L. O. T. THOMPSON.
FEEDING DEVICE FOR VAPOR BURNERS.
APPLICATION FILED SEPT. 17, 1908.

952,770.

Patented Mar. 22, 1910.

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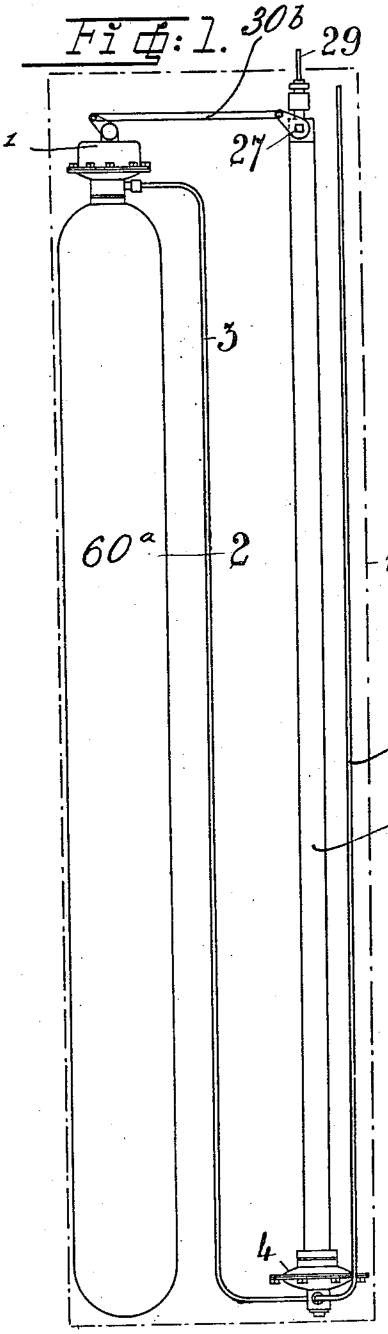

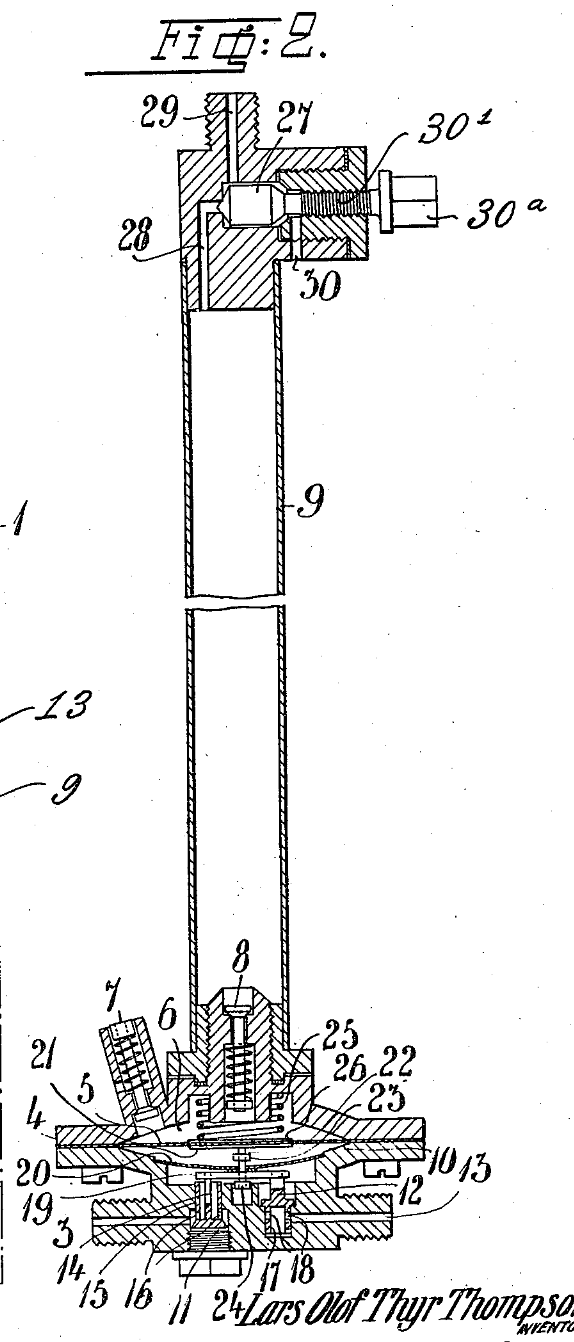

WITNESSES
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2 SHEETS—SHEET 2.

