

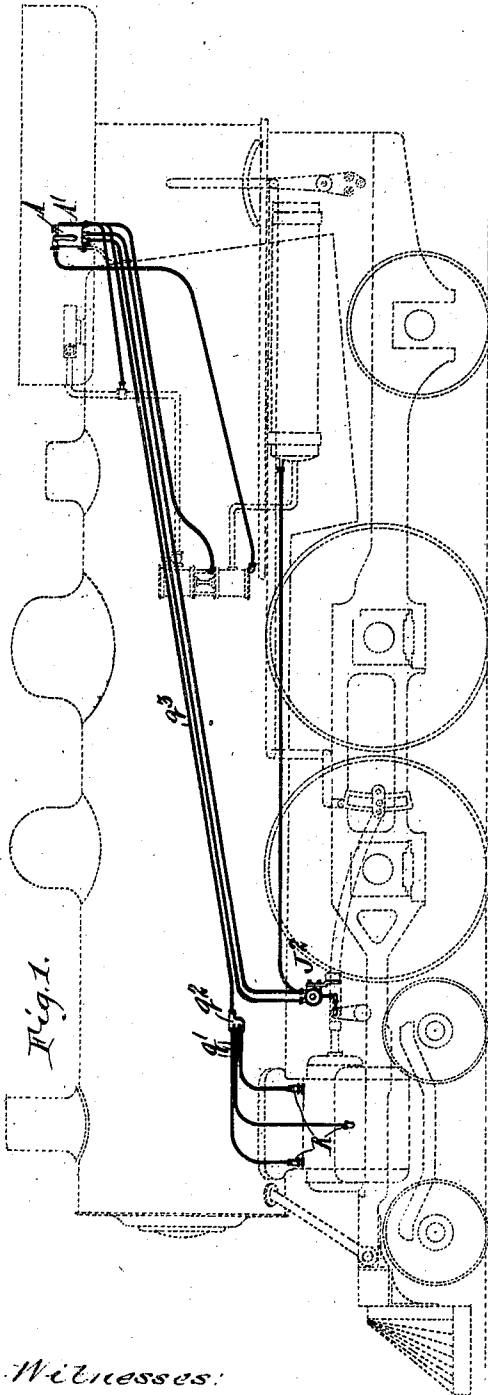
C. W. MANZEL.
LUBRICATOR.

APPLICATION FILED AUG. 24, 1905.

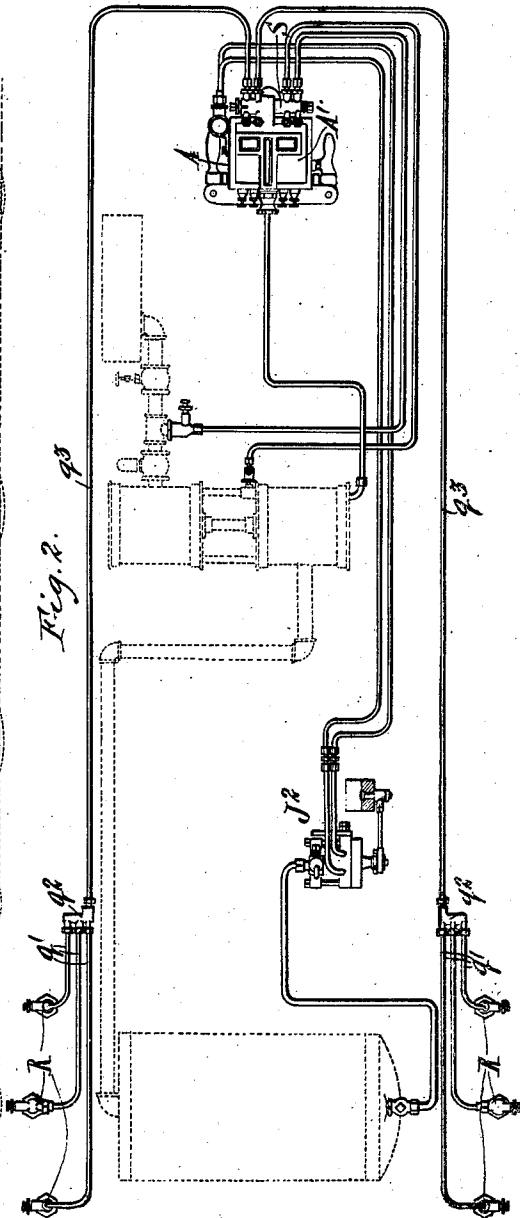
Patented May 4, 1909.

8 SHEETS—SHEET 1.

920,769.



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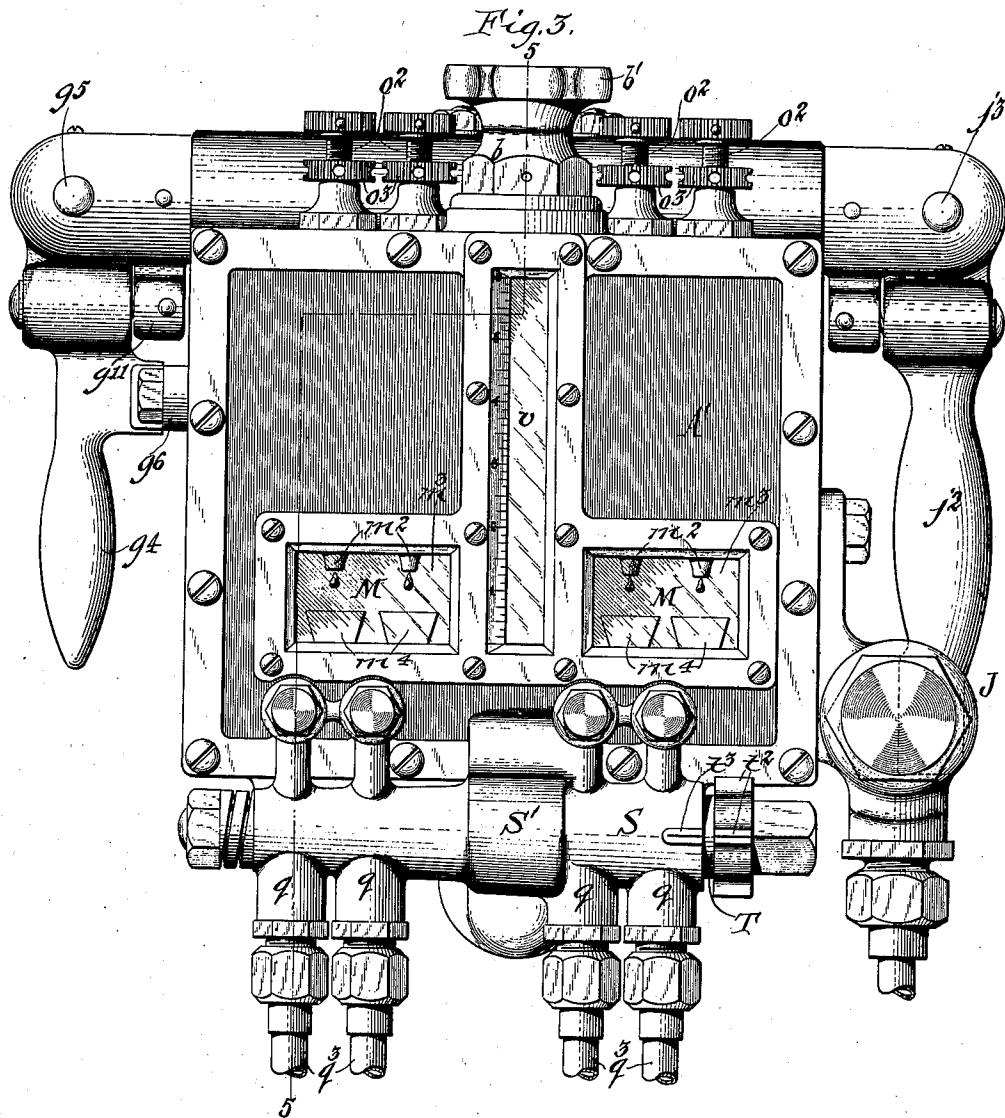
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8 SHEETS—SHEET 2.



