(No Model.) 2 Sheets—Sheet 1.

H. C. LOWRIE.

HOUSE SEWERAGE OR DRAINAGE APPARATUS.

No. 343,326. Patented June 8, 1886.

Fig. 1.

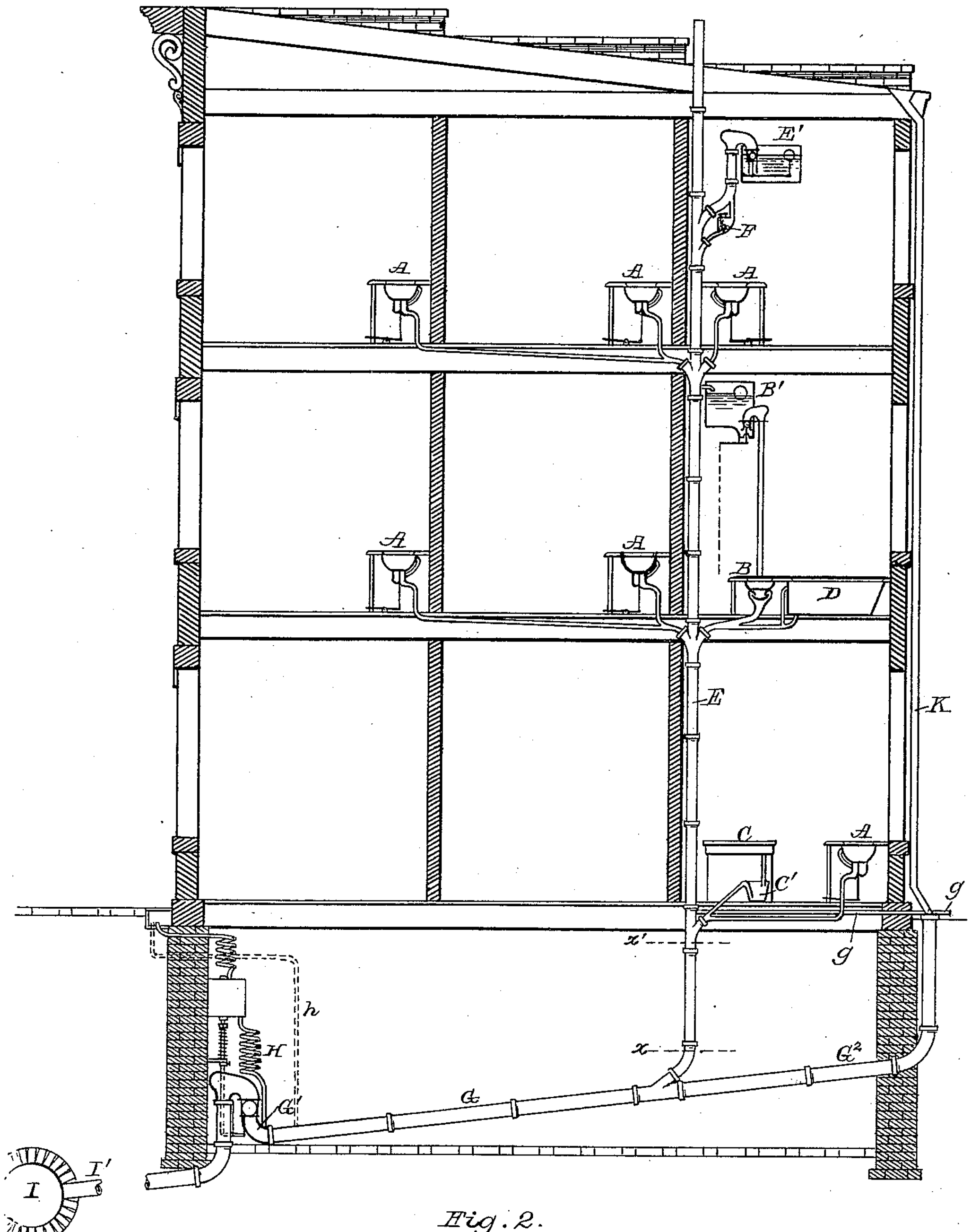
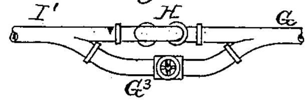