Fig: 3.

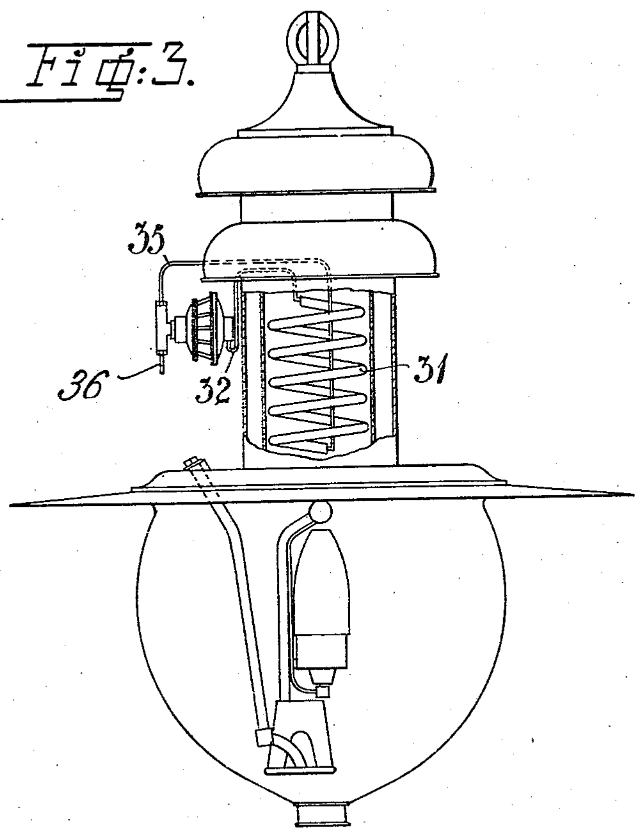
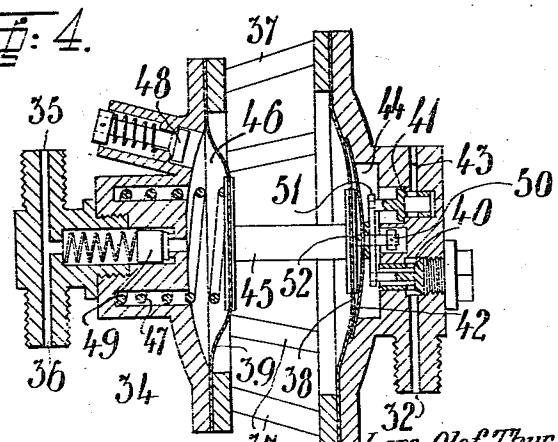


Fig: 4.



WITNESSES

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INVENTOR.

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UNITED STATES PATENT OFFICE.

LARS OLOF THYR THOMPSON, OF STOCKHOLM, SWEDEN, ASSIGNOR OF ONE-HALF TO FRITIOF LUDVIG AHLSELL, OF STOCKHOLM, SWEDEN.

FEEDING DEVICE FOR VAPOR-BURNERS.

952,770. Specification of Letters Patent. Patented Mar. 22, 1910.

Application filed September 17, 1908. Serial No. 453,495.

To all whom it may concern:

Be it known that I, Lars Olof Thyr Thompson, a citizen of the Kingdom of Sweden, residing at Stockholm, Sweden, have invented a new and useful Improvement in Feeding Devices for Vapor-Burners, of which the following is a specification.

This invention relates to devices for feeding vapor burners and particularly to the means employed for supplying a burning mixture in the form of a fluid or liquid to vapor burners of any character, as for instance, illuminating burners or lamps, stoves, or the like used for heating purposes and it may also be employed to advantage for pumping air, carbureting and like purposes.

