J. HUVERSTUHL.

LUBRICATOR.

APPLICATION FILED OCT. 14, 1909.

969,699. Patented Sept. 6, 1910.

3 SHEETS—SHEET 1.

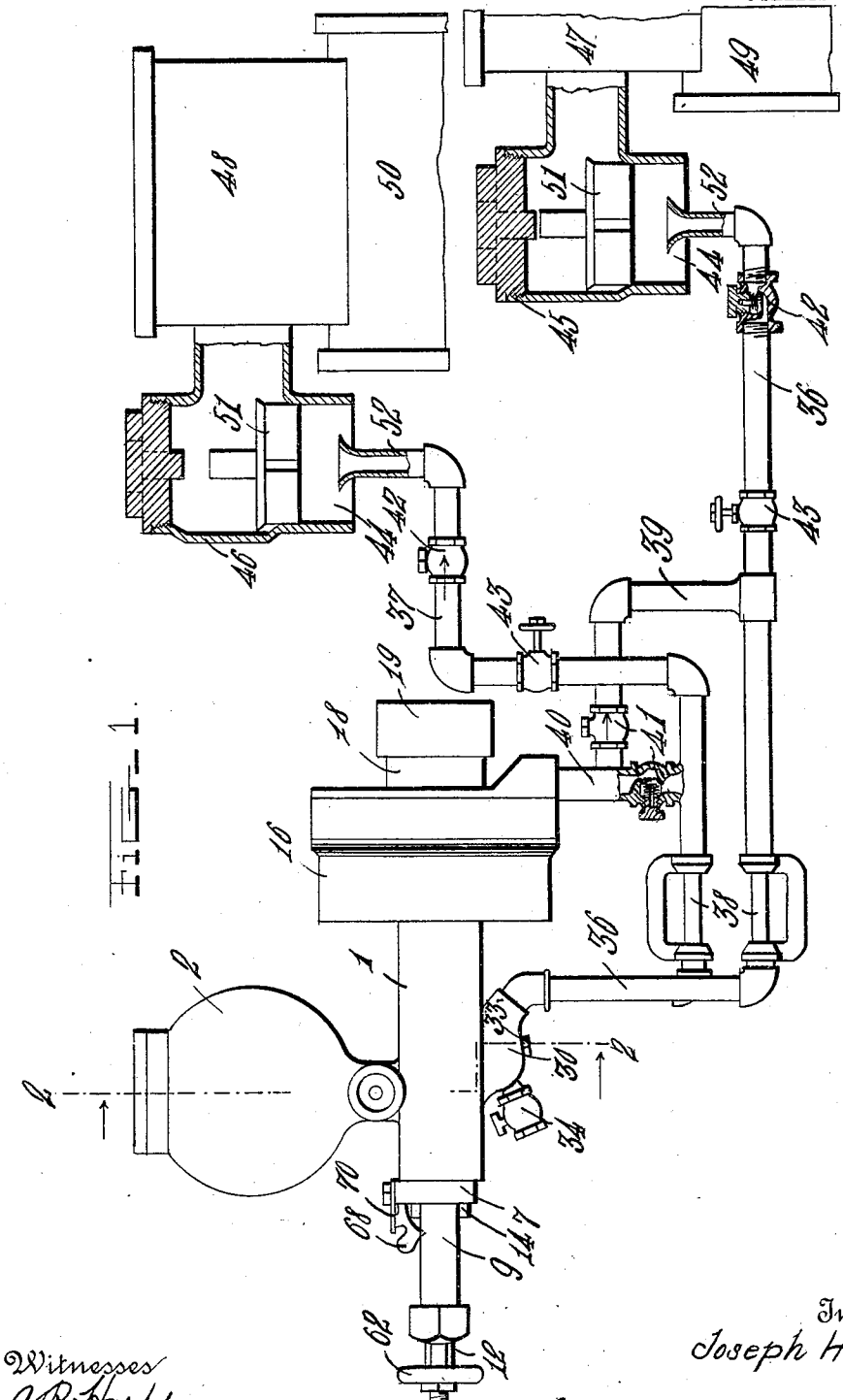

Fig. 1.