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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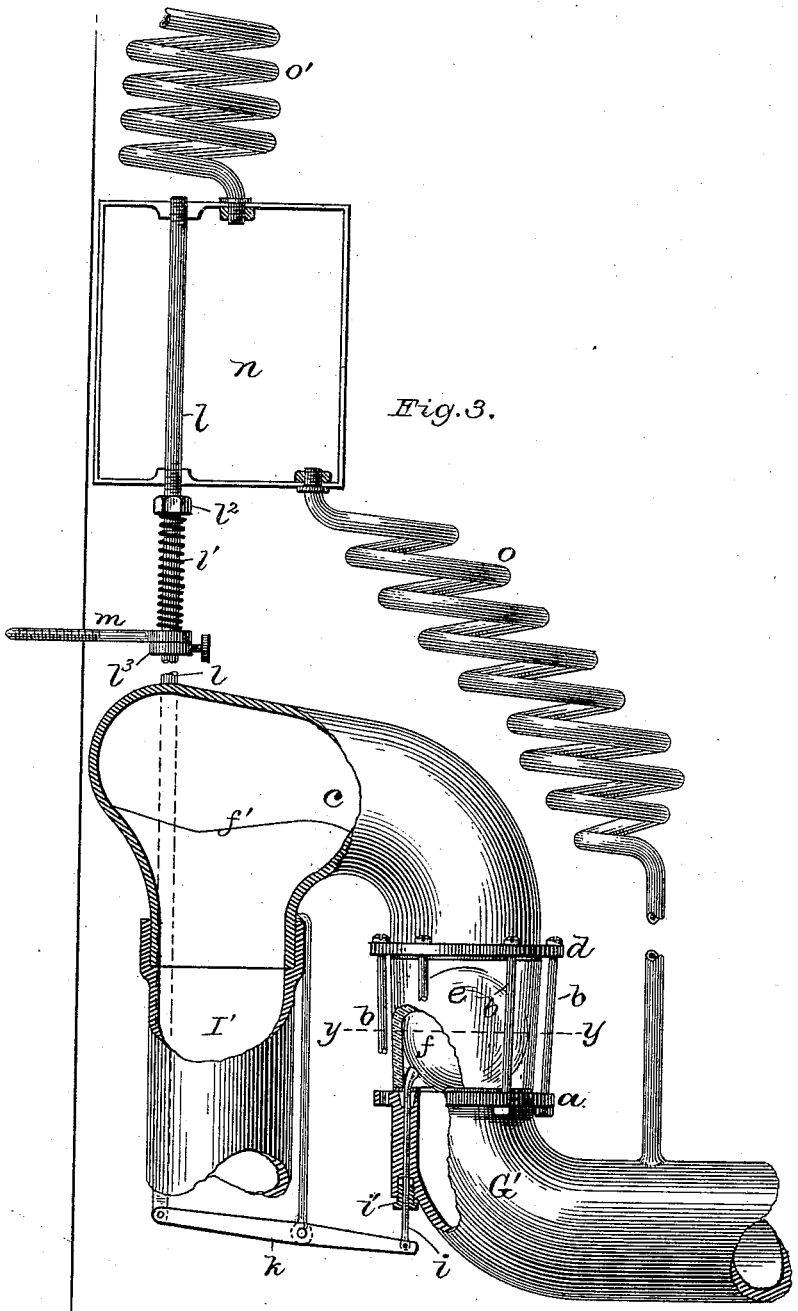

Fig. 3.

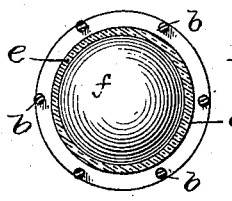

Fig. 4.

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UNITED STATES PATENT OFFICE.

HARVEY C. LOWRIE, OF DENVER, COLORADO.

HOUSE SEWERAGE OR DRAINAGE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 343,326, dated June 8, 1886.

Application filed December 8, 1884. Serial No. 149,755. (No model.)

To all whom it may concern:

Be it known that I, HARVEY C. LOWRIE, of Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in House Sewerage or Drainage Apparatus; and I do hereby declare that the following specification, taken in connection with the drawings furnished and forming a part of the same, is a clear, true, and complete description of the several features of my invention.

The objects of my said improvements are to provide for a frequent, reliable, and effective siphonage of the contents of house-drains, not only as regards liquids and such solid matters as are incident to domestic drains, but also as to offensive and dangerous gases.

With my improvements I deem it practicable to obviate all necessity for the usual traps of various kinds, heretofore deemed essential; but such traps may be employed therewith, if desired.

An important factor in my apparatus is a ball-siphon, devised by me, which constitutes the subject of a separate application for Letters Patent, Serial No. 127,666, heretofore filed by me.