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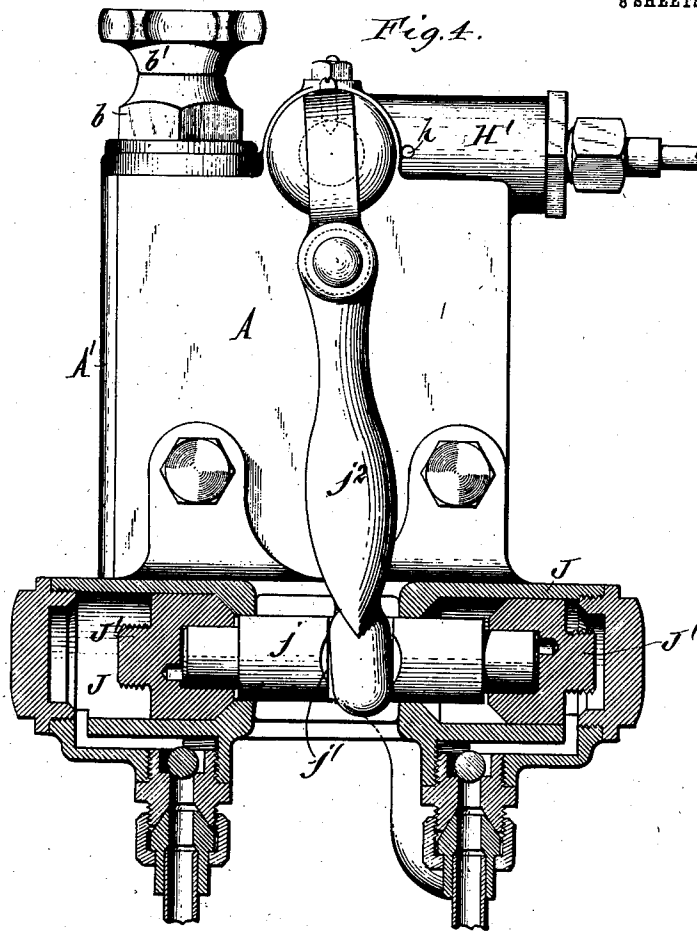
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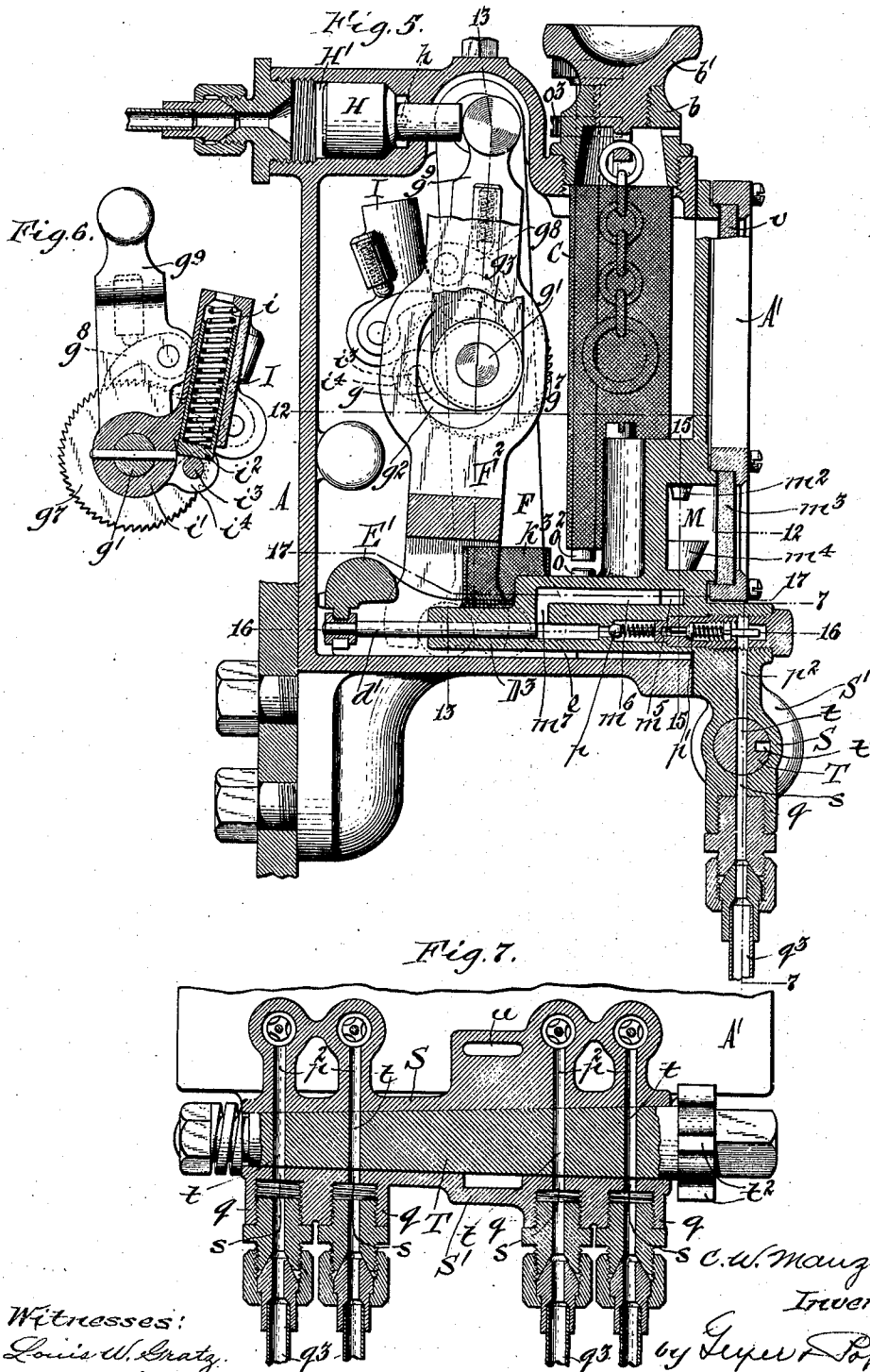
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8 SHEETS—SHEET 4.