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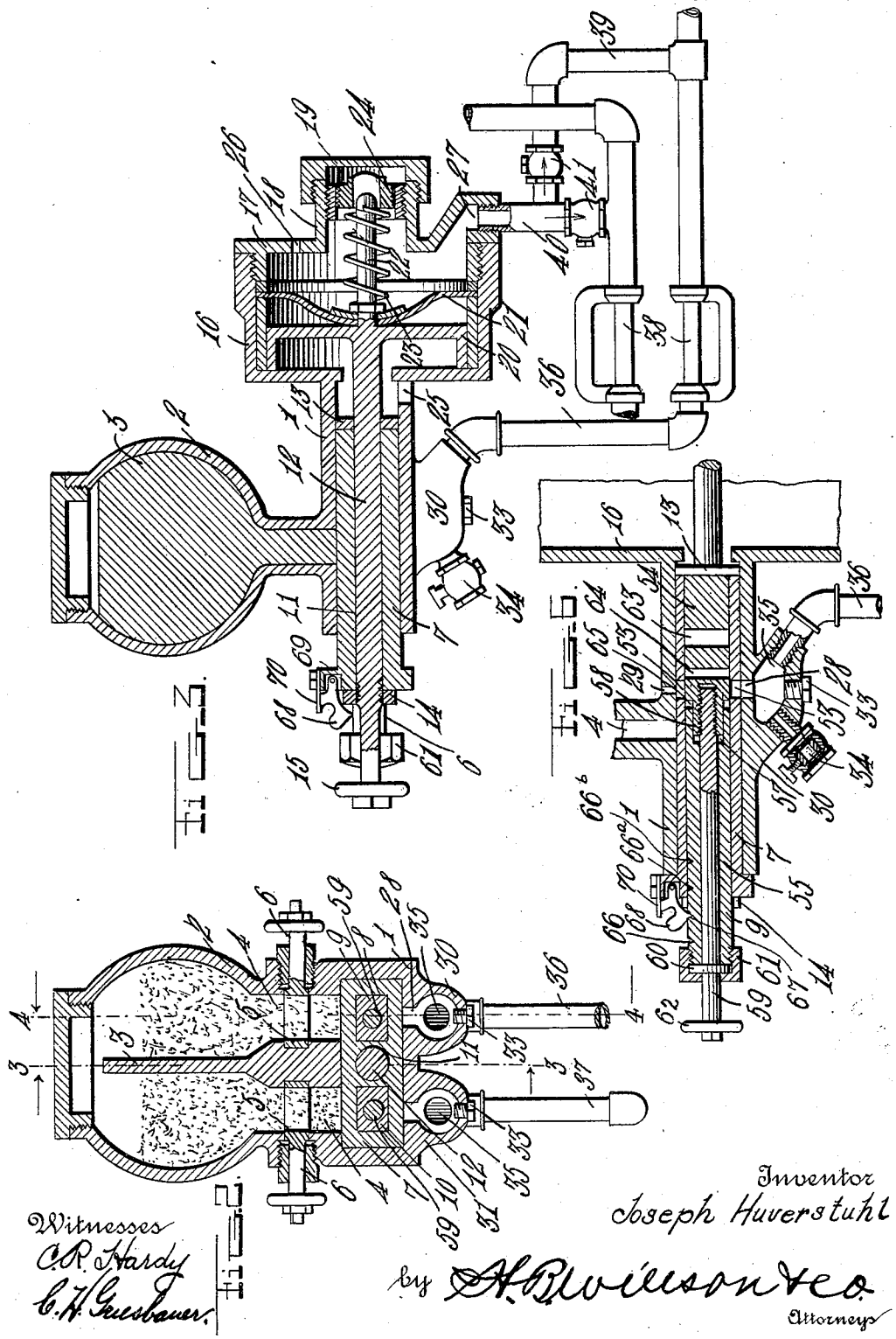

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3 SHEETS—SHEET 3.

