No. 650,064. Patented May 22, 1900.

A. KITSON.

SYSTEM OF LIQUID DISTRIBUTION.

(Application filed Nov. 14, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

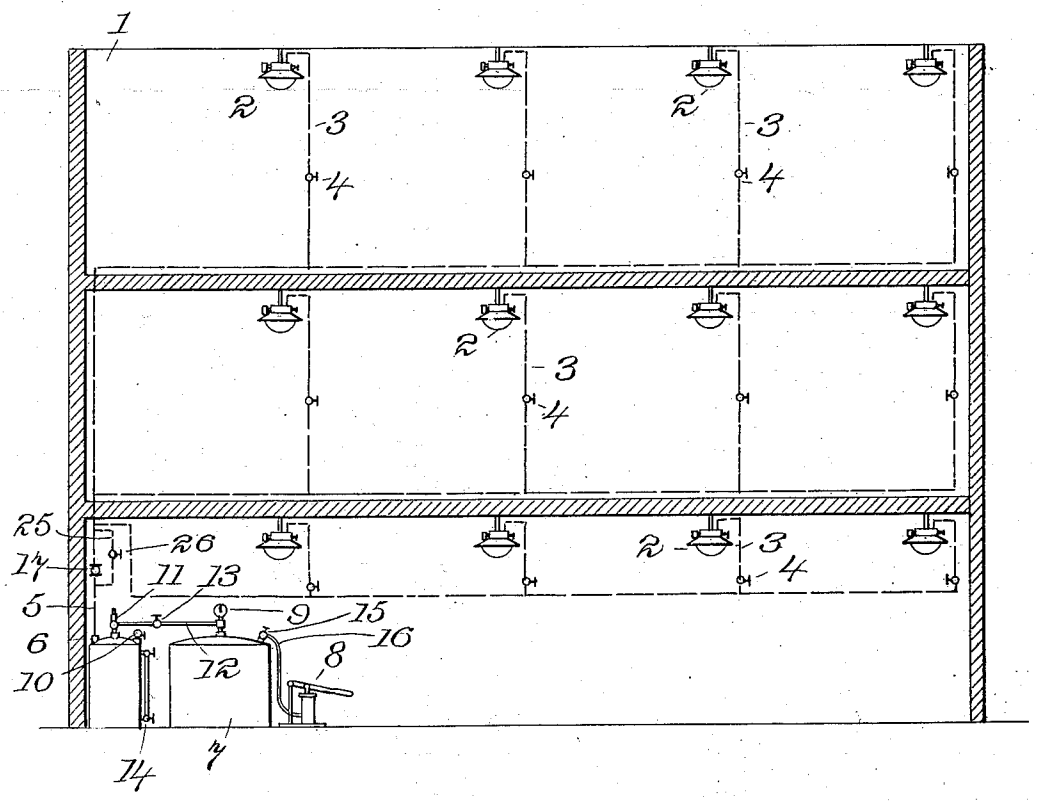
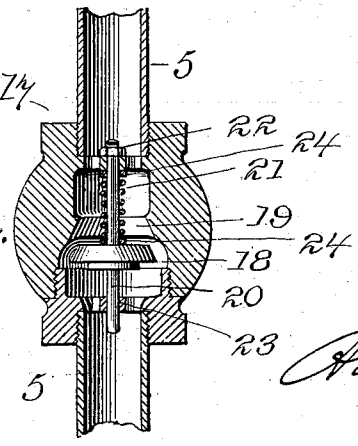


Fig. 2.