920,769.



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920,769.

Patented May 4, 1909.
8 SHEETS—SHEET 5.

Fig. 8.

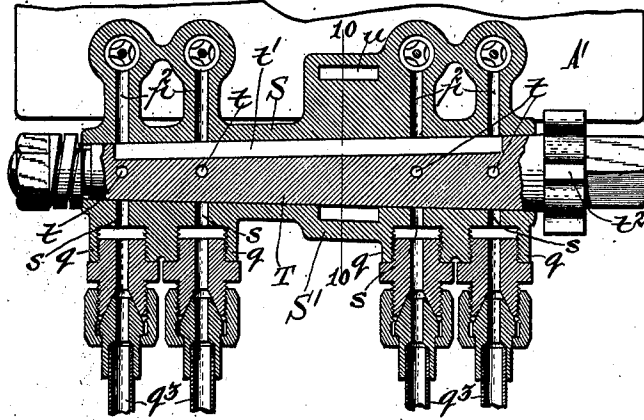


Fig. 9.

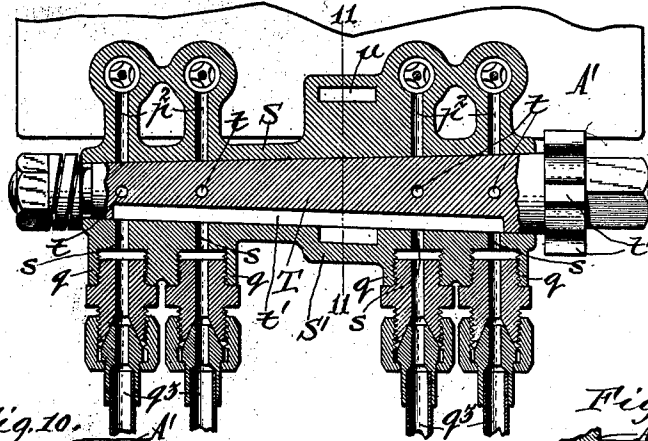


Fig. 10.

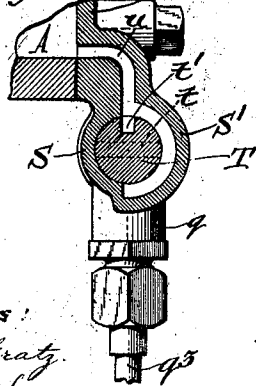
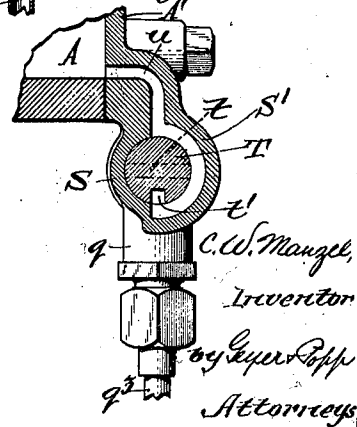


Fig. 11.



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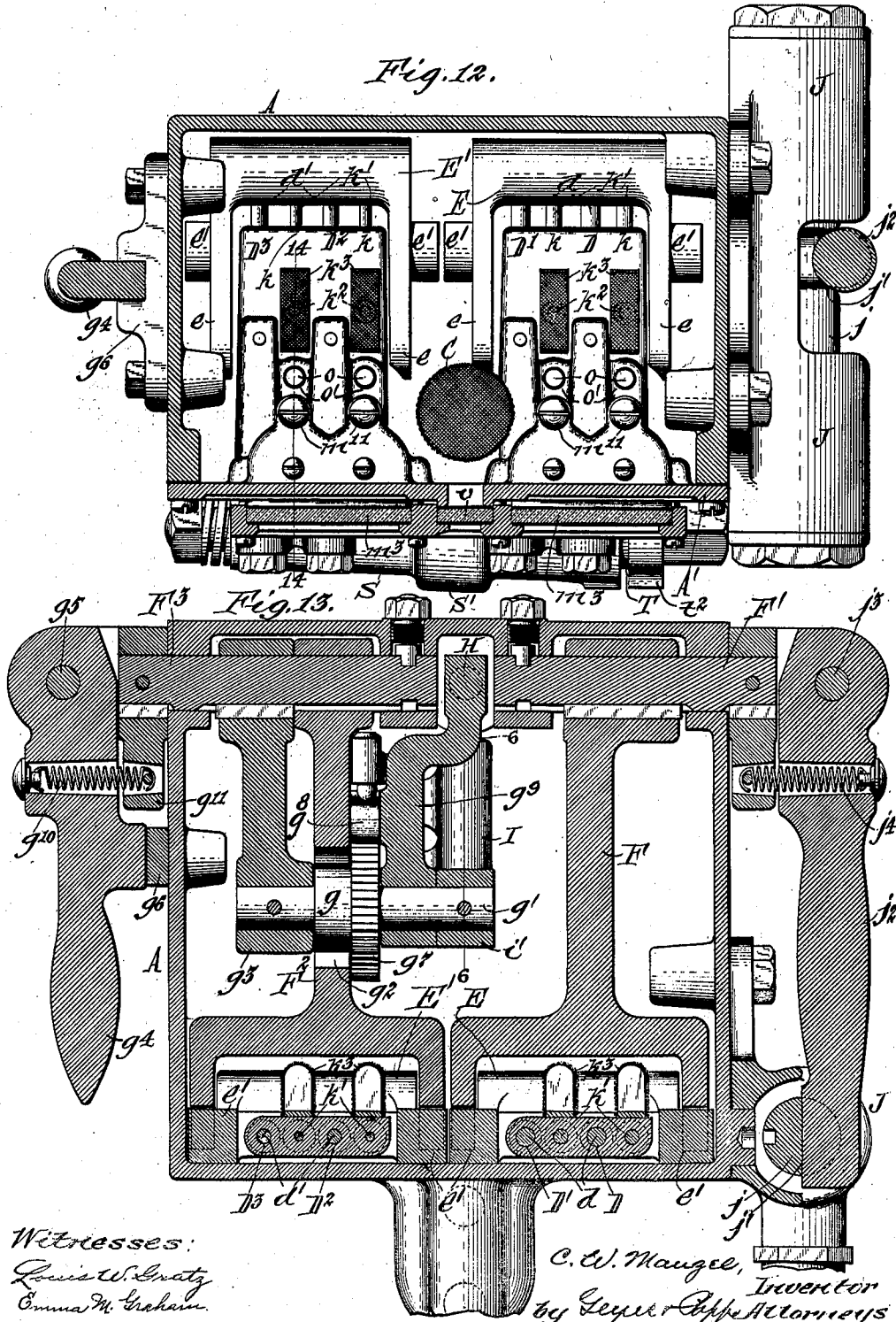
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8 SHEETS—SHEET 6.