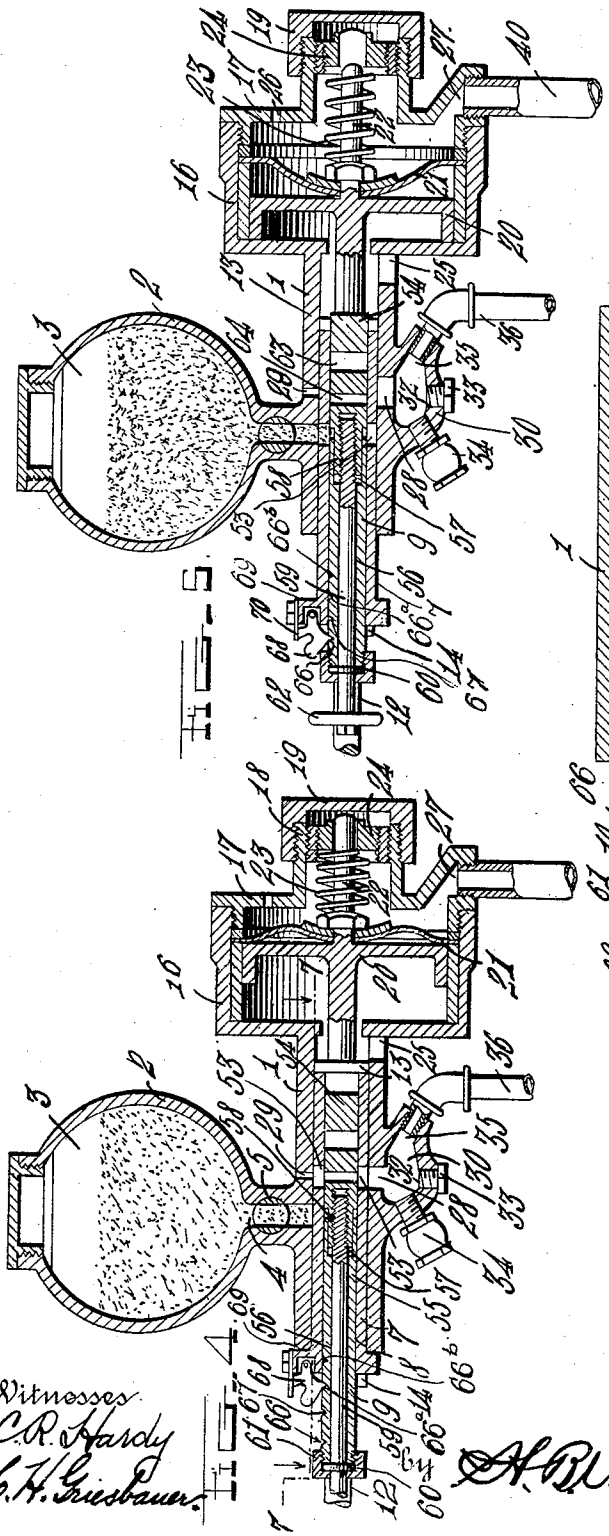

Fig. 5.

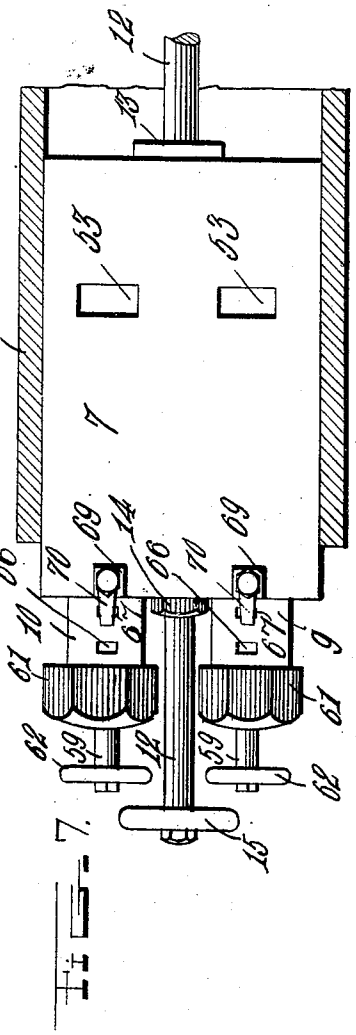

Fig. 7.

