No. 657,664. Patented Sept. 11, 1900.

W. H. LAW.

HYDRANT.

(Application filed Dec. 16, 1899.)

(No Model.) 2 Sheets—Sheet 1.

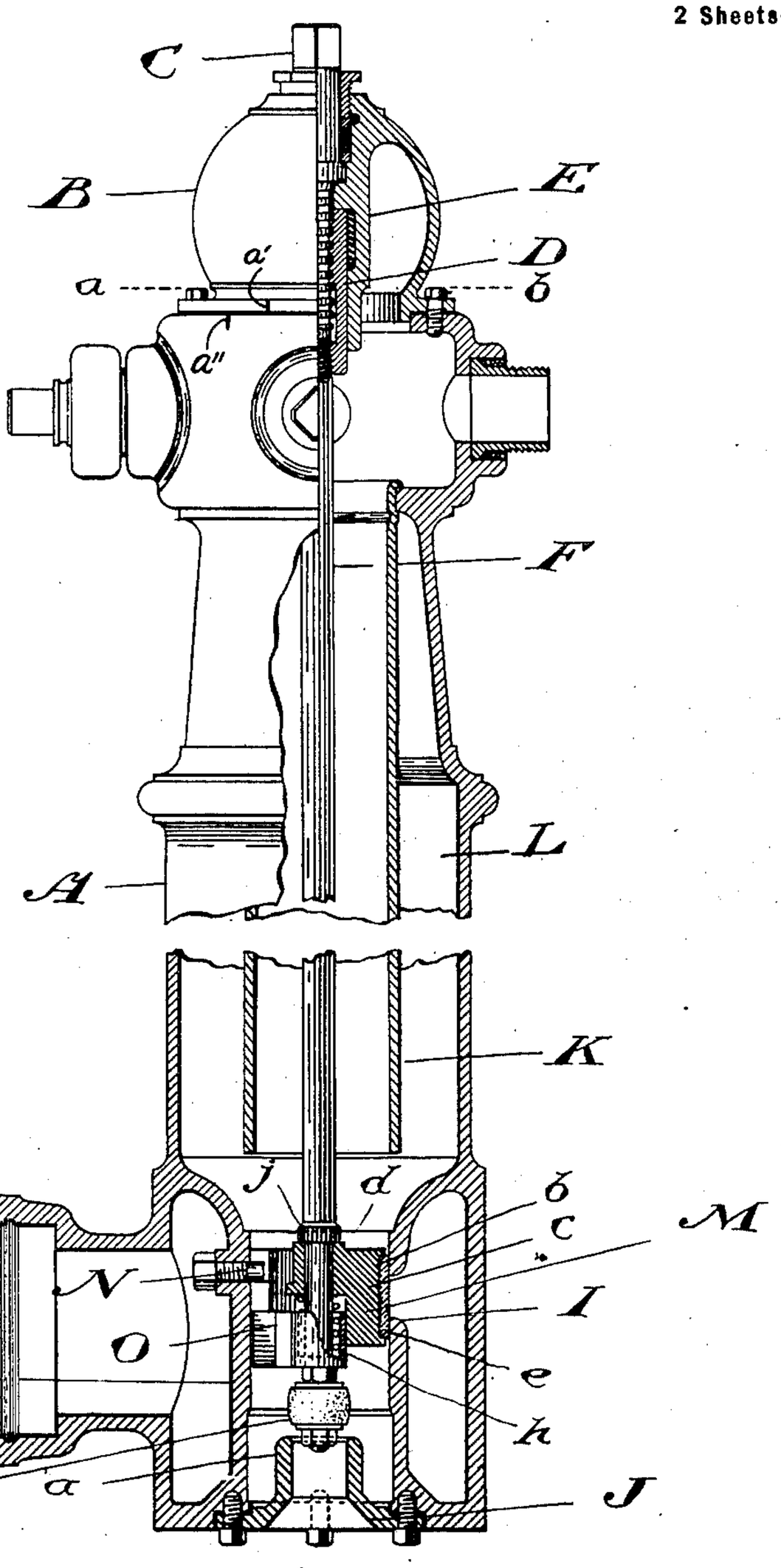

Fig. 1.