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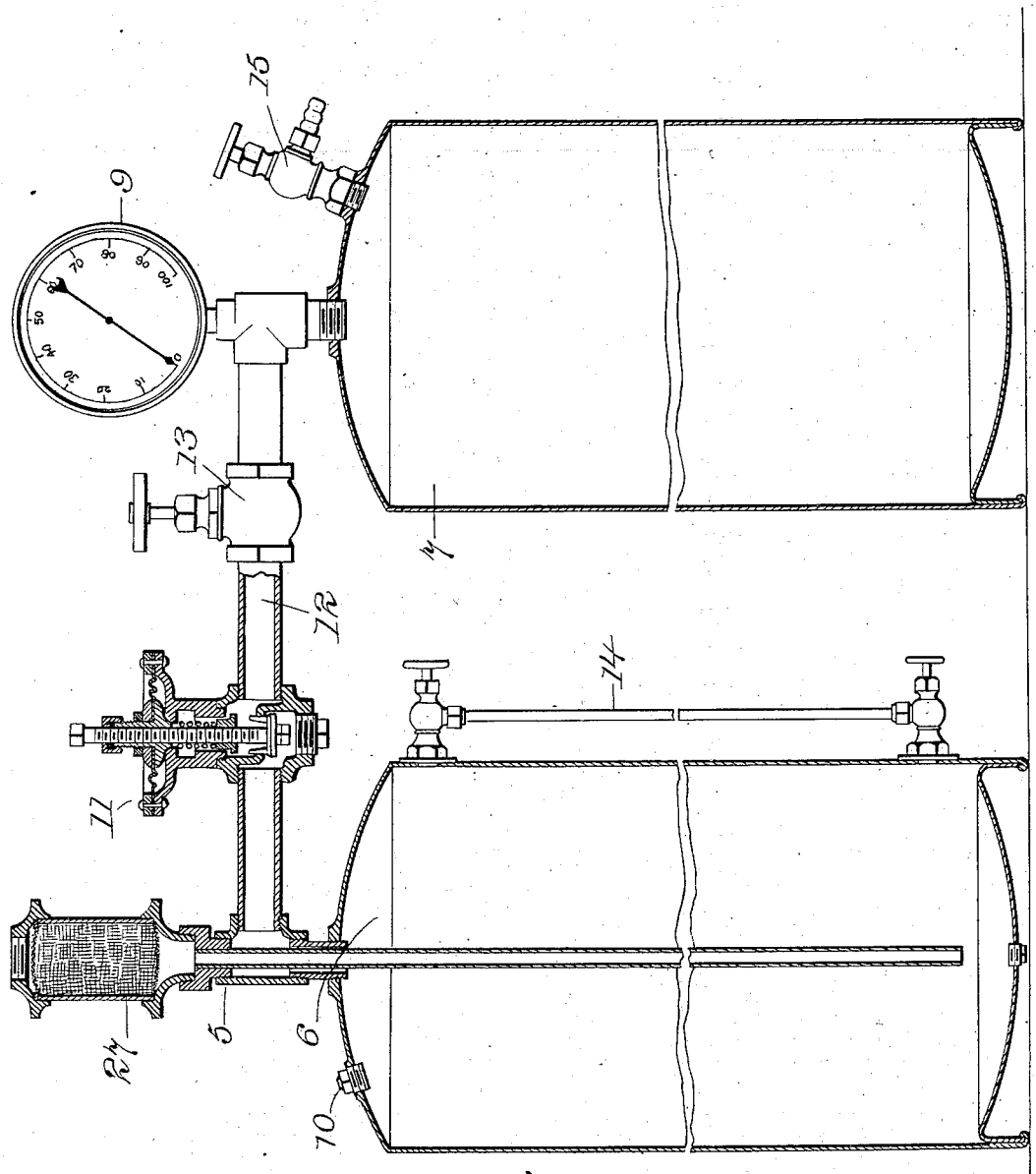


Fig. 3.

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UNITED STATES PATENT OFFICE.

ARTHUR KITSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE KITSON HYDROCARBON HEATING AND INCANDESCENT LIGHTING COMPANY, OF SAME PLACE AND CHARLESTON, WEST VIRGINIA.

SYSTEM OF LIQUID DISTRIBUTION.

SPECIFICATION forming part of Letters Patent No. 650,064, dated May 22, 1900.

Application filed November 14, 1898. Serial No. 696,465. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR KITSON, a subject of the Queen of Great Britain, and a resident of Philadelphia, county of Philadelphia, Commonwealth of Pennsylvania, have invented certain new and useful Improvements in Systems of Liquid Distribution, (Case S,) of which the following is a specification.

My invention relates to systems for distributing liquids under pressure, and is more specifically designed to produce a safe and convenient system for distributing oil under pressure to a large number of lamps, stoves, or other devices consuming oil.

The objects to be attained in a successful system consist, first, of an even pressure throughout a considerable period of time, clearing of the pipes of oil when the system is not in operation, and an automatic checking of the flow in case of a leak at any point in the system. My invention accomplishes all these desired results, and the preferred form of apparatus embodying said invention is illustrated in the accompanying two sheets of drawings, in which—

Figure 1 is a diagrammatic view of a portion of a building in section, showing my system installed. Fig. 2 is an enlarged sectional detail of the automatic differential valve, and Fig. 3 is an enlarged sectional view of the liquid and air tanks and their connections with certain modifications.

Throughout the drawings like reference-figures refer to like parts.

Fig. 1 of the drawings indicates a building 1, in which are installed one or more lamps 2 2, &c. These lamps are fed by branch oil-pipes 3 3, &c., in each of which is a valve 4 4 within reach of a person standing on the floor. The main oil-pipe 5 supplies all these branches from the liquid-tank 6. This main connects with the lower portion of the liquid-tank, as clearly shown in Fig. 3. The air-tank 7 is preferably of relatively-greater capacity than the liquid-tank, although the system will be operative if the said air-tank is of only equal capacity with the liquid-tank or even somewhat less; but the best results are obtained when the air-tank is at least equal to and preferably in excess of the capacity of the liquid-tank. Compressed air or other fluid under pressure is confined in the so-called "air-tank," preferably by means of the air-pump 8.

The gage 9 indicates the pressure in the air-tank, and the pressure-reducing valve 11 reduces the pressure of the air delivered to the liquid-tank to a predetermined standard pressure, usually fifty pounds.

12 is the pipe connection from the air-tank to the upper part of the liquid-tank, and 13 is a hand-operated valve therein.

10 is an escape-valve connected to the upper portion of the liquid-tank. This escape-valve can be opened or closed by hand.