Witnesses
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UNITED STATES PATENT OFFICE.

JOSEPH HUVERSTUHL, OF LOS ANGELES, CALIFORNIA.

LUBRICATOR.

969,699. Specification of Letters Patent. Patented Sept. 6, 1910.

Application filed October 14, 1909. Serial No. 522,551.

To all whom it may concern:

Be it known that I, JOSEPH HUVERSTUHL, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Lubricators; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in lubricators.

One object of the invention is to provide a lubricator adapted to be automatically operated by suction caused by vacuum in the steam chest of an engine when the engine is drifting with steam shut off, and vacuum produced in the intake passage of a gas engine or by the vacuum produced in the cylinder of an air pump or any machine producing a vacuum to which the lubricator is applied.

Another object is to provide means whereby the quantity of graphite fed at each operation of the lubricator may be regulated or controlled.

With the foregoing and other objects in view, the invention consists of certain novel features of construction, combination and arrangement of parts, as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a diagrammatic side view of my improved lubricator, showing the same connected with the steam chests of the right and left cylinders of an engine, parts being broken away and in section; Fig. 2 is a vertical cross sectional view through the graphite hopper and feeding mechanism on the line 2—2 of Fig. 1; Fig. 3 is a central vertical longitudinal section through the lubricator on the line 3—3 of Fig. 2, showing the valve operating piston in a retracted position, as when the valve is being charged with graphite from the hopper; Fig. 4 is a vertical longitudinal section taken on a line with one of the feed valves in the main operating valve on the line 4—4 of Fig. 2, and also through the cylinder and valve operating piston, showing the position of the latter when the feed valves are in position to discharge their charges of graphite; Fig. 5 is a similar view, showing the position of the valve and piston when the feed valves are receiving a charge of graphite; Fig. 6 is a detail longitudinal section of a portion of the hopper and valve casing, showing the position of the valve when adjusted to an inoperative position; Fig. 7 is a detail horizontal sectional view through the main valve casing on the line 7—7 of Fig. 4, showing a plan view of the main discharge or operating valve.

In the embodiment of the invention, I provide a main valve casing 1, which may be secured to an engine in any suitable manner and at any desired position. The casing 1 is preferably of a flat oblong or rectangular shape and has arranged on its upper side a hopper 2 which is adapted to contain graphite or other suitable lubricating material. The hopper 2 is preferably provided with a central longitudinally disposed partition 3, which divides the hopper into two compartments, each of which is provided with a separate discharge passage 4. The passages 4 are provided with discharge valves 5, the stems 6 of which project through the opposite sides of the hopper whereby the valves may be turned to open or close the passages 4. The passages 4 open through the valve casing 1 to permit the discharge of the graphite or lubricating material from the hopper to the feeding mechanism.

Slidably mounted in the valve casing 1 is a main discharge valve 7 which is preferably in the form of a flat oblong or rectangular block and has formed therein on opposite sides of its center longitudinally disposed passages 8 in which are slidably mounted right and left feed valves 9 and 10. The valve 7 is provided with a central longitudinally disposed bore or passage 11 in which is arranged a stem 12 having near its inner end a flange or collar 13 which bears against the inner end of the valve. The stem 12 is threaded adjacent to its outer end and on said threaded portion is screwed a jam nut 14 by means of which and the collar 13 the stem is securely fastened to the valve. The outer end of the stem projects beyond the outer end of the valve and forms a handle 15 by means of which the valve may be manually adjusted.