Witnesses
D. J. Colbourne.
J. M. Webster

Inventor
Wm. H. Law
by Ridout & Maybee
attys

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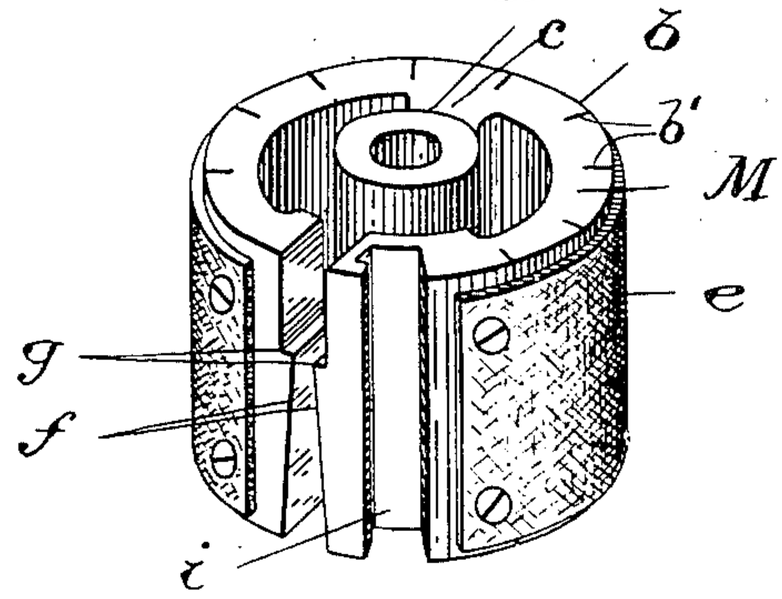


Fig. 2.

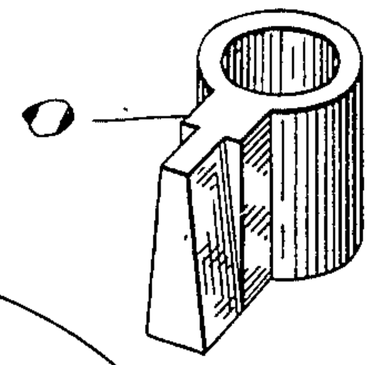
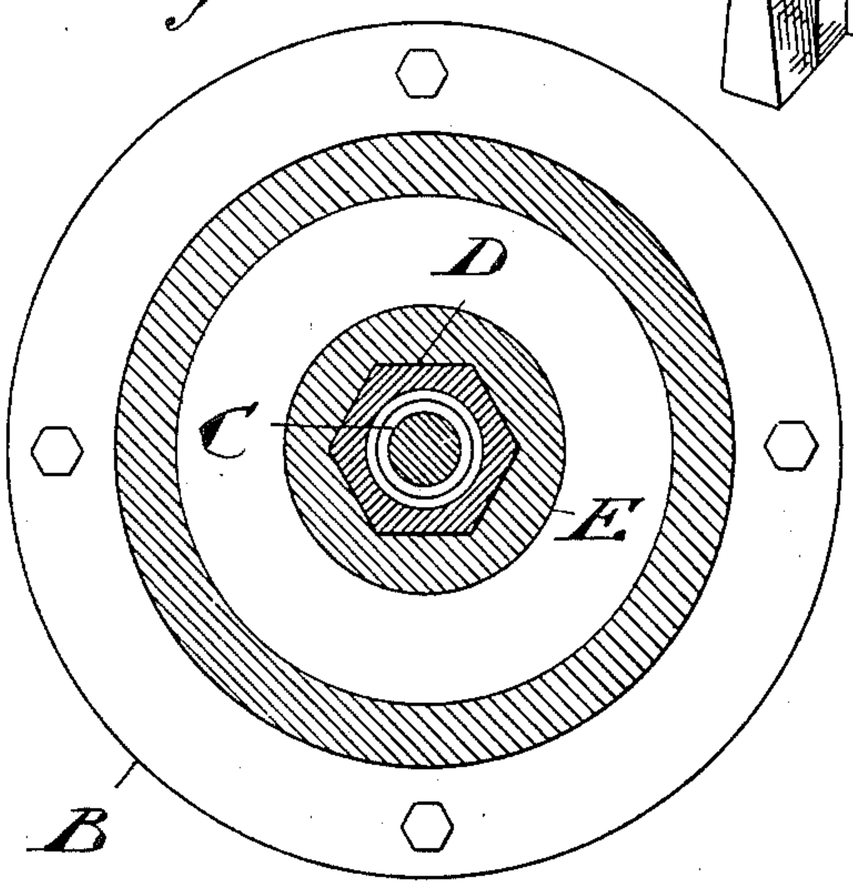


Fig. 4.



