal position, the valve in its normal position closing off the oil supply pipe 28.

In the modified form of construction illustrated in Fig. 5, the automatic oil starting and stopping mechanism is also located at a distance beyond the frame or casting 6, and furthermore in this modified form, steam pressure acting upon a small quantity of water, is relied upon to effect the automatic opening of the valve controlling the flow of oil to the nozzle. There is a pipe corresponding to the pipe 48 of the Fig. 4 form of construction, and designated by the same reference numeral, and the outer end of this pipe connects with a horizontal tube 53. In this tube are located the valve 31, piston 34, rod 35 connecting said valve and piston, and the coiled springs 30 and 40 bearing respectively against the valve and piston. The oil supply pipe 28 leads to that portion of the tube 53 in which the valve 31 is located. A steam pipe 54 leads into that portion of the tube 53 wherein the spring 40 is confined, and said pipe is provided at a point between its ends with a condensing coil 55. The outer end of pipe 54 connects with the steam chest 22^b, or other steam chamber or passage of the engine mechanism.

In the operation of the Fig. 5 form of construction, when the engine mechanism is started, the steam chest 22^b is of course supplied with steam, and this steam flows from said chamber through the pipe 54 and enters the tube 53, acting expansively against the piston 34, and thereby moving said piston and the valve 31 to such an extent as to cause the valve to open the oil supply pipe 28. The oil is then free to flow down the pipe 48 to the drip nozzle. As long as the engine mechanism is running, steam pressure will of course be exerted on the piston, and consequently the valve will be held in its open position. In this form of the device, the oil which is acted upon by the plunger is forced through the pipe 22 directly to the machinery to be lubricated. When the engine mechanism stops, of course steam is no longer

supplied, and consequently pressure is no longer exerted on the piston, and hence the valve returns to its normal position and shuts off the flow of oil through the pipe 28 to the nozzle.

The coil 55 is advisably provided, inasmuch as it forms a means for condensing the steam, and hence the water of condensation, (instead of oil as in the other forms of construction,) acts directly against the packing 37, and thereby prevents the damaging effect of hot steam against said packing, which hot steam, it is apparent might soon destroy the packing. It will be understood that the packing 37 is preferably of leather, or other flexible material, in order to effect a tight but yet yielding joint, inasmuch as such joint is important for successful working. As this particular form of packing is desirable, it is obvious that a means should be provided to prevent destruction thereof. In the other forms of construction, the oil first acts against the packing 37, and this oil has the same effect as the water of condensation, that is to say, prevents the destruction of the leather or flexible packing. Each time the mechanism is stopped, it will be evident that a small quantity of water of condensation is left in the coil, so that when the mechanism is subsequently started, the steam will act against this small body of water and not directly against the packing fitted to the end of the piston.

What we claim as our invention is:

1. In an automatic stop and start feed for oil pumps, the combination of a pump, a valve casing, a drip nozzle in communication with the casing, said drip nozzle being adapted to drip oil into the pump, an oil supply pipe leading to the casing, a valve movably fitted in the casing, the said valve being normally at a position to prevent the oil from flowing into the casing, an oil outlet pipe in communication with the pump cylinder and adapted to convey the oil to the machinery to be lubricated, said pipe being also in communication with the casing, means for actuating the pump mechanism, the said pump mechanism when actuated causing the oil to act through pressure and thereby move the valve in a direction to permit the oil to flow from the oil supply pipe through the casing and to the nozzle, and means when the pump mechanism is stopped, for returning the valve to its normal closed position.

2. In an automatic stop and start feed for oil pumps, the combination of a pump, a valve casing, a drip nozzle in communication with the casing, said drip nozzle being adapted to drip oil into the pump, an oil supply pipe leading to the casing, a valve movably fitted in the casing, the said valve being normally at a position to prevent the oil from flowing from the oil supply pipe into the casing, engine mechanism and a conduit connecting the pump with the engine mechanism and also connecting with the casing, and through which conduit the oil is forced by the forcing mechanism of the pump, said engine mechanism when started causing pressure to be exerted whereby the valve is moved in a direction to permit the oil to flow from the oil supply pipe through the casing and to the nozzle, and means when the engine mechanism is stopped to return the valve to its normal closed position in which it closes off the flow of oil to the nozzle.