On the inner end of the valve casing 1 is arranged an air cylinder 16, the outer end of which is closed by a head 17, as shown. The head is provided with a tubular extension 18, on the outer end of which

is screwed a cap 19. In the cylinder 16 and secured to the stem of the valve 7 is a piston 20 which operates in the cylinder to automatically move the valve 7, as will be hereinafter described. On the outer portion of the cylinder 16 between the piston and the cylinder head 17, is a flexible diaphragm 21 which is secured at its center to the piston, as shown. The stem 12 extends beyond the piston 20 and projects into the extension 18 of the cylinder head, as shown at 22, and around said extended end 22 of the valve stem is arranged a coil spring 23, one end of which is secured to the extension 22 of the valve stem adjacent to the outer side of the piston 20, while the opposite end is engaged with a tension nut 24, which is screwed into the interiorly threaded extension 18 of the cylinder head. The valve casing 1 is provided with an air port 25 through which air enters and passes into the cylinder 16 on one side of the piston 20. In the cylinder head 17 is also formed an air vent or passage 26, through which air passes to the cylinder on the opposite side of the piston and acts on the diaphragm 21. The cylinder head is further provided with an air suction port 27 with which is adapted to be connected air suction pipes hereinafter described.

In the lower side of the valve casing 1 back or to one side of the passages 4, are formed graphite discharge passages 28 and in the upper side of the valve casing 1, immediately above the passages 28, are formed air inlet passages 29. The passages 28 in the lower side of the valve casing communicate with graphite chambers 30 and 31 arranged on the lower side of the valve casing or below the feed valves 9 and 10. The chambers 30 and 31 have formed in their lower side clean-out ports 32 which are normally closed by screw plugs 33. In one side of the chambers 30 and 31 are arranged small air cocks 34 by means of which atmospheric pressure is admitted to the chambers 30 and 31. The chambers 30 and 31 are further provided with graphite discharge passages 35 with which are connected right and left hand graphite discharging and suction pipes 36 and 37, in which, at suitable points, are arranged sight feed glasses 38. The pipes 36 and 37 are connected by branch pipes 39 and 40 with the air port 27 of the cylinder head 17. In the branch pipes 39 and 40 are arranged check valves 41 which operate in the direction of the arrows shown on the drawings, and are provided to prevent the graphite passing through the pipes 36 and 37 from entering through the branch pipes 39 and 40 to the cylinder 16. In the pipes 36 and 37 are also arranged check valves 42 which open in the direction of the arrows shown thereon and are provided to prevent the air pressure from backing up in the pipes 36 and 37, as will be more fully described. The pipes 36 and 37 are also provided with cut-out valves 43 which are adapted to be closed to stop the operation of one or both sides of the feeding mechanism, should either of the check valves fail to operate or for any cause that would necessitate the cutting off of one side or the other of the lubricator.

The discharge ends of the pipes 36 and 37 can be connected directly with the steam chests or with the air inlet passages 44 of the relief valve casings 45 and 46 of the right and left hand steam chests 47 and 48 of the engine cylinders 49 and 50 as shown. In the relief valve casings 45 and 46 are arranged the usual or any suitable form of relief valves 51. The ends of the pipes 36 and 37 which enter the inlet passages 44 of the valve casings 45 and 46 are provided with outwardly flaring or cone-shaped discharge nozzles 52 which are provided to reduce the size of the passages 44 in order that suction will occur in the discharge pipes 36 and 37 on the reciprocation of the pistons in the cylinders when the engine is drifting with steam cut off, to draw the graphite therethrough and into the steam chests and cylinders, as will be hereinafter more fully described.

The main valve 7 is provided near one end with upper and lower alined feed ports 53 which are adapted to be brought into alinement with the discharge passages 4 in the hopper and upper side of the valve casing 1 and with the discharge passages 28, in the lower side of the valve casing which communicate with the chambers 30. The feed valves 9 and 10 which are slidably mounted in the passages 8 of the main discharge valve 7 are preferably formed in two adjustably connected sections 54 and 55. The outer sections 55 of the valves are provided with central longitudinally disposed cylindrical bores or passages 56 which terminate at their inner ends in sockets 57. The adjacent ends of the inner sections 54 of the valves are provided with reduced tubular interiorly threaded extensions 58 which are slidably engaged with the sockets 57 formed in the adjacent ends of the outer sections of the valves as shown.

