S. W. LEWIS.

HYDRANT.

No. 188,384. Patented March 13, 1877.

FIG. 1.

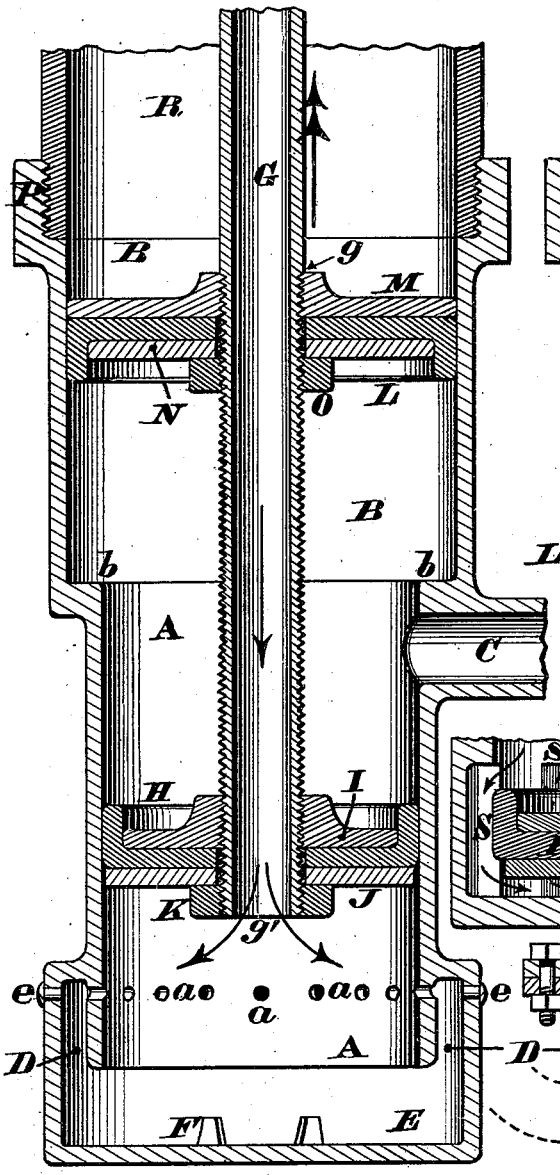


FIG. 2.

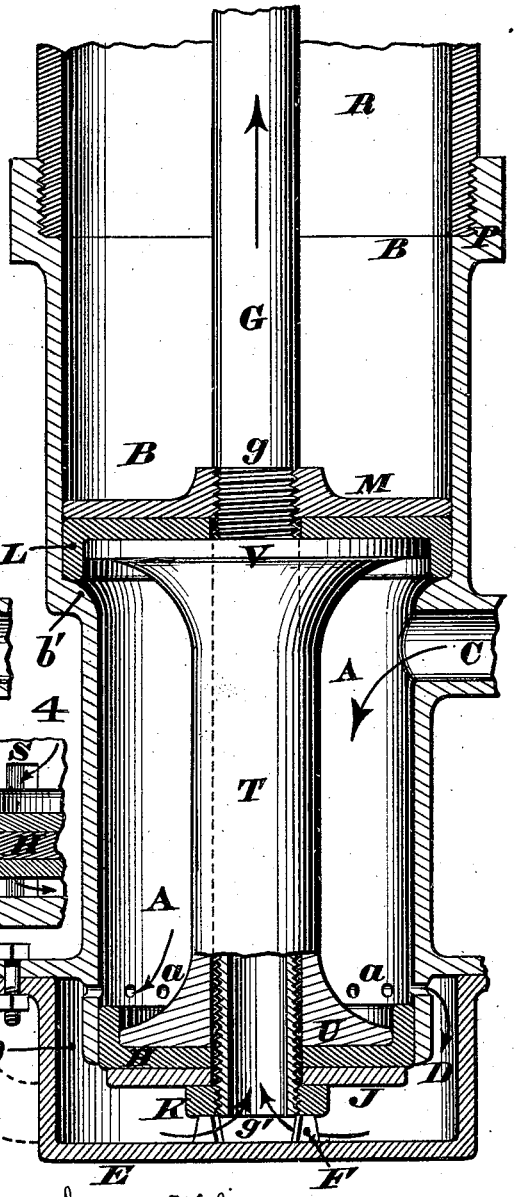
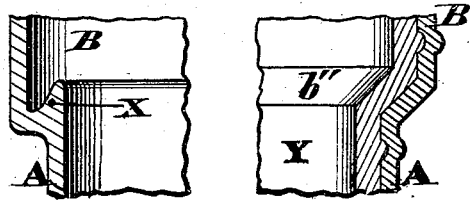


FIG. 3.