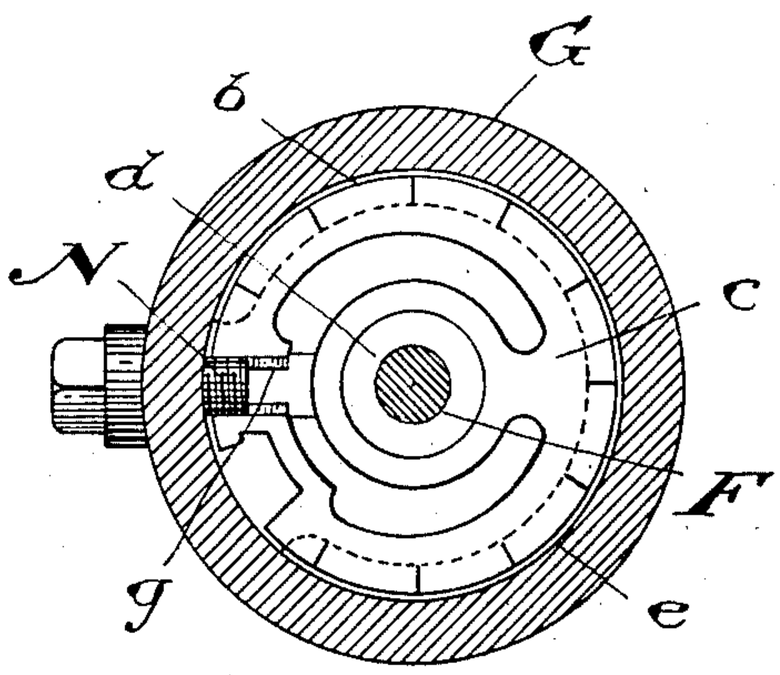


Fig. 3.

Witnesses.
J. J. Colbourne
J. H. Webster

Inventor.
Wm H Law
by Pidout & Maybee
attys.

UNITED STATES PATENT OFFICE.

WILLIAM H. LAW, OF TORONTO, CANADA.

HYDRANT.

SPECIFICATION forming part of Letters Patent No. 657,664, dated September 11, 1900.

Application filed December 16, 1899. Serial No. 740,598. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. LAW, mechanical engineer, of the city of Toronto, in the county of York, Province of Ontario, Canada, have invented certain new and useful Improvements in Hydrants, of which the following is a specification.

The object of my invention is to devise a durable, easy-working, and positive-acting hydrant which will not freeze, by which water hammer will be prevented, in which water friction is reduced to a minimum, and in which the working parts are readily removable without taking the hydrant out of the ground.

With this object in view my invention consists in the use of the annular air-chamber in the body of the hydrant; in the use of the valve tube or chamber at the bottom of the hydrant, forming, with the body, an annular water-chamber communicating with the main at one side and at the other by a suitable port with the interior of the tube; in the use of a piston-valve split so that after it is raised to cover the said port it may, by the further motion of the valve-rod, be expanded to fit the valve-tube tightly and so effectively close the port, and, lastly, in such details of construction as are hereinafter more specifically described and then definitely claimed.

Figure 1 is a sectional elevation, partly broken away, of my improved hydrant. Fig. 2 is a perspective view of the valve with the expanding wedge separated below it. Fig. 3 is a plan view of the valve. Fig. 4 is a cross-section on the line *a b* in Fig. 1.

In the drawings like letters of reference indicate corresponding parts in the different figures.

A is the body of the hydrant, and B the head. The upper portion of the body, as shown, is provided with one or more hose-nipples.

C is a screw which operates the nut D in the usual manner. This nut is preferably hexagonal in shape and is made to slide vertically in the sleeve or guide E, formed on or connected to the head. To the nut C is rigidly secured the valve-rod F, which therefore does not turn when the hydrant is opened or closed.

At the lower portion of the body A is formed the valve tube or chamber G. The ends of this tube are extended downwardly to the sides of the body, so that the tube, with the body, forms an annular water-chamber. H is the inlet-pipe communicating with one side of the said annular chamber, and I a port forming an opening between the other side of the said annular chamber and the interior of the valve tube or chamber G. The lower end of the valve-tube G is closed by the cover J, suitably bolted in position and provided with the tubular portion *a*, projecting upwardly into the tube or valve-chamber to form a drain-tube.