In the bores or passages 56 of the outer sections of the valves, are arranged adjusting bolts 59, the threaded inner ends of which are adapted to screw into the threaded extensions 58 of the inner sections of the valves, whereby when said bolts are turned in one direction or the other, the inner sections of the valves will be adjusted toward or from the inner ends of the outer sections. The adjusting bolts 59 are provided, adjacent to their outer ends, with annular flanges or collars 60 which bear against the outer ends of the outer sections of the valves

and on said outer ends, around the bolts, are screwed cap nuts 61 which engage the collars 60 and thereby revolubly hold the bolts in place. On the outer ends of the adjusting bolts are arranged operating wheels or handles 62.

The inner sections 54 of the valves 9 and 10 are provided with transversely disposed feed passages or pockets 63 and 64, which are of different sizes whereby a greater or less amount of graphite may be fed therethrough. The space between the meeting ends of the inner and outer sections of the valves also forms a feed passage or pocket 65, the size of which may be regulated by adjusting the sections of the valves by means of the adjusting bolts 59, as hereinbefore described. By moving the valves 9 and 10 to bring one or the other of the passages 63, 64 or 65 into alinement with the passages 53 in the main discharge valve, a greater or less quantity of graphite may be fed through the passage 5 from the hopper to the chambers 30 and 31.

In order to hold the valves 9 and 10 in their adjusted positions in the passages 8, I provide the outer portions of the valves with a series of notches 66, 66^a and 66^b which correspond with the passages 63, 64 and 65. I also provide the valves with a notch 67 and with said notches 66, 66^a, 66^b and 67 are adapted to be engaged pawls 68 which are pivotally mounted in bearing lugs 69 formed on the upper side of the outer end of the main valve over each of the passages 8 therein. The pawls 68 are held in engagement with the notches 66, 66^a and 66^b and 67 by springs 70.

When the valves are adjusted in the passages 8 to bring the notches 67 opposite the pawls 68, none of the feed passages 63, 64 or 65 will be in alinement with the passages 53 and said passages will be closed by a solid portion of the valves, thus preventing the feeding of the graphite (see Fig. 6). By this construction and arrangement of feed valves, it will be seen that the valves may be independently adjusted so that the lubricator may be caused to feed a greater or less or the same quantity of graphite from the opposite sides of the hopper or that either or both of the valves may be adjusted to inoperative or closed position.

When the valves are adjusted in the passages 8 to bring the notches 66 into engagement with the pawls 68, the adjustable pockets 65 will register with the passages 53 as shown in Fig. 5. When the feeding valves 9 and 10 are adjusted to cause the pawls 68 to engage the notches 66^a, the pockets 64 will be caused to register with the passages 53, as shown in Fig. 4. When the valves are adjusted to cause the pawls 68 to engage the notches 66^b, the pockets 63 will be caused to register with the passages 53.

In the operation of the device, when a vacuum is produced in the steam chests of the engine, the relief valves will be raised and a suction created in the discharge pipes 36 and 37 and the air drawn out of the outer portion of the cylinder 16 which will cause the piston to move forwardly by reason of the pressure of air entering the cylinder through the port 25 on the opposite side of the piston, thereby shifting the main valve to a position where the passages 53 therein will be opposite to or in alinement with the air passages 29 and the discharge passages 28 in the valve casing, at which time, the air will enter the passages 29 and force the graphite contained in the pockets or passages in the feed valves out through the discharge passages 28 and into chambers 30, where the graphite will be acted on by atmospheric pressure entering the chambers through the cocks 34, thereby forcing the graphite into the pipes 36 and 37 through which it is drawn by suction to the steam chests and cylinders of the engine to lubricate the valves and pistons therein. The various check valves arranged in the pipes 36 and 37 prevent the return of the graphite or the backing up of the air or the entrance of steam into the pipes from the steam chests. When the vacuum is broken in the discharge pipes 36 and 37, the check valves therein will immediately close and air will enter the inlet port 26 in the outer portion of the cylinder 16 and when the air pressure in this side of the cylinder equals the air pressure on the opposite side of the piston, the spring 23 will force the piston back in the cylinder thereby moving the main discharge valve to bring the passages 53 and the alined passages or pockets of the feed valves opposite to or in alinement with the feed passages 4 of the hopper thus permitting a fresh charge of graphite to enter the passages 53 and pockets of the valves, so that when the piston is again operated by the suction in the discharge pipes, the valves will be brought to a position to discharge the graphite from the pocket and passages therein, as hereinbefore described.