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8 SHEETS—SHEET 7.

Fig. 14.

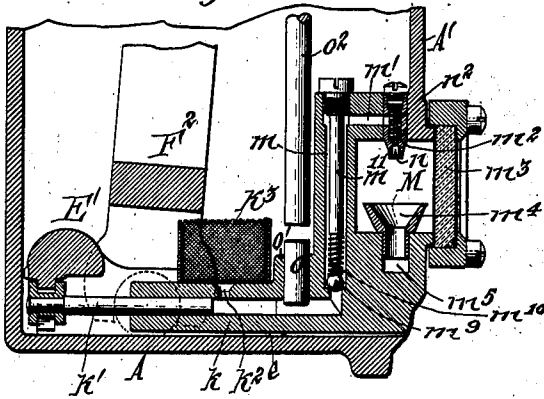


Fig. 15.

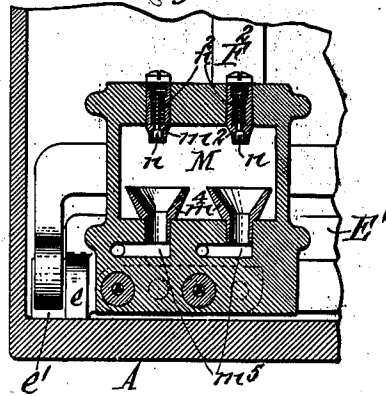


Fig. 16.

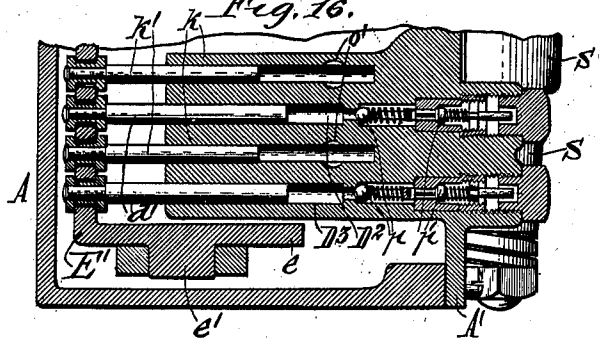


Fig. 17.

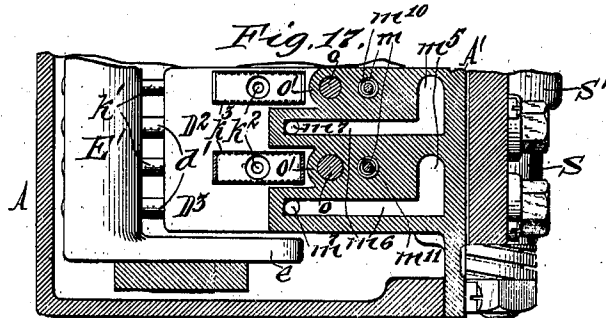
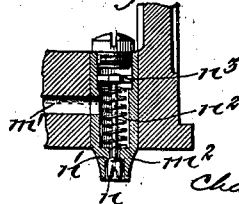


Fig. 18.



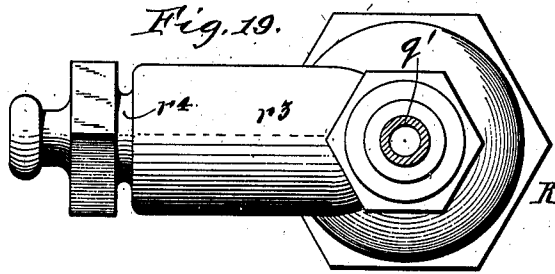
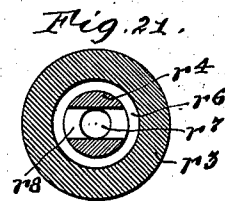
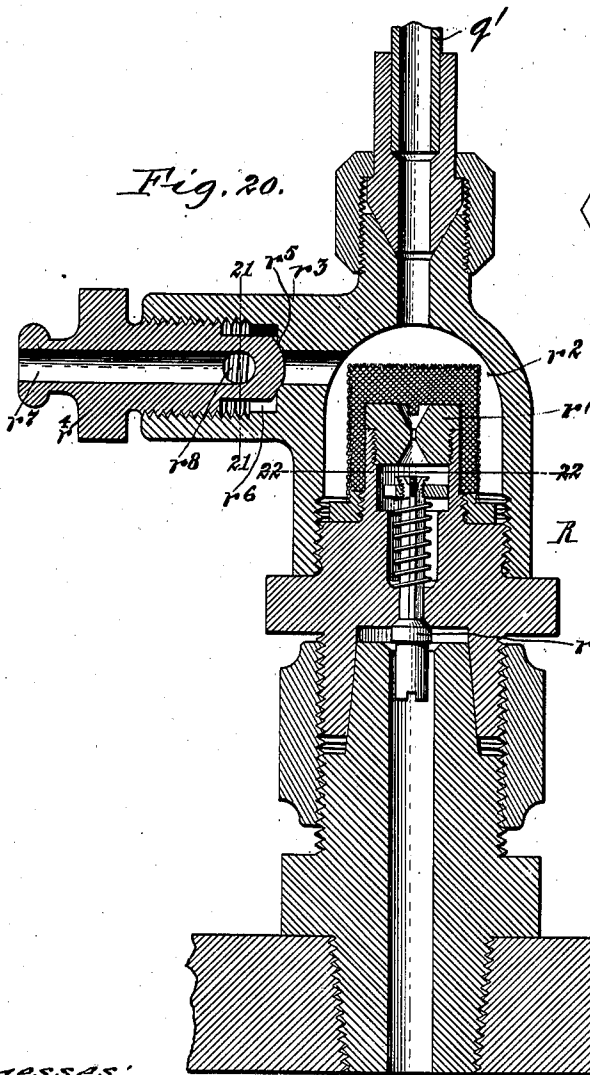
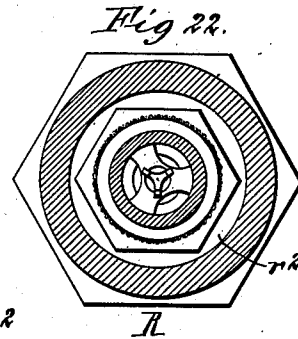
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LUBRICATOR.
APPLICATION FILED AUG. 24, 1905.