Within the upper portion of the body is located a tube K at its upper end either formed integral with or expanded into a circular flange formed on the body, so as to form, with the body, an annular air-chamber L, closed at its upper end and open at its lower end. The tube K is slightly larger than the internal diameter of the valve-tube G and extends downward into proximity with the upper end of the same.

M is the main valve vertically movable upon the lower end of the valve-rod I, but limited as to its movement by the stop *j*, formed on or secured to the valve-rod. This valve is formed as a piston-valve loosely fitting the valve-tube G and consists of an annulus *b*, split at one side and connected at the other side by means of a suitable bridge *c* to the eye or central portion *d*, which latter portion embraces the valve-rod. The annulus *b* is recessed on its outer face and a strip of rubber packing *e* secured therein. The flanges forming the upper and lower sides of the recess for the packing are preferably slit, as shown at *b'*, so that the annulus will be sufficiently elastic to be expanded, as hereinafter described. The sides *f* of the opening in the annulus are tapered or beveled to correspond with the taper or bevel of the sides of the wedge hereinafter described. Shoulders *g* are also preferably formed on the sides of the opening to coact with the stop N to limit the upward motion of the valve. This stop N is preferably screwed through the valve-tube G from the outside.

O is a wedge rigidly secured to the valve-rod F and suitably shaped to enter the opening between the ends of the annulus *b*. The

portion of the wedge secured to the valve-rod, as well as the eye *d* of the valve, are recessed to receive the coil-spring *h*, by which they are normally held separated. It will be seen from examination of Fig. 1 that the recess in the eye *d* is made sufficiently large to admit of the wedge being drawn up a limited distance within the valve M.

P is a piston-valve secured to the lower end of the valve-rod F and adapted to close the drain-tube *a* when the piston-rod G is forced down sufficiently far.

Through the annulus *b*, to one side of the opening therein, is formed the groove *i* sufficiently deep to permit of the valve being drawn up past the stop N when the valve is turned, so that the stop and the groove register with one another. To do this, it is simply necessary to unbolt the head of the hydrant and turn it till the index-lines *a' a''* on the head and body coincide, when the valve is in the proper position to be withdrawn.

Having described the construction of my improved hydrant, I will now briefly set out its mode of operation.

The normal position is that shown in Fig. 1, in which the piston-valve P is withdrawn from the drain-tube *a*, the main valve raised to cover the inlet-port I, and the wedge O drawn up to expand the main valve M to tightly close said inlet-port. To open the valve and admit water to the hydrant, the screw C in the head is turned to the left, the screw being right-handed. This first of all withdraws the wedge from the main valve, thus loosening it in the tube, and then presses down the latter until the inlet-port I is uncovered. At the same time the valve P is pressed down and closes the drain-tube *a*. As soon as the port I is uncovered the water ascends up through the tubes G and K to the hose-nipples; but during the passage of the water upward some portion of it will rise up into the annular chamber L, compressing the air therein until the air-pressure is equal to the water-pressure. This air now constitutes an elastic cushion and is capable of still further compression in case of an increase of the water-pressure, such as may take place through the sudden closing of a valve or valves of other hydrants that may be in service at the same time in the same vicinity. This air-cushion thus prevents the jarring in the pipes known as "water-hammer." When the valve is closed, by turning the screw C to the right the parts are drawn to their original position, the valve being first raised opposite the inlet-port and then expanded by the action of the wedge. As soon as the valve is closed and the water-pressure cut off the compressed air in the air-chamber reacts upon the water in the hydrant and forces it out through the hose-nipples until the air in the chamber is reduced to the atmospheric pressure. Then the remainder of the water will gravitate through the opening in the valve out through the drain-pipe very rapidly. Thus as there is no water left in the hydrant all danger from freezing is entirely obviated. The parts are so proportioned that the drain-tube is always closed before the main valve uncovers the port and remains closed until the main valve fully covers the inlet-port. There cannot, therefore, be any loss of water through the drain.

It will be seen that from my construction the hydrant cannot be flooded by a leaky valve, as the water would pass down through the main valve and out at the drain-tube. It is well known that an accumulation of water from leaky valves is a frequent source of frozen hydrants.