Samuel W. Lewis
by James H. Layman.
his Attorney.

Attest.
E. W. Byrd
F. P. Kennedy.

UNITED STATES PATENT OFFICE

SAMUEL W. LEWIS, OF CINCINNATI, OHIO.

IMPROVEMENT IN HYDRANTS.

Specification forming part of Letters Patent No. **188,384**, dated March 13, 1877; application filed December 15, 1876.

To all whom it may concern:

Be it known that I, SAMUEL W. LEWIS, of Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and useful Non-Wasting, Anti-Freezing, and Automatically-Closing Hydrant, which invention is fully set forth in the following specification and accompanying drawing, in which—

Figure 1 is a vertical section of my hydrant, the plunger being shown as in the act of being elevated. Fig. 2 is a similar section, but representing the plunger depressed, so as to open the hydrant; and Figs. 3 and 4 represent two modifications of my invention.

The object of my invention is to provide a hydrant that will neither waste water nor freeze up in the winter season, and that will automatically close itself the moment the plunger is at liberty to assume its normal or elevated position, and I accomplish this result by the following combination of appliances.

The principal feature of my hydrant is the valve-chamber, which latter consists of two cylinders of different diameters, traversed by oppositely-cupped pistons, attached to a hollow plunger occupying an axial position within said valve-chamber. Of these two cylinders the lower one is the smaller, and is furnished, at or near its junction with the upper cylinder, with an inlet-pipe or solder-tail of customary construction. Located a suitable distance above the lower end of this smaller cylinder is a series of apertures or channels, below whose level the lower piston is depressed when the hydrant is opened or turned on. This depression of said piston allows water to flow through said apertures or channels, so as to enter beneath the piston, and thereby have access to the tubular plunger, up which latter the water ascends, and is then discharged at the spout or nozzle, in the usual manner.

The escape of water at the upper end of the larger cylinder is prevented by the piston of the same, which piston is, for the time being, depressed about as far as the ledge or shoulder formed by the junction of the two cylinders. Now, as long as the plunger is maintained in this depressed position the flow of water will continue, as previously described; but the moment said plunger is liberated the pressure of water raises it, thereby elevating the smaller piston within the lower valve-chamber. This elevation of the plunger is caused by the pressure of water beneath the larger piston, and as soon as the lower piston is elevated above the level of the previously-described apertures or channels the supply of water to the tubular plunger is at once shut off.

Evidently, the continued ascent of these two connected pistons has a tendency to produce a vacuum beneath the lower one, and, consequently, all water contained within the hollow plunger immediately runs down into the lower chamber, and prevents the hydrant freezing up in the winter season.

My valve-chamber consists, essentially, of two cylinders, A and B, of different diameters, the junction between them being effected either with a horizontal ledge, *b*, or a bell-mouth, *b'*, or else with an inclined or sloping seat, *b''*, or otherwise. Of these two cylinders the lower one, A, is the smaller, and is furnished with an inlet, C, of any suitable kind, said inlet being located at, or immediately below, the junction of the two chambers A and B. Furthermore, this lower cylinder is furnished with a series of lateral apertures, ports, passages, or channels, *a* or S, whose united areas should about equal the area of the hollow plunger, which latter device will be hereafter fully described.

These apertures or channels are located at such a distance above the lower end of chamber A as to insure the smaller piston passing fairly below them when the plunger is depressed, as seen in Fig. 2 and Diagram 4. The aforesaid ports *a* communicate with the annular space D, situated between the lower portion of chamber A and the shoe or base E of the hydrant, which base may be cast with the valve-chamber, as seen in Fig. 1, or it may be bolted to the latter, as represented in Fig. 2; or the base may be screwed to the cylinder A, or coupled to the same in any secure manner.