3. In an automatic stop and start feed for oil pumps, the combination with a member to which fluid under pressure is adapted to be supplied of means for permitting fluid under pressure to pass to said member or to be shut off therefrom, an oil pump, a casing, a drip nozzle in communication with said casing to supply oil to said pump, an oil supply pipe leading to the casing, a valve movably fitted in the casing, means acting against the valve in a direction to hold said valve in a position to normally close off the flow of oil from the oil supply pipe through the casing and to the drip nozzle and means affording communication between said member and said oil pump and said casing so that oil can be pumped to said member and the said valve can be moved by pressure in a direction to permit the oil to flow from the oil supply pipe through the casing and to the nozzle.

4. In an automatic stop and start feed for oil pumps, the combination of an oil pump provided with an outlet conduit leading to the machinery to be lubricated, and through which conduit the oil is forced by the forcing mechanism of the pump, said conduit being also in communication with a part of the machinery to be lubricated to which fluid under pressure is adapted to be supplied, means for permitting fluid under pressure to pass to such part of the machinery to be lubricated or to be shut off therefrom, a valve casing, a drip nozzle in communication with said casing and adapted to drip oil into the pump, an oil supply pipe leading to the casing, a conduit leading from the outlet conduit to the casing, and a valve movably fitted in the casing and normally closing the flow of oil from the supply pipe through the casing to the drip nozzle, and adapted, when pressure is exerted in the casing and conduit leading thereto, to be moved in a direction to permit of the flow of oil from the oil supply pipe through the casing to the nozzle.

5. In an automatic stop and start feed for oil pumps, the combination of an oil pump provided with an outlet conduit leading to the machinery to be lubricated and through which conduit the oil is forced by the forc-

ing mechanism of the pump, said conduit being also in communication with a part of the machinery to be lubricated to which fluid under pressure is adapted to be supplied, means for permitting fluid under pressure to pass to such part of the machinery to be lubricated or to be shut off therefrom, a valve casing, a drip nozzle in communication with said casing and adapted to drip oil into the pump, an oil supply pipe leading to the casing, a short pipe leading to the casing, a tube intersecting said pipe and communicating with a port leading to the outlet conduit, said intersecting tube being in communication with the short pipe through an opening or openings, and a valve movably fitted in the casing and normally closing off the flow of oil from the supply pipe through the casing and to the drip nozzle, and adapted, when pressure is exerted in the casing and the outlet conduit, to be moved in a direction to permit of the flow of the oil through the casing to the nozzle.

6. In an automatic stop and start oil feed, the combination of a valve casing, caps removably fitted to opposite ends of said casing, a drip nozzle in communication with the casing, an oil supply pipe in communication with the casing, a piston and valve movably fitted in said casing and connected together, a packing loosely fitted against the face of the piston, a light spring confined within one of the end caps of the casing and bearing at its inner end against the loose packing fitted against the face of the piston, a heavier coiled spring confined within the other end cap of the casing and bearing at its inner end against the valve and normally holding the piston and valve in such position that the valve will close off the flow of oil from the oil supply pipe through the casing and to the nozzle, means for permitting a fluid under pressure to exert pressure within the casing and against the loose packing and piston, and means for controlling the passage of the fluid under pressure and for shutting it off.

7. In an apparatus of the class described, the combination of a lubricant feed pump provided with a delivery conduit leading to the apparatus to be lubricated and communicating with a source of fluid pressure, a source of lubricant supply for said pump, a feed nozzle between said pump and said supply, a fluid actuatable spring-restrained valve between said nozzle and said supply, and means, actuated by pressure exerted in said conduit, to open said valve, to deliver lubricant to said nozzle.