As a part of my present invention, I have provided for a reliable automatic flushing operation, dependent upon the contents of the house sewer or drain pipe, and have devised certain details in construction involving economy, and also facilities for the convenient inspection of the ball and its seat, as well as for the economical and convenient repair of the parts most liable to derangement from wear.

After fully describing my invention, in connection with the accompanying drawings, the features deemed novel will be specified in the several clauses of claim hereunto annexed.

Referring to the two sheets of drawings, Figure 1, Sheet 1, illustrates in vertical section a building containing all of my improvements in what I deem their best form. Fig. 2, Sheet 1, is a plan or top view of the flushing-siphon and its connections with the main soil-pipe, and with an extension which leads to a street-sewer, and illustrates the use of a cut-out pipe by which sewer-connections can be established with the house independently of the siphon. Fig. 3, Sheet 2, is an enlarged side elevation of the siphon and its ball-tripping mechanism, portions of the several parts being either broken away or shown in section for disclosing the interior. Fig. 4, Sheet 2, is a horizontal section of Fig. 3 on line *y*.

In Fig. 1 I have illustrated set basins A, closet B, local tank B′, kitchen-sink C, with grease-trap C′, and bath-tub D, each of which has its waste-pipe coupled to the vertical soil-pipe E, in a manner substantially as heretofore, except as will be observed.

I employ no local traps, as heretofore, in any of the lateral waste-pipes, and thereby not only obviate a large item in the cost of plumbing, but I also avoid such offensive deposits as are well known to be liable to be collected and retained in traps of all kinds.

The grease-trap C′, it is to be understood, is not for cutting off gaseous communication with the soil-pipe, but merely to facilitate the collection and ready removal of such matter as should, if possible, be excluded from all house-drainage pipes.

The theory under which I dispense with what are intended to serve as sewer gas-traps (but seldom so operate) is, that house-drain pipes, by being siphoned at more or less frequent intervals, and freely supplied with fresh air following each flushing operation, will not and cannot contain gases offensive or dangerous to health, especially if during the intervals between the flushing operations an absolutely-reliable gas-trap is afforded at the siphon between the sewer-connections and the main soil-pipe of the house.

As here shown, the vertical soil-pipe E extends from the cellar of the house through the roof in a direct line, and this I deem important in all cases. At its top the soil-pipe E communicates with the open air, and may or not be provided with a cap. A ventilating-cowl of small capacity may be applied thereto; but I prefer that all air-currents in said pipe should be downward. Near the roof, or at any other desirable point, I couple said vertical soil-pipe with a flushing-tank, E′, which may contain any of the well-known mechanisms for automatically discharging its contents into the soil-pipe.

For disinfecting the soil-pipe after each flushing operation it is sometimes desirable to interpose between the tank E′ and the soil-pipe a chamber, F, to be filled with suitable

disinfecting-salts—such as sulphate of iron (copperas) resting upon a loose mass of fibrous matter—and said chamber is located below a bend in said connecting-pipe, and respectively coupled thereto and with the soil-pipe, so that during each flushing operation said chamber will be filled with water without in any manner impairing the rushing velocity of the water in large volume into the soil-pipe, and also so that after each flushing operation the liquid contents of the chamber will pass downward into the soil-pipe. The intervals between the flushing operations and the consequent intervals between the delivery of the disinfectant can be varied according to the graduated supply of water to the tank, as from a street-main or other available source.

At the foot of the vertical soil-pipe, and coupled thereto, is what I term the "main soil-pipe" G, usually located in the cellar of a building, as shown, and secured to a side wall thereof. I deem it advisable that its joints be wholly exposed, in order that any leakage may be at once detected and corrected. I also deem it desirable that said main pipe be of considerable length and inclined downward toward its outlet, as shown. Said main soil-pipe should generally be considerably larger in diameter than the vertical soil-pipe, and be provided with an upwardly-turned elbow, G′, with which the flushing apparatus H is connected, this latter being in turn connected with the sewer I by the usual drain-pipe, I′, this latter being as much lower than the main soil-pipe as circumstances will permit.

It is to be understood that the flushing apparatus H can be widely varied in its construction without departure from certain features of my invention, provided it is sealed against the escape of offensive gases, operates as a positively-closed trap against the entrance of sewer-gases to the main soil-pipe during its quiescent intervals, and is capable of so permitting the rapid discharge of accumulated liquid and solid contents from said soil-pipes as to also withdraw gases therefrom, and, still further, to cause them to be filled with fresh air. I have, however, here shown an automatic flushing-siphon which was devised by me, as hereinbefore indicated, and said siphon is so organized that it is automatically operated by the liquid contents of the soil-pipes at more or less frequent intervals, which may be readily varied to meet requirements from time to time.