Patented May 4, 1909.
8 SHEETS—SHEET 8.



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UNITED STATES PATENT OFFICE.

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J. L. OSGOOD, OF BUFFALO, NEW YORK.

LUBRICATOR.

No. 920,769.

Specification of Letters Patent.

Patented May 4, 1909.

Application filed August 24, 1905. Serial No. 275,515.

To all whom it may concern:

Be it known that I, CHARLES W. MANZEL, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Lubricators, of which the following is a specification.

This invention relates to a force-feed-lubricator devised more especially for use on locomotives for oiling the steam cylinders and other parts, such as the air pump of the brake mechanism.

One of the objects of my invention is to so combine the pump or pumps with the reservoir as to effectually exclude air therefrom and the conduits or passages connected therewith and at the same time dispense with stuffing boxes.

A further object is the provision of a sight-feed lubricator which is simple and compact in construction and positive and reliable in operation.

Another object is to provide the pump of the lubricator with simple regulating means whereby the same can be adjusted to deliver a greater or less predetermined quantity of oil, as desired.

A further object of the invention is to provide the lubricator with efficient controlling means by which the oil in the reservoir can be discharged directly into the pipe lines or conduits leading to the chest plugs of the steam cylinders for priming the same, or circulated through the pump and the reservoir without passing through said pipes, for maintaining the oil in the reservoir at the proper level to always submerge the pump or pumps and exclude air from the same.

In the accompanying drawings consisting of 8 sheets: Figure 1 is a side elevation of an apparatus embodying the improved lubricator, the same being applied to a locomotive which latter is shown by dotted lines. Fig. 2 is a top plan view of the apparatus. Fig. 3 is an enlarged front view of the lubricator. Fig. 4 is a side elevation thereof, with the air motor shown in longitudinal section. Fig. 5 is a vertical section in line 5—5, Fig. 3. Fig. 6 is a vertical section in line 6—6, Fig. 13. Figs. 7, 8, and 9 are longitudinal sections of the controlling valve in line 7—7, Fig. 5, showing different positions of the valve key. Figs. 10 and 11 are transverse sections in lines 10—10 and 11—11, Figs. 8 and 9, respectively. Fig. 12 is a horizon-

tal section of the lubricator in line 12—12, Fig. 5. Fig. 13 is a vertical section thereof in line 13—13, Fig. 5. Fig. 14 is a fragmentary vertical section in line 14—14, Fig. 12. Fig. 15 is a similar section in line 15—15, Fig. 5. Figs. 16 and 17 are fragmentary horizontal sections in lines 16—16 and 17—17, Fig. 5. Fig. 18 is a fragmentary vertical section of the drip-nozzle, on an enlarged scale. Fig. 19 is an enlarged top plan view of one of the chest-plugs. Fig. 20 is a vertical section thereof. Fig. 21 is a transverse section in line 21—21, Fig. 19. Fig. 22 is a horizontal section in line 22—22, Fig. 19.

Similar letters of reference indicate corresponding parts throughout the several views.

In the drawings is shown a multiple lubricator having four oil pumps, two of which are adapted to supply the steam cylinders of the locomotive and the other two the cylinders of the air-pump of the brake mechanism. The improvements are, however, equally applicable to a lubricator having a single pump.

The body or reservoir A of the lubricator is rectangular and provided with a removable front plate A'. In its top the reservoir is provided with a filling tube b closed by a screw plug b', said tube carrying a depending tubular strainer C for intercepting any foreign substances in the oil. In the lower portion of the reservoir are arranged a suitable number of force pumps or delivery cylinders D, D', D'', D''', four being shown in the drawings for supplying the various cylinders above mentioned.

The plungers d of the pumps which supply the steam cylinders are secured at their projecting rear ends to a cross head E having forwardly projecting arms e provided with trunnions e', and the plungers d' of the other two pumps are secured to a similar cross head E'. The cross head E is reciprocated by a depending arm F secured at its upper end to a transverse rock shaft F' suitably journaled in the upper portion of the reservoir, as shown in Fig. 13, said arm having forked lower ends which straddle the trunnions e' of said cross-head. The other cross head E' is actuated by a similar arm F' depending from a shaft F'', preferably arranged in line with the rock shaft F', as shown.

The air and steam cylinders of the air pump require less lubrication than the main

steam cylinders of the locomotive, and the plungers of the pumps D^2 , D^3 which supply the first-named cylinders are therefore provided with a comparatively slow actuating mechanism and the plungers of the pumps D , D^1 with a rapid actuating mechanism, both of which mechanisms may be of any suitable construction. Preferably the slow actuating mechanism consists of an eccentric g loosely mounted on a horizontal shaft g^1 and closely fitted in a longitudinal slot g^2 of the rock arm F^2 so that the rotation of the eccentric causes the latter to vibrate. The arm F^2 is loosely hung on the shaft F^3 . The shaft g^1 is secured at one end in a hanger g^3 keyed to the shaft F^3 . This shaft is normally held from turning by an arm or handle g^4 pivoted to its outer end by a transverse pin g^5 and interlocking with a notched plate g^6 secured to the adjacent side of the lubricator body, as shown in Figs. 3, 12 and 13. To the eccentric is secured a ratchet wheel g^7 with which engages a feed pawl g^8 carried by an oscillating arm g^9 . This arm is pivoted at its lower end upon the shaft g^1 and swung in a forward direction by a piston H sliding in a pneumatic cylinder H^1 to which compressed air is admitted intermittently by any suitable means, the air in front of the piston being exhausted through a port h in the front portion of the cylinder. The return stroke of the pawl arm g^9 is effected by a spring i arranged in a stationary housing I carried by a hub i^1 which is secured to the shaft g^1 . This spring bears at its lower end against a follower i^2 which in turn bears against a pin i^3 carried by a lug i^4 which projects rearwardly from the hub of the oscillating arm g^9 .