The gage-glass 14 shows the height of the oil remaining in the liquid-tank, and the check-valve 15 prevents the air in the air-tank from leaking back to the pump through the hose 16. In the main pipe 5 is placed an automatic differential valve 17, which may be of any desired construction, which will produce an automatic closing of the valve when the pressure in the consuming devices or in the branch pipes connecting thereto, or in any one of them, falls to a predetermined extent below the standard fifty-pounds pressure of the liquid-tank. I have illustrated one form of such differential valve in Fig. 2. The valve-plunger 18 may be seated by pressure in a tapering valve-seat 19, being guided by the spindle 20, passing through the spider 23, cast integrally with the valve-chamber. The nut 22 prevents the valve falling beyond a graduated distance below its seat, and it is normally held at this distance from its seat by the spring 21, surrounding the spindle. The degree of compression of this spring may be varied by inserting washers 24 under one end of it or by other means. Around this differential valve I preferably arrange a by-pass 25, controlled by hand-operated valve 26.

The mode of operation of my invention is as follows: The liquid-tank being filled with oil or other liquid to be distributed under a pressure of, say, fifty pounds to the square inch, the air-tank is pumped full of air or other fluid under pressure to a gage-pressure of more than

fifty pounds, the relative pressures being determined by the relative capacities of the two tanks. If the air and the liquid tanks are of equal capacity, then the initial charge of the air-tank should be at a one-hundred-pounds pressure. If the capacity of the air-tank is about four times that of the liquid-tank, as indicated in Fig. 1 of the drawings, then an initial pressure of sixty-two and a half pounds will suffice. When the lamps are to be started into operation, the valve 13 is opened and the air passes through the pressure-reducing valve 11 to the liquid-tank, creating a pressure of fifty pounds to the square inch therein. On opening the valve 26 in the by-pass 25 the oil will be forced out through the main and the various branches up to the lamps or other consuming devices 2 2. The whole system of piping being thus filled, the valve 26 is closed and the system continues to operate, automatically supplying oil to the consuming devices. If one of the lamps should melt down or one of the supply-pipes become injured, so that a considerable leak would occur, the pressure in the main behind the automatic differential valve 17 would eventually be lowered considerably, and this difference of pressures of the two sides of the valve-plunger 18 would when it equalled the predetermined amount overpower the spring 21 and force the valve into its seat, thus automatically closing off the supply of oil and preventing the loss of any considerable amount by leakage and also preventing the danger of fire and destructive action by the oil on goods and furniture. The differential valve will automatically open again the moment the pressures are equalized on its two sides or the moment the pressures approach within the predetermined difference, so that if the valve is set to operate at a difference of twenty-pounds pressure and closes as above described then upon the shutting off of the valve which controls the branch in which the leak is occurring and the restoration of equilibrium by opening the by-pass 26 the differential valve 17 will immediately open and the system will resume its normal operation of supplying oil to the undamaged branches. The pressure in the air-tank will fall as the fluid-tank is gradually emptied; but as it will never fall below the normal of fifty pounds to be maintained in the liquid-tank the pressure in said tank and on the oil throughout the system will be maintained equally and even until the last drop of oil is expelled. When the lamps are shut off, the valve 13 is closed and the escape-valve 10 opened. This takes all pressure off the liquid in the reservoir-tank, and the oil standing in the main and in the various branches therefrom siphons back into the liquid-tank, thus rendering the system a dry-pipe system when not in operation.

Various changes could be made in the details of my invention without departing from the spirit and scope thereof so long as the relative arrangement of the parts shown in the drawings and the principle of operation set forth in the specification are preserved.

Other forms of tanks and means of securing the desired pressure may be substituted, and other forms of differential valves might be used, &c.; but all these modifications I consider within the scope of my invention.

In the modification shown in Fig. 3 the air-tank and the fluid-tank are of the same capacity. The pressure-reducing valve 11 is of the well-known type, as shown in sectional view. I also show in this figure a filter 27 in the main supply-pipe which may be of any fibrous material and serves the purpose not only of purifying the oil of any floating particles of solid matter, but also equalizes the flow and tends to prevent the lamps from flickering.

Having therefore described my invention, what I claim as new, and desire to protect by Letters Patent, is—

1. In a system for the distribution of liquid under pressure, the combination of the liquid-tank, the main leading therefrom, one or more liquid-consuming devices supplied from said main, and a differential valve in said main, set to be closed automatically by a predetermined difference between the pressures in the liquid-reserve tank and in the consuming devices, together with a valve-controlled by-pass around said differential valve, substantially as described.

2. In a system for the distribution of liquids under pressure, the combination of the liquid-supply reservoir, the supply-main, the automatic valve in said main which closes in the direction of outflow through said main, and the adjustable spring which normally holds said valve open, together with the by-pass around said automatic valve, and the hand-operated valve which controls said by-pass, substantially as described.

Signed by me at New York city, New York, this 27th day of October, 1898.

ARTHUR KITSON.

Witnesses:
LILIAN FOSTER,
A. PARKER SMITH.