The attachment to a house drain or soil pipe of a flushing apparatus capable of being intermittingly operated by the contents of said drain or pipe I believe to be a novel feature, and its value will be obvious when it is considered that in many cases a large and wasteful use of water would be required for effecting the clearance of the pipes, which I am enabled to accomplish by the use of sewage alone. If, however, a waste of water be of no consequence, it is always desirable that it be used freely; but with my apparatus it can be best admitted directly into the soil-pipes, and thus not only serve by its weight for flushing, but also by its flow between the flushing operations to thoroughly cleanse said pipes.

My flushing-siphon H, as here shown, differs in some valuable particulars from that illustrated in my aforesaid prior application for Letters Patent, and it is best illustrated on Sheet 2. The elbow G′ of the main soil-pipe is provided with a flange, *a*, pierced for the passage of bolts *b*. The siphon-head or ball-chamber *c* at its front downwardly-curved end has a flange, *d*, also pierced for the reception of said bolts *b*, and said head at its rear end is in any suitable manner thoroughly coupled to the drain-pipe I′. Between the flanges *a* and *d* is the ball-seat chamber *e*, squared up at its top and bottom edges, and provided with gaskets in the form of disks of lead, rubber, felt, or other suitable packing material, so that when the several bolts *b* are in place and their nuts tightened up said chamber will be securely clamped between the two flanges *a* and *d*. It will be readily seen although the ball-chamber or siphon-head and the soil-pipe elbow be firmly mounted—*i. e.*, so as to be practically immovable—that they will nevertheless be capable of being sprung apart slightly, if the bolts be properly loosened, and that upon removal of the bolts at one side of the ball-seat chamber the latter can be readily removed laterally and be as readily replaced. In its best form said ball-seat chamber is made of transparent glass, whereby its interior can be investigated.

I am aware that ball-traps have heretofore had transparent-glass casings; but I think I am the first to provide a detachable transparent ball-seat chamber in connection with a separate ball-chamber, whereby not only can the interior be inspected, but also whereby a durable and non-corrosive inclined ball-seat is cheaply provided.

I am also aware that ball-seat chambers in other forms of trap have heretofore been detachable, but only after more or less derangement of the pipes connecting therewith, thus differing from my seat-chamber, which is interposed between parallel flanges of a fixed elbow and a fixed siphon-head, so that said chamber may be moved laterally without disturbance of the head or elbow, thus preserving the adjacent joints intact. The ball *f* within the siphon is composed of wood or metal or rubber or any other suitable material, and is of such size that it snugly fits the interior of the ball-seat chamber, so as to require pressure from beneath for releasing it from its seat. The upper portion of the head *c* is so constructed internally that the ball, after leaving its seat, is carried upward by a rush of liquid to the upper portion of the head on supporting-ways *f′*, and is there retained until siphonage ceases, whereupon it rolls backwardly and drops to its seat.

As thus far described, it is to be understood that the ball and its inclined seat are of such a character that the ball, when fully seated, can

only be displaced by pressure applied to and below the ball. Referring now to Fig. 1, it will be assumed that the ball in its lightest contact with its seat can be displaced by the pressure thereon of the contents of the soil-pipes when at the height indicated by the lower dotted line, x, and also that said ball may be so firmly seated as to require such maximum pressure as would result if the vertical pipe were filled to the height of the dotted line x'. Under these circumstances the contributions to the soil-pipe from its various laterals will occasion intermitting rushing discharges through the siphon and into the sewer, and during each discharge fresh air will be drawn into the vertical soil-pipe, and after each discharge the ball will fall to its seat and securely seal the mouth of the main soil-pipe against the entrance of gas from the sewer. It will be observed that when the ball is thrown from its seat the entire outward passage through the pipes to the sewer is wholly unobstructed. Should masses of paper, rags, or other similar matter chance to accumulate below the ball, they would only serve to more effectually close the siphon, and merely involve correspondingly greater pressure for operating it, and as one safeguard against the rising of the liquid in the vertical soil-pipe above the entrances to its lowest series of laterals I introduce a small vent-pipe, g, which extends horizontally from said soil-pipe above the line x' to the open air above the surface of the ground. This pipe g, when the siphon operates properly, serves also as an air-inlet.