Upon the forward stroke of the oscillating arm the spring i is compressed and when the pressure is temporarily removed from the rear side of the piston H , the spring reacts and returns the oscillating arm to its initial position.

If desired, the pumps D^2 , D^3 may be operated by hand by swinging the arm or handle g^4 outwardly out of engagement with the notched plate g^6 and rocking the shaft F^3 by means of this handle the motion of the shaft being transmitted to the depending arm F^2 through the medium of the hanger g^3 , shaft g^1 and eccentric g . As shown in Fig. 13, a spring g^{10} connects the handle g^4 with an arm g^{11} secured to the projecting end of the shaft F^3 and serves to yieldingly hold the handle in its inner locked position. This spring is preferably arranged in transverse openings formed in said arm and handle, as shown.

As illustrated in Fig. 4, the operating mechanism of the pumps D , D^1 preferably consists of an air motor comprising a pair of cylinders J , J , each containing a reciprocating piston J^1 . These pistons are connected by a rod j having a central groove or recess

j^1 with which engages the lower end of a rock arm j^2 depending from the shaft F^1 . This arm, like the handle g^4 , is pivoted to the projecting end of said rock shaft by a transverse pin j^3 , so that it can be swung out of engagement with the piston rod j for operating the pumps D , D^1 by hand; and said arm is provided with a spring j^4 similar to the spring g^{10} for retaining it in its normal position.

Compressed air or other fluid under pressure is alternately admitted to the outer ends of the motor cylinders J for reciprocating the pistons, the admission of the fluid being controlled by a valve mechanism J^2 of any suitable construction.

With each pump or delivery cylinder D , D^1 , D^2 , D^3 is preferably combined a primary or regulating cylinder L arranged at one side thereof and adapted to supply a predetermined quantity of oil to the same. This regulating cylinder contains a plunger k^1 which is secured to and actuated by the corresponding cross head E or E^1 and receives the oil from the reservoir through an inlet opening k^2 in its upper side, as shown in Fig. 14, a suitable strainer k^3 being applied to the opening. The delivery end of this regulating cylinder is connected with a sight-chamber M by a passage m ascending from its rear end and extending thence horizontally above said chamber, the horizontal portion m^1 of the passage terminating in a drip nozzle m^2 which depends into the chamber and from which the oil falls in drops. This sight-chamber is located at the front of the lubricator and provided in its outer wall with a transparent pane m^3 of glass or other suitable material through which the engineer may observe the quantity and rapidity of the drop-feed. In the bottom of the sight-chamber below each drip-nozzle is located a receiving funnel m^4 whence the oil passes through a transverse passage m^5 , a longitudinal passage m^6 and a descending passage m^7 into the corresponding secondary or delivery cylinder, as shown in Figs. 5 and 17.

In the ascending passage m is arranged a check valve m^8 which closes toward the delivery cylinder and is yieldingly held against its seat by a spring m^{10} , as shown in Fig. 14. This spring is backed by a stop or rod m^{11} screwed into the upper end of the passage m .

In order to prevent the oil in the horizontal passage m^1 from flowing through the drip nozzle and being wasted when the force pump is at rest, a suitable check valve n is arranged in said nozzle, as shown in Figs. 14, 15 and 18. This valve closes upwardly against a seat n^1 and is normally held thereto by a spring n^2 applied to its stem and interposed between an internal shoulder of the nozzle and a nut n^3 secured to the stem. This spring is of the proper tension to restrain the escape of the oil from said horizontal passage when the force pump stops,

and yet allow the oil to pass the valve when the pump is in operation.

o Figs. 5, 12, 14 and 17, is a regulating piston or follower fitted in an enlargement or lateral chamber o^1 of the regulating cylinder which enlargement communicates with said cylinder near its delivery end and is preferably arranged on the upper side thereof, as shown. The outward movement of the piston is limited by a stop or screw threaded rod o^2 passing through a threaded opening in the top of the oil reservoir and locked in position by a jam nut o^3 . The spring m^{10} is so regulated that the resistance of the check valve m^9 is greater than the weight or resistance of the regulating piston o .

Upon the forward stroke of the plunger of the regulating cylinder the regulating piston o is raised by the pressure in the cylinder until it strikes its stop o^2 , the oil in the cylinder entering the portion of the enlargement left vacant by the displaced piston. As soon as the regulating piston is thus arrested, the continued pressure in the cylinder overcomes the spring of the check valve m^9 , opening the latter and delivering a greater or less charge of oil through the drip nozzle m^2 into the funnel of the sight-feed chamber M, according to the extent of travel of the regulating piston permitted by its stop. The piston of the regulating cylinder has a uniform, predetermined stroke and the capacity of this cylinder is augmented more or less by its enlargement according as the piston is allowed to recede more or less by its stop. It follows that by increasing the capacity of the cylinder, a smaller quantity of oil will be pumped into the sight-chamber and supplied to the delivery cylinder. Thus, if it is desired to supply the maximum quantity of oil to the delivery cylinder, the stop is adjusted to its lowest position and if a smaller quantity is to be supplied the stop is raised to a greater or less extent.

Upon the backward or return stroke of the plunger of the regulating cylinder k , a vacuum is created in said cylinder, causing the piston o to be depressed to its initial position by the atmospheric pressure upon the oil in the reservoir.

As shown in Figs. 5 and 16, each delivery cylinder is provided in its discharge passage with one or more check valves p , p^1 of any ordinary construction. These discharge passages communicate by descending passages p^2 with delivery nipples q which depend from the front plate of the oil reservoir and to which are attached the pipes or conduits leading to the chest plugs R of the steam cylinders or other parts to be lubricated. In the drawings, a set of three chest plugs is shown for each cylinder, these plugs being connected by individual pipes q^1 with a manifold or union q^1 which in turn is connected with one of the delivery nipples q by

a pipe q^3 . The chest plugs may be of any suitable construction, but they are preferably provided with a vent and for this purpose are constructed as shown in Figs. 19-22. The plug is provided in its oil passage with an upwardly closing check valve r and above said valve with a choke plug r^1 . This plug is inclosed by an inlet chamber or cap r^2 provided at one side with a vent nipple r^3 for the escape of any air in the oil pipe leading to the chest plug. This nipple is normally closed by a screw plug r^4 which bears at its inner end against an internal seat or shoulder r^5 of the nipple.

