J. M. THATCHER.

Sewer-Trap

No. 204,397. Patented May 28, 1878.

Fig. 1.

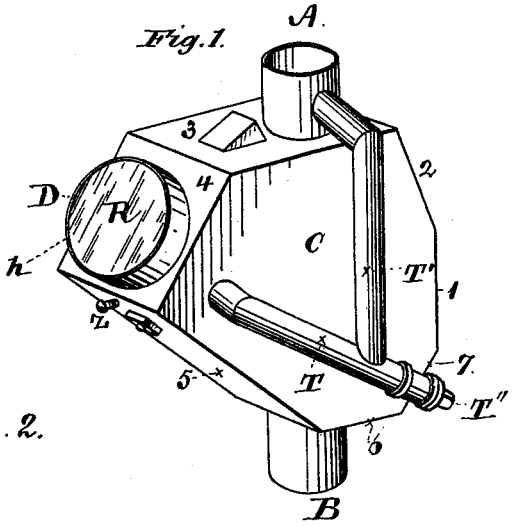


Fig. 2.

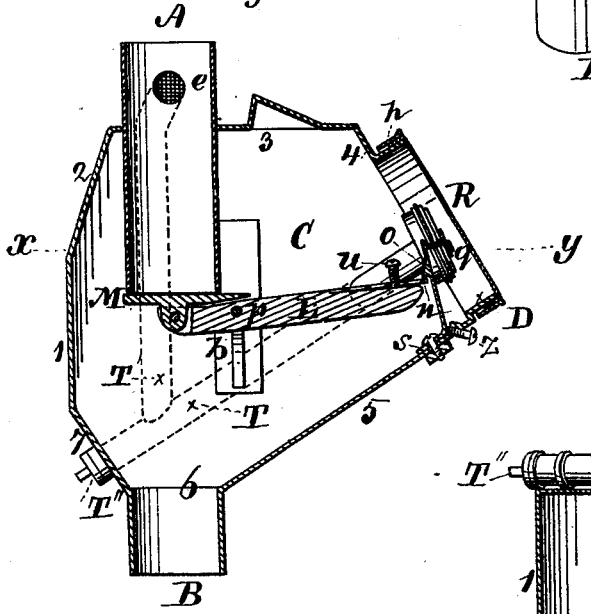
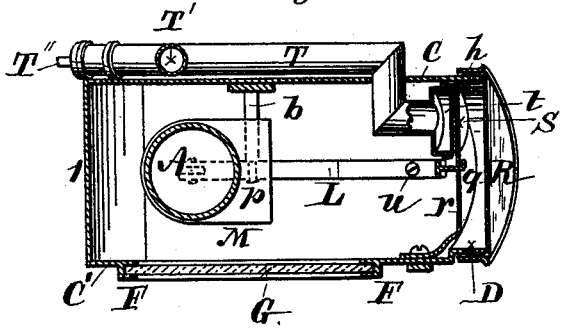


Fig. 3



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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN SEWER-TRAPS.

Specification forming part of Letters Patent No. **204,397**, dated May 28, 1878; application filed May 1, 1878.

To all whom it may concern:

Be it known that I, JOHN MERRITT THATCHER, of Jersey City, in the county of Hudson, in the State of New Jersey, have invented a new and useful Improvement in Sewer-Traps, which I have fully set forth in the following specification.

It will be difficult, if not impossible, to enumerate or to classify, under separate heads, the different methods and devices which have heretofore been suggested, used, patented, or described to prevent sewer-gases or the noisome effluvia emanating from the sewer to penetrate the interior of dwelling-houses or buildings connected with the sewer by means of soil or waste pipes. It will suffice to say that all, or nearly all, involve the principle of the water-lute or water-seal, which consists in the interposition between parts of the same soil-pipe of **S**-shaped or otherwise equivalently-formed chambers, which, holding in its convolutions a body of water, intercepts the gases which may tend to rise in the soil-pipe into the interior of the house. The shortcomings of sewer-traps constructed on that principle are too well known to require enlargement. It will suffice to say that in the first place the liquid which forms the seal is not unfrequently contaminated, and contains excrementitious matter, which in itself is calculated to emanate gases which pollute the air. If not used for some time, these traps are apt to dry out, and then allow free exit to the gases. Again, it frequently happens that the force or volume of the gases in the sewer is so great as to force the seal, particularly under certain conditions of the weather, when the gases are blown up through the water-seal. These and many other difficulties or objections have led me to devise a trap constructed on a new principle of operation, whereby I have successfully obviated all the trouble, more or less, attending sewer-traps heretofore known or used.

The trap I have devised is designed to be adapted or placed upon the soil-pipe at a point as near as possible to the exit from the house—that is to say, within the house—so as to afford convenient access to it, but in the lowest part in the house and nearest its connection with the sewer-pipe. It may, however, be employed with like advantages all throughout the building, such as in connection with water-closets, bath-tubs, wash-stands, sinks of any description, and everywhere where the ordinary **S**-traps are used.