From the foregoing description, taken in connection with the accompanying drawings, the construction and operation of the invention will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of the invention, as defined in the appended claims.

Having thus described my invention, what I claim is:

1. In a lubricator of the class described, a valve casing having lubricant supply and discharge passages, a main discharge valve

in said casing, said valve having feed ports formed therein and adapted to be brought into alinement with the passages in said casing, adjustable feed valves in said main valve, said feed valves having formed therein lubricant pockets of different sizes, and means to adjust said feed valves to bring one or the other of the pockets therein into alinement with the feed ports in said main valve.

2. In a lubricator of the class described, a valve casing having lubricant supply and discharge passages, a main discharge valve in said casing, said valve having feed ports formed therein and adapted to be brought into alinement with the passages in said casing, adjustable feed valves in said main valve, each of said feed valves being constructed in adjustably connected sections and having formed therein lubricant pockets of different sizes, one of which is adjustable and formed by the space between the adjacent inner ends of the sections of the valve, and means whereby said feed valves are held in adjustable positions in said main valve.

3. In a lubricator of the class described, a main valve casing having lubricant supply and discharge passages and an air port, a lubricant hopper arranged on and connecting with the supply passages in said casing, cut-off valves arranged in said hopper, lubricant chambers on said casing and connecting with the discharge passages therein, a main discharge valve in said casing, feed valves slidably mounted in said main valve, said feed valves being formed in adjustably connected sections and having formed therein lubricant pockets of different sizes, adjusting bolts arranged in said sections of the feed valves whereby the size of one of said pockets may be increased or diminished, air cocks arranged on said lubricant chambers, and combined suction and lubricant discharge pipes connected to said chambers.

4. In a lubricator of the class described, a valve casing having lubricant supply and discharge passages and an air inlet, a main discharge valve in said casing, said valve having lubricant feed ports adapted to be brought opposite to the supply and discharge passages in said casing, feed valves adjustably mounted in said main valve, said valves having lubricant pockets formed therein and adapted to be brought into alinement with the feed ports in said main valve, discharge pipes connected to the discharge passages in said main valve casing, pressure controlled operating mechanism connected to said main valve and discharge pipes, and means whereby a suction is created in said pipes.

5. In a lubricator of the class described, a hopper adapted to contain lubricating material, a main discharge valve, adjustable feed valves arranged in said main valve, and an automatic pressure controlled valve operating mechanism adapted to shift said main discharge valve and said feed valves into position to receive a charge of lubricating material from said hopper and to a position whereby the lubricating material is discharged from the valve.

6. In a lubricator of the class described, a hopper adapted to contain lubricating material, a main valve casing connected to said hopper, discharge pipes connected with said valve casing, a main discharge valve slidably mounted in said valve casing, said valve having formed therein alined ports or passages, feed valves adjustably mounted in said main valve, said feed valves having formed therein a series of pockets adapted to receive lubricating material from said hopper, a pressure controlled valve operating mechanism, and means whereby a suction is created in said discharge pipes to actuate said valve operating mechanism and to draw the lubricating material from the pockets in said feed valves and through said pipes.

7. In a lubricator of the class described, a main valve casing having formed therein lubricant supply and discharge passages and an air inlet port, a main discharge valve in said casing, said valve having lubricant feed ports, adjustable feed valves arranged in said main valve, an air cylinder having air inlet and discharge ports, a piston connected to said main valve and operable in said cylinder, combined suction and lubricant discharge pipes connected to said cylinder whereby air is exhausted therefrom on one side of said piston to permit the same to be operated in one direction by air pressure in the cylinder on the opposite side of the piston thereby shifting said main valve to a position for discharging lubricant, and a spring to force said piston in the opposite direction whereby said valve is shifted to a position to receive lubricant.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOSEPH HUVERSTUHL.

Witnesses:
B. W. Brown,
E. L. Farmer.