What I claim as my invention is—

1. In a hydrant, the body thereof provided with a main or inlet valve, a tube forming with the said body an annular air-compression chamber and having an open end in proximity to said valve, a drain-valve communicating with said air-compression chamber, and means for opening said drain-valve as the main or inlet valve is closed, whereby the air compressed in said air-compression chamber assists in expelling the water, substantially as described.

2. In a hydrant the body provided with a valve tube or chamber at its lower end, and a valve controlling the admission of water to the said tube, and a tube forming with the body an annular air-chamber closed at its upper end, the tube extending down in proximity to and being of slightly-greater width than the aforesaid valve-tube, substantially as and for the purpose specified.

3. In a hydrant, the body thereof provided with a main or inlet valve at its lower end, a tube forming with the said body an annular air-compression chamber at its upper end and having an open lower end communicating with said valve, and a drain-valve also communicating with the open end of said tube, the said main and drain valves moving simultaneously and arranged so that one opens as the other closes, whereby the air compressed in said air-compression chamber assists in expelling the water, substantially as described.

4. In a hydrant, a body, a valve-tube located at the lower portion thereof and turned outwardly at its ends to join said body to form an annular water-chamber, an inlet being formed in the body to the chamber, an inlet-port from the side of the chamber into the interior of the said valve-tube, a valve-rod, a split valve loose thereon and so formed as to be capable of expansion with the tube, and having its solid side against the inlet-port in the side of said tube, and a wedge secured to the valve-rod and arranged so that by the vertical motion of the valve-rod the split valve is expanded by the wedge to tightly close the inlet-port, substantially as and for the purpose specified.

5. In a hydrant a valve-tube with an inlet-port formed therein in combination with a

valve-rod; a split valve loose thereon and so formed as to be capable of expansion within the tube; a stop to limit the vertical movement of the valve on the rod; a wedge screwed to the valve-rod and arranged so that by the vertical motion of the valve-rod the split valve may be expanded by the wedge to tightly close the inlet-port; a stop on the tube to limit the upward motion of the valve and a spring arranged to tend to keep the valve and wedge pressed apart, substantially as and for the purpose specified.

6. In a hydrant a valve-tube with an inlet-port formed therein in combination with a valve-rod; a valve comprising an annulus divided at one side, an eye loose on the valve-rod and a suitable bridge by which the other side of the annulus is connected to the eye; a stop to limit the upward motion of the valve on the rod; a wedge fast on the rod and adapted to enter the division in the annulus; and a stop on the tube to limit the upward motion of the valve, substantially as and for the purpose specified.

7. In a hydrant a valve-tube with an inlet-port formed therein in combination with a valve-rod; a valve comprising an annulus divided at one side, an eye loose on the valve-rod and a suitable bridge by which the other side of the annulus is connected to the eye; a stop to limit the upward motion of the valve on the rod; a wedge fast on the rod and adapted to enter the division in the annulus; a stop on the tube to limit the upward motion of the valve; and a spring arranged to tend to keep the valve and wedge pressed apart, substantially as and for the purpose specified.

8. In a hydrant the combination of the valve-tube G provided with the inlet-port L; the valve-rod F provided with the stop *j;* the valve M comprising the divided annulus *b*, bridge *c* and eye *d* loose on the valve-rod G, the tapered sides *f* of the opening and the shoulders *g;* the wedge O fast on the rod F; the stop N on the tube G; and the spring *h* arranged between the wedge and the eye *d*, substantially as and for the purpose specified.

9. In a hydrant a valve-tube provided with an inlet-port in combination with a main piston-valve; a stop connected to the tube and adapted to limit the upward motion of the valve and a groove in the valve which will admit of the valve being lifted out when turned to make the groove and stop register, substantially as and for the purpose specified.

10. In a hydrant a valve-tube provided with an inlet-port in combination with a main piston-valve; a stop connected to the tube and adapted to limit the upward motion of the valve and a groove in the valve which will admit of the valve being lifted out when turned to make the groove and stop register; a detachable head for the hydrant; a non-revoluble nut, carried by the head in a suitable guide, to which the valve-rod is rigidly connected and a screw held from vertical motion engaging the said nut, substantially as and for the purpose specified.

Signed at Toronto, Canada, November 18, 1899.

WILLIAM H. LAW.

In presence of—
JOHN G. RIDOUT,
J. EDW. MAYBEE.