The principle on which I construct my trap consists substantially in this: At a given point of the vertical or perpendicular portion of the soil-pipe I interrupt its continuity, and insert between the two opposite ends having the same vertical axis a chamber containing a valve and valve-operating mechanism. This valve is arranged to always or normally close the lower end of the upper portion of the pipe, but is suddenly removed when actuated by automatic means, which takes place whenever a certain or given quantity or column of liquid shall have formed or collected in the pipe.

The operative parts of the valve are nicely adjusted, so that they shall act every time a sufficient body of water shall have collected in the pipe to thoroughly flood the soil-pipe, and carry with it any matter more or less solid, however light or heavy. A trap properly constructed on this principle can, under no circumstances, allow any gases from the sewer to ascend or penetrate into the building, for the greater the tendency of the gas to rise the greater the pressure of the valve against its seat.

Having thus indicated the general purpose and object of my said invention, I shall now proceed to describe the manner in which the same is or may be carried into effect.

The trap is composed of a chamber of any suitable form and material, preferably of cast-iron or brass.

In the drawings I have shown the same to be composed of two seven-sided polygonal plates, C C′, united on top, bottom, and sides by means of quadrangular plates 1, 2, 3, 4, 5, 6, and 7, constituting an irregular prismatic body or chamber, which is provided on the two opposite and parallel sides 3 and 6 with two tubular appurtenances, both projecting outside of the chamber, both having the same axis, the one, A, extending some distance into the interior of the chamber, the other, B, having no internal projections, but is so arranged as that the adjoining sides of the chamber shall flare from it, or form, in connection with it, a funnel. The side 4 is also provided with

an internal tubular projection, D. This chamber, with its tubes A B, may be cast in parts with flanges, whereby they may be united by means of bolts, or screws, or rivets, or otherwise; or they may be made of sheet metal and the joints carefully soldered; or any other mode of construction may be adopted, so as to produce a perfectly-hermetic chamber.

The form I have described is not material. It may be made in the form of curvilateral shells united, as before described, or by any means known to mechanics.

The principal feature, however, is, first, that the lower sides shall converge toward the tube B, and, second, that room shall be provided for the play of the valve mechanism, which I shall presently describe.

Instead of making the chamber of metal, it may be made, in part or wholly, of glass, so that the operation of the trap may be visible at any time.

In the drawings I have shown the chamber with its tubular projections in three views, Figure 1 being a perspective view, showing the chamber in the position it is intended to be placed with respect to the soil-pipe, the tubular projection A B being in the vertical line of prolongation, and connecting the two ends and filling the gap of the soil-pipe. Fig. 2 is a vertical section through the axis of the soil-pipe or tubular connections A B, the plane of section being parallel to the plates C C'. Fig. 3 is a transverse section on line *x y* in Fig. 2.

In said drawings, the chamber is made in part of metal and in part of glass, the plate C' being provided with a window-frame, F, and having inserted in it, by hermetically-sealed joint, a glass plate, G, as shown in Fig. 3.

In the middle of the chamber, upon a pivot, *p*, or spindle supported in suitable brackets or journal-bearings *b*, is suspended a lever, L, carrying at its one end a hinged or loosely-jointed flap-valve, M, which adapts itself or falls flat and fair upon its seat, which is the lower opening of the pipe A, and which, for this purpose, is ground smooth to form a perfect and tight joint with the valve. The opposite end of the lever is weighted, so that the tendency of the lever shall always be to keep the valve closed against the tube.

The rear or weighted end of the lever L engages, also, with an adjustable spring-hook, *o*, by means of an adjustable blade, *n*, which keeps the lever locked and the bottom of the tube A closed until said lever is released by the withdrawal of the hook or catch.

To effect this latter operation of releasing the lever, the upper end of the spring-hook is connected by means of a loose link or hook, *q*, with a spring-blade, *r*, fast to the interior of the side wall of the chamber at *s*, and carrying a disk, S, which adapts itself against an elastic diaphragm, *t*, covering the enlarged mouth of a tube, T, which, from this point or from any convenient point where the valve-lever-locking mechanism is arranged, proceeds out of the casing on a dip down along the side of the chamber. The end of this tube is provided with a stopper, T^2, or a cock. From the upper tube A, above the chamber C, proceeds another tube, T^1, which also has a downward dip, or, as shown in the drawing, is carried perpendicularly down until it meets and connects with the tube T. A fine grating or wire-gauze, *e*, closes the opening of the branch tube T^1 into the tube A.

On one side of and upon the tubular projection D, I adapt an elastic diaphragm, R, which may be made of a sheet of pure vulcanized rubber, held by means of a hook, *h*.