The plug r^4 is reduced at its inner end, to leave an annular space r^6 between the same and the wall of the nipple and is provided with a longitudinal passage r^7 which extends from its outer end nearly to its inner end and communicates with said annular space by a transverse passage r^8 intersecting the inner end of the longitudinal passage. By this construction, upon partly unscrewing the hollow plug r^4 any air in the chest plug and the feed pipe connected therewith is allowed to escape through the hollow plug.

The passage of the oil from the reservoir of the lubricator A to the chest plugs R may be controlled by a valve of any suitable construction. The preferred valve shown in the drawings is located at the base of the reservoir and consists of a horizontal case S formed integral with the front plate A¹ and interposed between the delivery or pump cylinders D, D', D², D³ and the delivery-nipples q , and a rotary key or tapering plug T fitted in the case. This key is provided with transverse ports t arranged to connect the discharge passages of the delivery cylinders with said nipples for forcing the oil into and through the feed pipes, as shown in Figs. 5 and 7. The key is also provided in its periphery with a longitudinal port or channel t^1 adapted to connect said nipples and pipes with a priming channel or passage u which extends from the lower portion of the oil reservoir to the lower side of the valve case S, as shown in Figs. 7-11, this channel being formed in an enlargement S¹ of the valve case S and the front plate of the oil reservoir, as shown in Fig. 3. The valve case is provided in its bottom with discharge ports s arranged in line with the delivery nipples q , and the longitudinal port t^1 of the key is of sufficient length to connect these ports with the priming channel u when the key is turned to the position shown in Figs. 9 and 11, so as to allow oil to flow by gravity from the reservoir through said priming channel, longitudinal port and discharge ports into the nipples q and pipes q^3 .

The key has a square end adapted to receive a wrench for turning it, and the same is provided with arms or lugs t^2 which are adapted to be brought into register with a

suitable mark or lug t^3 on the adjacent end of the valve case for readily indicating the different positions of the valve-key.

When it is desired to expel the air from the pipe lines between the lubricator and the chest-plugs, the controlling valve T is turned to the position shown in Figs. 9 and 11, and the vents of the chest-plugs are opened by unscrewing the plugs r^4 . The oil now flows through the priming channel u , the controlling valve, the feed-pipes q^3 , q^1 and the vent-nipples r^3 of the chest-plugs, carrying before it any air in the pipes and the inlet chambers of said plugs and expelling it through the vent-nipples. After thus priming the system, the vent plugs are closed, the key of the controlling valve is turned to bring its transverse ports t in line with the delivery nipples q and the discharge passages of the delivery cylinders D, D¹, D², D³, as shown in Fig. 7, and the oil pumps are actuated, whereupon oil is pumped from the reservoir through the feed-pipes q^3 , q^1 and the chest plugs R in an obvious manner.

By the use of the priming means above described, the conduits from the oil reservoir to the chest plugs are always filled with a solid column of oil and a positive and uniform feed of the oil to the steam cylinders or other parts to be lubricated is therefore insured.

It sometimes happens that the engineer has no more oil aboard than that contained in the reservoir of the lubricator. In such a case, in order to maintain the necessary level in the reservoir to keep the pump cylinders submerged and exclude air therefrom, it is only necessary to turn the key T so as to bring its longitudinal port t^1 in register with the discharge passages of the delivery cylinders, as shown in Figs. 8 and 10. In this position of the key, the discharge nipples are cut off from the pump cylinders and the oil delivered by the latter is simply returned through the longitudinal key-port and the upper portions of the priming channels u into the oil reservoir, the oil being circulated through the cylinders and the reservoir as long as the controlling valve remains in this position. To enable the engineer to observe the oil level in the reservoir the latter is provided in its front wall with a transparent panel or gage-glass v , the lower end of which terminates above the top of the pump cylinders, so that even if the reservoir should not be refilled until the level reaches the lower end of the gage-glass, the pump cylinder and its inlet will still remain submerged, excluding air therefrom and insuring a steady and reliable feed of the oil to the parts to be lubricated.

It will be observed that the ends of the pump cylinders through which the plungers pass, as well as the inlet of the cylinders, are arranged wholly within the lower portion of the oil reservoir or supply chamber where

they remain submerged so long as the level in the reservoir is not allowed to fall below the tops of the cylinders. The oil thus acts as a seal or packing which effectually prevents air from entering the pumps between the plungers and the bores of the cylinders and hence the atmosphere is also excluded from all the passages and pipes leading from the pumps to the chest plugs. My improved arrangement, while affording this important advantage, at the same time simplifies the construction of the lubricator by dispensing with stuffing boxes at the ends of the pump cylinders.

The use of stuffing boxes at the ends of the shafts F¹, F³ is also avoided by locating the same in the upper portion of the reservoir above the customary oil level, as shown.

The several pump cylinders and sight-chambers are preferably carried by or formed integral with the removable front plate A¹ of the lubricator, as best shown in Figs. 5 and 14, so that said parts are readily applied and removed with the plate. The pump cylinders extend through this plate and their outer ends are closed by screw-plugs, as shown. Upon removing these plugs, convenient access is had to the check valves p , p^1 for repairing or renewing the same.

I do not wish to claim in this application the distributor o^1 in combination with the chest plugs, as the same forms the subject of a separate application filed by me August 28, 1905, Serial No. 276,036; nor the construction of the air motor shown herein as the same is claimed in another application filed August 28, 1905, Serial No. 276,035; nor the chest plug with the plugged vent nipple r^3 , as the same forms the subject of another application filed August 19, 1905, Serial No. 274,832.

I claim as my invention:

1. In a lubricator, the combination of a reservoir, a pump supplied therefrom, a shaft journaled in the body of the lubricator, a rock arm mounted on said shaft and connected with the pump-plunger, a motor having a movable member, and a combined actuating-arm and handle movably attached to said rock-shaft and capable of moving into or out of engagement with the movable member of the motor, substantially as set forth.

2. In a lubricator, the combination of a reservoir, a pump supplied therefrom, a shaft journaled in the body of the lubricator, a rock arm mounted on said shaft and connected with the pump-plunger, a motor having a movable member, a combined actuating-arm and handle movably attached to said rock-shaft and capable of moving into or out of engagement with the movable member of the motor, and a spring tending to hold said handle in engagement with said member, substantially as set forth.