The principal object of the invention is to provide means for continuously pumping the combustible fluid to the burner at minimum expense and to provide a pumping means which may be readily controlled for the purpose of starting or stopping the flow of fluid as required.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel details of construction and arrangement of parts as will be more fully hereinafter described, illustrated in the accompanying drawings, and more particularly pointed out in the appended claims, it being understood that various changes in the form, proportion, size and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings:—Figure 1 is a front elevation of the feeding device constructed in accordance with the invention. Fig. 2 is a sectional elevation of the feeding pump drawn to an enlarged scale. Fig. 3 is a detail elevation illustrating a slightly modified structure. Fig. 4 is a sectional view of the pumping device shown in Fig. 3.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The receptacle 1 indicated by dotted lines in Fig. 1 is intended to hold the combustible fluid and arranged within or at a short distance from the receptacle is a pressure tank 2 which may contain any suitable fluid under pressure, such for instance as carbonic-acid gas. At the upper portion or discharge end of the tank is placed a controlling valve 2′ which when the gas or other operating fluid is under very heavy pressure may be made in the form of a reducing valve. In the lower portion of the receptacle is arranged a pump 4 that is connected to the tank 2 by means of a supply tube 3 and from the pump leads an exhaust pipe 13 through which the operating fluid may be discharged at any suitable point. The casing of the pump 4 is formed of two main sections having suitable bolting flanges between which is clamped the edge of a diaphragm or membrane 5 that may be formed of any suitable flexible material, said diaphragm serving to divide the interior of the pump casing into an upper chamber 6 and a lower chamber 10. The upper chamber is provided with an inwardly opening automatic valve 7 which is moved to open position when the diaphragm descends in order to permit the inflow of the combustible fluid from the receptacle 1 and leading from the upper portion of the casing is a discharge port under the control of an outwardly opening automatic valve 8 through which the combustible fluid passes into a chamber 9 which is of sufficient cubic content to form an equalizing chamber, this tube 9 being connected to the vapor burner or other point of consumption in the manner hereinafter described. The lower chamber 10 of the pump is in communication with the supply tube 3 through a port that is under the control of a cylindrical valve 11, said valve having a cylindrical portion 15 from which leads a stem 14 that is connected to an upper cross bar 19 within the chamber 10 and the lower portion of the cylinder 15 is provided with an opening 16 by which the interior of the chamber 10 is placed in communication with the inlet tube 3 when the valve is in its lowermost position, as shown in Fig. 2. When the valve is moved upward communication with the inlet tube is cut off. The chamber 10 also communicates with the discharge 13 through a port that is under the control of a valve 12 having an upwardly extending stem that is also connected to the cross bar 19. The valve 12 is in the form of a cylinder 17 closed at its upper end but open at its lower end, and is provided with side openings 18 which when the valve is in its uppermost position communicates with the chamber 10 but when the valve moves downward these openings are closed as shown in Fig. 2.

Arranged in suitable seats formed in the lower chamber 10 are the opposite ends of a bowed spring 20 and above the spring is a rigid disk 21 firmly secured to the lower face of the diaphragm and from which depends a rod 22 that passes freely through alined openings in the cross bar 19 and spring 20 and is provided with a pair of fixed collars 23 and 24 the collar 23 being disposed above the central portion of the spring and the collar 24 below the lower face of the cross bar. When the diaphragm moves upward under the pressure of fluid entering through the tube 3 the spring will be flattened and forced upward until its central portion is curved above the horizontal plane of its opposite ends whereupon the spring will arch upward to its full extent and by engagement with the collar 23 will carry the cross piece and the two valves upward, thus suddenly closing the inlet valve and opening the discharge valve. Secured to the upper face of the diaphragm is a disk 26 against which bears a helical compression spring 25 that serves to force the diaphragm down to its lowermost position when the discharge valve is open. This spring, however, has not sufficient resistance to prevent the upward stroke of the diaphragm under the pressure of fluid entering through the tube 3 and it is only after the inlet valve has been closed and the exhaust valve opened that the expansion of the spring can force the diaphragm down and thus effect the discharge of operating fluid through the tube 3. During this downward movement the spring 20 will be bowed in the opposite direction and restored to its initial position carrying with it the two valves so as to open the inlet valve and close the discharge valve thus permitting a second pumping operation. During the downward movement of the diaphragm the combustible fluid which enters through the port 7 will accumulate in the upper chamber 6 of the pump, while the valve 8 will remain closed. On the up stroke of the diaphragm the valve 7 will be automatically closed and the charge of fluid will be pumped up into the equalizing tube 9. At the top of the equalizing tube is a casing containing a tubular valve 27 that is arranged to control three ports 28, 29 and 30 the valve being arranged to close against conical seats and being provided with a threaded stem 30′ having a non-circular shank or head 30^a. When the valve is in the position shown in Fig. 2 the combustible fluid which enters the tube 9 cannot pass through the port 20 and thence outward through port 29 to the point of consumption while it is to be noted that the port 29 is in free communication with the return port 30 so that any fluid which has been pumped into the tube 29 may return by gravity from the tube 29 and flow through the port 30 into the original receptacle 1. When the valve is moved to the other position the return port 30 is closed and the supply port 28 is placed in communication with the tube 29 which leads to the vapor lamp or other point of consumption. On the shank 30^a is secured a rocker arm which is connected by a link 30^b to a similar rocker arm on the valve 2′ at the top of the pressure tank 2 and these arms are so relatively positioned that when the valve 27 is moved to the position shown in Fig. 2 the supply of fluid under pressure through the pipe 3 to the pump will be cut off and when the main valve is moved to the other position the valve 2′ will be opened and actuating fluid may then flow freely to the pump.