To insure a perfect fit of the valve M against its seat or the lower end of the tube A, and to provide means for adjustment in case of wear of either the hinge-pin of the valve or the fulcrum-pin of the lever, I make the blade *n* on the tail end of the lever adjustable by means of a set-screw, *u*.

It will be understood that by turning the screw in either direction the position of the blade *n* in relation to the hook *o* can be adjusted, and thereby effect a perfect fit of the valve against its seat. The screw *z* in the rear of the spring-hook O will adjust both its position and stiffness.

The necessity and importance of the means of adjustment will appear more fully from the description of the operation of the trap, which is as follows: We shall assume the trap to be put into position, as before indicated, and connected with the soil-pipe above and below.

Whenever, now, in any part of the building, from closet, bath, or other portion, excrementitious or other matters are, by means of water, carried into the soil-pipe, then the following will happen: Solid and liquid mass, together with fresh water necessary to cleanse, will collect in the lower part of the pipe A, which is closed by the valve M until the quantity accumulated shall be deemed sufficient to properly flood the pipe. This quantity is determined by that usually discharged at each pull of the knob operating the water-closet mechanism. When such quantity shall have accumulated in the pipe A, the liquid portion generally rises some distance above the drain *e*, and (any solid particles in suspension therein being retained by the strainer) flows over and out of the tube T^1 and up the tube T until it is filled. The liquid in the tubes T and T^1, pressing against the elastic diaphragm *t* with a force due to the difference of columnar pressures between the level at the diaphragm and the level of the mass in the soil-pipe above the valve M, causes the said diaphragm to bulge, and by so bulging to push the disk S, which, in its turn, will pull the trigger or the connecting-link of the spring-hook and release the lever. When the lever is thus released and actuated by the superincumbent weight, it will suddenly tilt and allow the contents of the tube A to be discharged and flooded.

Upon the discharge of the tube A two things

will happen almost simultaneously or in quick succession. The mass discharged, being a columnar body of the exact area of the tube, in descending will leave a vacuum behind, both in the tube A and after its passage down the tube B in the chamber, and the equilibrium of atmospheric pressure will be re-established but slowly, if at all, by the minute air-leaks in the pipe-joints, &c., if there be any.

One other effect of the sudden discharge of the body of liquid from the soil-pipe above the valve M is that the elastic diaphragm *t* will collapse or reassume its normal position, being relieved from the pressure from within the tubes T T^1, and, by thus collapsing, allow the spring-hook *o* to fall back in position to catch the tail end of the lever L. When actuated by its weight it will tilt back to close the bottom of the tube A. But the before-referred-to vacuum, which is coincident with the discharge of the soil-pipe A, would prevent the operation of the lever, and the valve would remain open an indefinite time until, by a slow process, incidental to almost unavoidable imperfection in the construction of the apparatus, equilibrium of atmospheric pressure shall have been established. The occurrence of this vacuum would utterly destroy the utility of my apparatus, and has been a source of great trouble and research and experiment.

I have succeeded in overcoming this difficulty by the simple and inexpensive device shown in the drawings, and consisting in the application and use of an elastic diaphragm, R, or the mechanical equivalent of the same, in one of the sides of the chamber, which admits of the space in the chamber itself contracting and expanding according to differences of pressure within and without the chamber, thereby at all times maintaining the equilibrium desirable and necessary for the perfect operation of the apparatus.

Instead of the elastic diaphragm, a rubber bulb or elastic and collapsible and expansible air-chamber may be used. This may be made with a screw-threaded neck, which can be screwed in a screw-threaded opening in any part of the chamber.

The stopper T^2 is provided to enable one occasionally to clean out the tubes T T^1 whenever the liquid contents should be found to have become stale or foul from some cause or other.

Having described my said invention, what I claim, and desire to secure by Letters Patent, is—

1. A sewer-trap consisting of a chamber containing tubular connections with the soil-pipe in the same vertical axis therewith, and a valve operated by independent mechanism to lock and release the same, substantially as and for the purposes set forth.

2. In a sewer-trap of the character herein described, the valve-operating mechanism consisting of a weighted lever carrying a valve on the opposite end and normally keeping said valve in its seat, a locking mechanism, substantially as described, holding the valve closed against any superincumbent weight upon the valve, and a means to release the locking mechanism operated by a given column of liquid, as and for the purposes set forth.

3. The combination, with the chamber of a sewer-trap, constructed and arranged for operation as herein set forth, of an elastic diaphragm or bulb, or the mechanical equivalent of the same, to maintain equilibrium of atmospheric pressure within said chamber, substantially as herein shown and set forth.

4. The combination and arrangement of tubes to convey liquid from the upper tube or soil-pipe to the elastic diaphragm operating the lever-locking mechanism, as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOHN M. THATCHER.

Witnesses:
A. POLLOK,
B. F. LEE.