3. In a lubricator, the combination of a reservoir, a pump arranged in the reservoir and supplied therefrom, a rock shaft journaled in the body of the lubricator above the pump, a rock arm mounted on said shaft and connected with the pump-plunger, a motor having a reciprocating member and a combined rock arm and handle pivoted to the end of said shaft to swing lengthwise thereof and adapted to move into or out of engagement with the reciprocating member of the motor, substantially as set forth.

4. In a lubricator, the combination of a reservoir, a pump arranged in the reservoir and supplied therefrom, a rock shaft journaled in the body of the lubricator above the pump, a rock arm mounted on said shaft and connected with the pump-plunger, a motor having a reciprocating member, a combined rock-arm and handle pivoted to the end of said shaft to swing lengthwise thereof and adapted to move into or out of engagement with the reciprocating member of the motor, and a spring connecting said arm with a part of said shaft, substantially as set forth.

5. In a lubricator, the combination of a reservoir, a pump arranged in the reservoir and supplied therefrom, the plunger of the pump extending through the rear end of the pump barrel, a cross head connected with the portion of the pump-plunger outside the barrel and provided at its sides with trunnions, a rock shaft journaled in the body of the lubricator above the pump, a depending arm mounted on said shaft and provided with a bifurcated lower end which engages said trunnions, and means for actuating said shaft, substantially as set forth.

6. In a lubricator, the combination with a pump cylinder and its plunger, of a reservoir inclosing the pump cylinder and having a gage-glass the lower end of which terminates above the top of said cylinder; the plunger, the inlet of the cylinder and the rear end of the cylinder through which the plunger passes being arranged in the lower portion of the reservoir and wholly within the same and said inlet being located in the upper side of the cylinder, whereby said parts are normally submerged by the oil in the reservoir, substantially as set forth.

7. In a lubricator, the combination of a source of supply, a pump-cylinder connected therewith and containing a plunger, means for imparting a uniform stroke to the plunger, and means independent of the plunger for varying the capacity or internal area of the cylinder, substantially as set forth.

8. In a lubricator, the combination of a reservoir, a pump supplied therefrom and having its cylinder provided with an enlargement or extension, a follower arranged in said extension and adapted to recede under the pressure therein, and means for lim-

iting the recession of the follower, substantially as set forth.

9. In a lubricator, the combination of a reservoir, a pump supplied therefrom and having its cylinder provided with an enlargement or extension, a follower arranged in said extension, adjustable means for limiting the outward movement of said follower, and a check valve arranged in the discharge passage of the pump and constructed of greater resistance than that of said follower, substantially as set forth.

10. In a lubricator, the combination of a reservoir, a pump supplied therefrom and having its cylinder provided with an enlargement or extension, a follower arranged in said extension and adapted to recede under the pressure therein, and an adjustable stop arranged opposite the outer end of said follower, substantially as set forth.

11. In a lubricator, the combination of a reservoir, a pump supplied therefrom and having its cylinder provided with an enlargement or extension, a follower arranged in said extension and an adjustable stop rod arranged opposite the outer end of said follower, and a spring-pressed check valve arranged in the discharge passage of the pump, substantially as set forth.

12. In a lubricator, the combination of a reservoir, a pump supplied therefrom and having its cylinder provided with an enlargement or extension, a follower arranged in said extension and adapted to recede under the pressure therein, adjustable means for limiting the outward movement of the follower, a spring pressed check valve arranged in the discharge passage of the pump, and adjusting means for regulating the tension of said valve-spring, substantially as set forth.

13. In a lubricator, the combination of a reservoir, a regulating pump supplied therefrom and having its cylinder provided with an enlargement or extension, a follower arranged in said extension, adjustable means for limiting the recession of the follower, a sight-chamber connected with the discharge passage of said pump and containing a drip-nozzle, a check valve arranged in said discharge passage, and a delivery pump supplied from said sight-chamber, substantially as set forth.

14. In a lubricator, the combination of a reservoir, regulating and delivery pumps arranged horizontally in the lower portion of the reservoir, the cylinder of said regulating pump having an enlargement or extension, a follower arranged in said extension, means for limiting the recession of the follower, a sight-chamber located above the plane of said pumps, there being an ascending passage leading from the discharge end of the cylinder of the regulating pump to the top of the sight chamber, and a passage leading from the bottom of the sight-chamber to the cylin-

der of said delivery pump, substantially as set forth.

15. In a lubricator, the combination of a reservoir having a discharge passage and a priming passage, a pump supplied from the reservoir, and means for connecting said discharge passage with the pump or said priming passage, at will, substantially as set forth.

10 16. In a lubricator, the combination of a reservoir having a discharge passage, a controlling valve arranged in said passage, a pump supplied from the reservoir and connected with the case of said valve, and a priming channel leading from the reservoir to said valve case, the movable member of the valve having ports arranged to connect said discharge passage with the pump in one position of the valve and with the priming channel in another position thereof, substantially as set forth.

17. In a lubricator, the combination of a reservoir having a discharge passage, a controlling valve arranged in said passage and comprising a case and a rotary key or plug, a pump supplied from the reservoir and connected with said valve case, and a priming channel leading from the reservoir to said valve-case, said valve-key having a transverse feed port arranged to connect said discharge passage with the pump in one position of the key and a longitudinal priming port arranged to connect said passage with said priming channel in another position of the key, substantially as set forth.

18. In a lubricator, the combination of a reservoir having a discharge passage and a return or circulating passage, a pump sup-

plied from the reservoir, and means arranged between the pump and discharge passage for connecting the pump with the discharge passage or said return passage, at will, substantially as set forth.

19. In a lubricator, the combination of a reservoir having a discharge passage and a combined priming and return channel, a pump supplied from the reservoir, and a controlling valve having ports arranged to connect the discharge passage either with the pump or the priming and return channel or to connect the pump with the priming and return channel, at will, substantially as set forth.

20. In a lubricator, the combination of a reservoir having a plurality of discharge passages, a controlling valve arranged in said passages and comprising a case and a rotary key or plug, a plurality of pumps supplied from said reservoir and connected with said valve-case, and combined priming and return channels leading from the reservoir to said valve case, said valve-key having transverse ports arranged to connect said discharge passages with their respective pumps in one position of the key and having also a peripheral longitudinal port arranged to connect said priming and return channels either with the discharge passages or the pumps in other positions of the key, substantially as set forth.

Witness my hand this 21st day of August, 1905.

CHARLES W. MANZEL

Witnesses:

C. F. GEYER,

E. M. GRAHAM.