When the base is cast with this cylinder, holes must be drilled in the walls of said base, so as to enable the formation of apertures *a* in the cylinder, after which said holes must be plugged or soldered up, as seen at *e* in Fig.

1. The construction shown in Fig. 2 prevents the necessity of drilling and plugging the base of the hydrant. Projecting upwardly from said base are lugs or stops F, which prevent the tubular plunger G coming in contact with shoe E, although the descent of said plunger may be arrested by suitable devices at the top of the hydrant. Plunger G is screw-threaded exteriorly from the point *g* to its lower end *g'*, in order that the two cupped pistons may be properly secured to said moving water-way. Of these two pistons, the lower one consists of an upturned cupped packing, H, clamped between a screw-threaded head, I, and a disk, J, the latter being secured in position with nut K. The upper piston, or the one that traverses the larger cylinder B, is composed of a down-turned cupped packing, L, clamped between a screw threaded head, M, and a disk, N. O is a nut that retains disk N securely in position. The upper end of cylinder B is screw-threaded at P to engage with the iron stock R, or said stock may be attached to cylinder B in any other appropriate way.

When my valve-chambers are to be applied to hydrants having wooden stocks or cases, the thread P may be omitted and a bell-mouth substituted for it, thereby insuring the proper insertion of the two pistons, and without injury to their cupped packings H or L, which cupped packings may be composed of leather, india-rubber, or any other material or materials. Furthermore, when the valve-chambers are to be fitted within wooden hydrants, the base E may be provided with a downwardly-projecting screw-threaded stem, for the purpose of securing said connected chambers or cylinders to the case or stock.

The outlets may be composed of grooves or channels S cast or cut longitudinally of cylinder A, as seen in Diagram 4, which construction obviates the use of shoe E, as said channels perform the functions of apertures *a* and annular chamber D.

The invention may be further modified by providing a spool, T, whose heads U and V serve as bearings for the oppositely-cupped packings H and L. (See Fig. 2.)

An inclined seat, X, may be arranged to insure an outward expansion of packing L before the hydrant is placed in communication with the water-mains. This seat is seen in the left illustration of Fig. 3.

Finally, the cylinders A and B may be furnished with a fusible-metal lining or bushing, Y, as represented in Fig. 3; but, as I reserve the right of making said lining or bushing the subject of a future application for patent, further description of this method of construction is unnecessary at the present time.

The operation of my hydrant is as follows: As soon as water is allowed to enter through inlet C the space between the two pistons H and L is at once filled, and no waste or escape can occur, because the pressure of water forces the packings H and L outwardly, and causes them to hug the walls of their respective cylinders in the most intimate manner. If these two cylinders A and B were of uniform bore, it is evident the areas of their respective pistons H and L would be exactly alike, and, consequently, an equilibrium or balance would be established, thereby retaining the plunger G in any position it should be left in. Now, by making the upper cylinder B of relatively greater diameter than the lower one A, no such equilibrium or balance can occur in my hydrant, but a differential pressure is induced, which differential pressure is exactly proportioned to the excess of area of piston L over the one H.

As a natural result of this arrangement of pistons, the excess of pressure is exerted upwardly, and therefore the plunger G, with its attached accessories, will continue to ascend until said plunger is arrested by some suitable stop at the top of the hydrant. This stop should be adapted to arrest the plunger when the upper margin of piston H is near the level of inlet C, at which time the other piston, L, will have reached the top of cylinder B, and such an elevated position of these two pistons is the normal condition of my automatically-closing hydrant. To open the hydrant, the plunger G is depressed by any suitable means until it is arrested by the lugs F, or else by their equivalent devices at the top of the stock or case. This depression carries piston H below the apertures *a*, or below the upper ends of channels S. Water now flows through said apertures and down the chamber D into the vacant space between said piston H and the shoe or base E. The currents then flow freely around the projections F, enter the open end *g'* of plunger G, and finally escape at the upper end of said tubular water-way. This flow of water through inlet C, cylinder A, apertures *a*, shoe D E, and pipe G *g'* is clearly indicated by arrows in Fig. 2.