8. In an apparatus of the class described, the combination of a lubricant feed pump provided with a delivery conduit leading to the apparatus to be lubricated and communicating with a part of said apparatus to which a fluid under pressure is adapted to be admitted, a source of lubricant supply for said pump, a valve adapted to control the delivery of lubricant to said pump, and means actuatable by the fluid under pressure for opening said valve to deliver lubricant to said pump, and means to control the flow of the fluid under pressure.

9. In a lubricating device, the combination with a pump frame provided with an oil supply passage and with an oil delivery passage, an oil pump communicating with said oil supply passage and adapted to force oil through said oil delivery passage to the apparatus to be lubricated, said apparatus to be lubricated and said oil pump being connected so that when the apparatus is in operation the pump is in operation, and an automatic valve for opening said supply passage when fluid under pressure is supplied to said apparatus for causing it to operate.

10. In an apparatus of the class described, the combination of a lubricant feed pump provided with a lubricant delivery conduit communicating with the apparatus to be lubricated, a source of lubricant supply for said pump, a valve located between said source of lubricant supply and said pump and controlling the delivery of lubricant to said pump, and means responsive to pressure exerted in said conduit for controlling said valve.

11. In an apparatus of the class described, the combination of a lubricant feed pump provided with a lubricant delivery port communicating with the apparatus to be lubricated, a source of lubricant supply for said pump, a valve controlling the delivery of lubricant to said pump and located between said source of lubricant supply and said pump, and means for opening said valve to deliver lubricant to said pump, said means being responsive to pressure exerted when the apparatus to be lubricated is in operation.

12. The combination with an apparatus to be lubricated, said apparatus being adapted to be operated by a fluid under pressure, of a lubricant feed pump provided with a lubricant delivery conduit communicating with the apparatus to be lubricated and exposed to the pressure of the fluid under pressure which is the actuating power for said apparatus, a source of lubricant supply for said lubricant feed pump, and means located between said source of lubricant supply and said lubricant feed pump responsive to fluid pressures existing in said conduit for controlling the delivery of lubricant from said source of lubricant supply to said lubricant feed pump.

13. The combination of a lubricator provided with a lubricant delivery passage communicating with the apparatus to be lubri-

cated, a source of lubricant supply for said lubricator, a valve located between said source and said lubricator for controlling the delivery of lubricant to said lubricator, and means responsive to fluid pressure transmitted through said conduit from the apparatus to be lubricated for controlling the operation of said valve.

14. In a lubricating device, the combination of a lubricant pump provided with a lubricant delivery passage communicating with the apparatus to be lubricated and a lubricant supply passage communicating with a source of lubricant supply, a valve located in said supply passage for controlling the delivery of lubricant to said pump, and pressure responsive means for actuating said valve to close said passage when said pump and apparatus are not in operation, and for opening said passage when said pump and apparatus are being operated.

15. The combination with apparatus to be lubricated which includes movable mechanism, of a lubricant supply pump adapted to be positively actuated by the movements of said movable mechanism, a discharge conduit leading from said pump to the apparatus to be lubricated, a source of supply of lubricant for said pump, a valve located between said pump and said source of lubricant supply for controlling the passage of lubricant to the pump, and a single means to start or stop the movable mechanism of said apparatus to be lubricated and to control said valve so that when the movable mechanism of the apparatus to be lubricated is in motion, said valve will be opened to allow lubricant to pass from the source of lubricant supply to the pump, and when the movable mechanism is stopped by said single control means the valve will be closed to shut off the flow of lubricant from the source of supply to the pump.

In testimony whereof, we affix our signatures, in presence of two witnesses.

WILLIS S. SHERMAN.
ARTHUR JACKSON WEST.

Witnesses:
A. L. MORSELL,
C. T. BENEDICT.