In the construction shown in Figs. 3 and 4 is shown a somewhat more economical arrangement where air is used for pumping purposes, the necessary pressure being secured by raising the temperature of the air and thus increasing its pressure. Arranged above the burner of the lamp is an air heater which may be of any desired construction but in the present instance is shown in the form of a helically wound tube arranged with its axis in a vertical plane and from the upper end of this heater passes a tube 32 which leads to the pumping mechanism for the purpose of supplying the necessary operating fluid under pressure thereto. The pumping mechanism in this instance comprises a pump 34 and a pump actuating motor 33 the air under pressure being supplied to the motor through the tube 32 as before described and the air supplied to the heater being fed by the pump through a tube 35. Also leading from the pump is a tube 36 which leads to a secondary pump preferably of the type shown in Fig. 2 for the purpose of supplying the fluid pressure necessary for the operation of the feeding mechanism by which the fluid combustible is supplied to the lamp. The heated air under pressure enters through the port 32 to the main valve of the motor 33 and there acts upon the diaphragm 38 of the motor. The inlet port is under the control of a valve 40 and the exhaust port 43 is under the control of a discharge valve 44 these two valves corresponding in structure and operation to the inlet and exhaust valves of the pump previously described. The stems of the two valves are connected to a cross bar 51 which is operated by a stem 52 having a collar 50 and arranged below the diaphragm is a bow spring 42 which operates in the manner previously described. The pump proper is provided with a single chamber 46 and its diaphragm 39 is connected to the similar diaphragm 38 of the motor by means of a rod 45 the constructions of the two diaphragms being similar except that the diaphragm 38 is preferably of greater area than the diaphragm 39. Arranged within the pump chamber is a spring 47 that tends to resist the movement of the diaphragm of the motor and the spaced casings of the motor and pump are held in proper relative position by connecting arms or rods 37. The pump is provided with an inlet port under the control of an inwardly opening automatic valve 48 and air is allowed to enter the pump chamber when the diaphragm moves in the direction of the motor diaphragm. When the diaphragm moves in the opposite direction the air is forced out from chamber 46 through a discharge port that is under the control of an outwardly opening automatic valve 49. This stream of air divides, a portion passing through the tube 35 to the lower end of the helical heater while another portion passes through the tube 36 to operate the pump by which the combustible fluid is forced to the vapor lamp or other point of consumption.

The mechanism shown in Figs. 3 and 4 operates in the following manner. The pump serves the motor in much the same way as a feed pump does a steam engine as it feeds the driving fluid, that is, the air, through the helical heater 31 where its temperature is raised and pressure is created so that it can operate the motor. When the motor is set in operation the heated air enters by way of valve 40 to the main valve of the motor and forces out diaphragm 38 thereby effecting closing movement of valve 40 and opening movement of valve 41. This movement being transmitted to the diaphragm 39 of the pump to the rod 35 will compress the spring 47 and any air then in chamber 46 of the pump will be forced out through the discharge passage and through the tubes 35 and 36 while the valve 48 will be closed. When the discharge valve 41 of the motor is open the spring 47 can act to return parts to the initial position.