As soon as the desired quantity of water has been drawn from the hydrant, the attendant may initiate its closure by simply elevating the plunger far enough to close the apertures *a* on the upper ends of grooves S, with the packing H, which act instantly arrests the flow through said outlets *a* or S and through the pipe G. The flow having been thus arrested, the excess of pressure against the larger piston L elevates the devices G H until said piston H is again brought to its normal position, or about on a level with the inlet C. Care must be taken, however, not to elevate this piston so far as to allow water flowing under it from the inlet C, which contingency can be provided against by the previously-described arrangement of a suitable stop at the top of the hydrant. This automatic elevation of plunger G and its attached accessories is indicated by the double-headed arrow in Fig. 1.

During the ascent of piston H from the level of apertures *a* or channels S to the bottom of inlet C a vacuum is produced in cham-

ber A, and into this vacuum the water contained in pipe G flows by gravitation, as indicated by the single-headed arrows in Fig. 1.

It will thus be seen that the lower portion of cylinder or chamber A serves as a receptacle to the water drained from plunger G, and by simply setting the hydrant deep enough in the ground all danger of the waste-water freezing will be completely obviated.

When the plunger begins to ascend, it is accelerated in its movement by the weight or pressure of the column of water contained therein; but as this column is gradually discharged into chamber A, the momentum of pipe G is retarded accordingly, and by the time said pipe is emptied of its contents the plunger gradually ceases to move, thereby avoiding any violent jar or concussion at the termination of its stroke.

During the closed condition of the hydrant all sediment contained in the water settles at the bottom of cylinder A; but the moment the hydrant is opened numerous currents enter from the various inlets *a* or S, and flow toward the center of the device, so as to escape up the pipe G, and in so doing the sediment is completely agitated and then carried away with the water.

It will also be noticed that whether the hydrant is opened or closed, the two cupped packings H and L are constantly submerged, and therefore they are always maintained in a soft and pliable condition, and the greater the pressure within chambers A and B, the more tightly will said cups H and L hug the walls of their respective cylinders.

I have described my automatically-closing hydrant as provided with a hollow or tubular water-way attached to the connected pistons H and L; but it is evident this tube G may be dispensed with, and a solid rod substituted therefor. In this case a special discharge-pipe must be applied to the base E or to the lower portion of cylinder A, which discharge-pipe may project from either side of the base or cylinder A; or said pipe may be attached to the bottom of either of these members A or E of the hydrant.

Such a lateral attachment of the special discharge-pipe to the left side of the base E is suggested by dotted lines in Fig. 2.

I am aware that it is not new to apply the ports *a* or channels S to a hydrant-base for the purpose of admitting water beneath the lower piston, and allowing the fluid to ascend within the tubular discharge-pipe; and therefore my claim to such ports or channels is expressly limited to their combination with a self-closing hydrant whose inlet-pipe is located at or near the junction of two communicating valve-chambers of unequal diameter, said chambers being traversed with pistons of corresponding differential areas, as herein described.

I claim as my invention—

1. A combined non-wasting, anti-freezing, and automatically-closing hydrant, having its inlet-port located at or near the junction of two communicating valve-chambers of unequal diameter, substantially as herein described and set forth.

2. A hydrant whose valve-chamber consists of two communicating cylinders of different diameters, traversed by independent pistons, attached to a common moving water-way, said chamber being provided with inlet and outlet ports, the inlet-port being situated at or near the junction of the two valve-chambers, substantially as herein described and set forth.

3. The combination of communicating cylinders A and B, of unequal diameters, inlet C, located at or near the junction of cylinders A B, outlets *a* or S, packed pistons H L, and a moving water-way, G *g'*, or its equivalent device, substantially as herein described and set forth.

4. In a non-wasting hydrant-valve, the upturned cupped packing or piston H, and downturned cupped packing or piston L, when so arranged that the upper piston L will be of greater diameter and present more area of surface to the water than the lower piston H, thereby causing an unequal pressure of water upwardly, so as to elevate and automatically close the valve when the inflowing current is admitted between said differential pistons, substantially as herein described and set forth.

In testimony of which invention I hereunto set my hand.

SAMUEL W. LEWIS.

Witnesses:

JAMES H. LAYMAN,

S. B. SPEAR.