In practice any air, gas or other fluid or liquid under pressure may be employed as an operating means and the construction of the pump may be varied or it may be worked directly or indirectly from any suitable source of power.

What is claimed is:—

1. In a fluid-pressure actuated diaphragm pump, a casing, a diaphragm, inlet and discharge valves for the operating fluid, a valve operating rod carried by the diaphragm, and a bowed spring arranged to act on the rod near the limits of movements of the latter in both directions to effect quick positive shifting of the valves.

2. In a fluid-pressure actuated diaphragm pump, a casing, a diaphragm therein, inlet and discharge valves for the operating fluid, a rod having a loose connection with the valves, and a bowed spring connected to the rod and arranged to be flexed first in one direction and then in the other direction near the opposite ends of the diaphragm travel to effect quick positive shifting of the valves.

3. In a fluid-pressure actuated diaphragm pump, a casing, a diaphragm arranged therein, inlet and discharge valves for the actuating fluid, a cross bar connecting said valves and provided with a central opening, a pair of fixed collars on said rods, and a bowed spring also having an opening for the passage of the rod, the opposite ends of said spring being seated in the casing, said spring serving to effect quick shifting of the valves near the completion of the movement of the diaphragm in both directions.

4. In a fluid-pressure actuated diaphragm pump, a casing, a diaphragm arranged therein, inlet and discharge valves for the operating fluid, a cross bar connecting the stems of said valves and provided with a central opening, a rod carried by the diaphragm and extending through the opening in the cross bar said rod having a pair of spaced collars thereon, and a bowed spring also having an opening for the passage of the rod, and the casing having seats for the opposite ends of the spring, the seats being arranged a distance from each other less than the length of the spring to thereby insure bowing of the same in opposite directions near the completion of the movement of the diaphragm in opposite directions.

5. In apparatus of the class described, a pump, a supply tank arranged to contain a fluid under pressure for operating said pump, a valve in the connection between the tank and pump, a valve casing connected to the pump and provided with an inlet port in communication with the pump, a discharge port leading to the point of consumption, and a return port, a double ended valve arranged in the casing and controlling the three ports, a threaded stem carrying said valve, crank arms on the two valves, and a connecting link between the two crank arms.

6. A device of the class described including a casing, a diaphragm mounted therein and subdividing the interior of the casing into non-communicating compartments, valved fuel inlet and outlet openings in one of said compartments, ports for directing fluid under pressure to and from the other compartment, simultaneously shiftable valves within said ports, a stem projecting from the diaphragm and movably engaging the connection between the pressure-controlling valves within the ports, a bowed spring within the pressure compartment and movable with the valves, and means upon the diaphragm rod for

shifting the spring to active position, said spring when active, constituting means for suddenly shifting the valves within the ports.

7. A device of the class described including a casing, a diaphragm secured to the casing and forming a fuel compartment and a pressure compartment, a valved fuel inlet opening into the fuel compartment, a valved fuel outlet opening from said compartment, ports for directing fluid under pressure into and out of the pressure compartment, valves for controlling the passage of fluid through said ports, a connection between the valves, a stem projecting from the diaphragm and loosely engaging said connection, said stem having means for alternately engaging said connection to shift the valves, a bowed spring within the pressure compartment and loosely engaging the said stem, said spring being shiftable by the stem into active position to automatically shift the valves in the ports, and a spring within the fuel compartment and bearing upon the diaphragm.

8. A pump of the class described including a main structure, a fluid actuated element mounted therein, inlet and discharge valves for the operating fluid, a valve operating rod carried by said element, and a bowed spring arranged to act on the rod near the limit of movement of the latter in both directions to effect quick positive shifting of the valves.

9. In apparatus of the class described, a pump, a supply tank arranged to contain a fluid under pressure for operating said pump, a valve in the connection between the tank and pump, a valve casing connected to the pump and provided with an inlet port in communication with the pump, a discharge port leading to the point of combustion, a return port, a double ended valve in the casing and controlling the three ports, and means for transmitting motion from one to the other of said valves.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

LARS OLOF THYR THOMPSON.

Witnesses:

J. F. A. RUTBÄCK,

HJALMAR ZETTERSTRÖM.