In order to provide for unusually frequent operations of the siphon during stormy weather, the main soil-pipe is extended, as at G^2, beyond its connection with the vertical pipe, and is then connected with a down-pipe, K, outside the building, and communicating with the gutters of the roof, so that the collected rain-fall not only enters the soil-pipe, as has been done heretofore, but in this combination it for the first time serves to more frequently operate the siphon and cause fresh air to be more frequently drawn into and circulated through the vertical soil-pipe and its laterals. In this connection it is to be understood that a small air-inlet pipe extended from the open air to the main soil-pipe near the siphon, as indicated at h in dotted lines, will be generally desirable, so that as soon as the liquid contents cease to fill the soil-pipe G below the siphon air can enter for enabling the contents of the sewer-pipe I' to be rapidly discharged and the ball to promptly fall to its seat.

For affording a sewerage-connection in the event of necessary repairs to the siphon, I introduce a "cut-out" pipe, G^3, provided with a suitable gate or valve, by which the contents of the soil-pipe G may pass around the siphon to the sewer-pipe I', as illustrated in Fig. 2.

With the apparatus as thus described reliable and satisfactory results can be obtained; but I deem it advisable for guarding against all possible contingencies in the failure of the siphon to operate when an ample quantity of matter has accumulated within the soil-pipes to warrant flushing, and therefore I have introduced mechanically-operated tripping devices, whereby additional pressure is applied to the ball to aid in releasing it from its seat. This mechanism embodies a vertically-sliding ball-rod, i, in a loose housing formed in a thickened portion of the soil-pipe elbow G', and provided with a packing, i', either in the flange of said elbow within the ball-seat chamber e or at the lower end of its housing. The upper end of the rod i is bent inwardly slightly, so as to engage with the ball when said rod is forced upwardly. In some cases the housing of this rod is sufficiently large at its upper end to receive the bent end of said rod, as when the ball-seat chamber is to be removed. Another portion of the tripping mechanism consists of a lever, k, pivoted at one end to said sliding rod i, and at its other end to a vertically-sliding post or bar, l, provided with one or more guide-brackets, m, extending from an adjacent wall. Upon the bar l a tripping-tank, n, is mounted, and said tank and bar are maintained normally in an elevated position by means of an expansive spiral spring, l', encircling said bar, and having its base on the bracket m. The upper end of said spring is engaged by a set-nut, l^2, tapped to the bar l, and below the bracket m said bar is provided with a sliding collar, l^3, having a set-screw, thus enabling said spring to be adjusted so as to support the tank n, without depressing the bar l, until the weight of said tank is properly supplemented by liquid deposited therein. It is obvious that a tripping-tank mounted on said rod might be supplied with water by way of a cock from a house service-pipe, and organized in a well-known manner for discharging its contents as soon as it had depressed the rod and tripped the ball, and it is to be understood that such may be done without departure from certain portions of my invention. In its best form, however, this tripping apparatus is operated by liquid supplied by the soil-pipe as follows: The tank is coupled to the soil-pipe by means of a small pipe, o, coiled, as shown, to admit of free vertical movement of the tank, and access to its interior from the open air is afforded by the similarly-coiled pipe o', so that as the liquid backs up in the soil-pipe it rises into the tank until it has a sufficient weight thereof to overcome the spring and trip the ball, whereupon, as the siphonage proceeds, the contents of the tank return to the soil-pipe and the tank rises, thus depressing the ball-rod i. The air-pipe o' not only serves as a vent for air during the filling of the tank with liquid, but also as an air-induct for permitting the liquid to freely leave the tank, and also for admitting air to the soil-pipe.

While I prefer to employ all of the several features of my invention, substantially as

shown and described, it will be obvious from the foregoing description that certain portions can be successfully used independently of others.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination of a vertical soil-pipe communicating at its top with the open air, a main soil-pipe coupled to the foot of the vertical pipe, and an automatic flushing apparatus connected with said main pipe and with a pipe leading to a sewer, substantially as described, whereby at intervals the liquid, solid, and gaseous contents of the main and vertical pipes will be automatically withdrawn and discharged into the sewer and the soil-pipes and their laterals ventilated, as set forth.

2. The combination of a ventilated vertical soil-pipe, a main soil-pipe, an automatic flushing-siphon coupled to said main pipe between it and a sewer, and a down-spout, for receiving rain-water from a roof, coupled to said main soil-pipe, substantially as described, whereby during a rain-storm the soil-pipes are frequently cleansed of liquids and gases and ventilated by the intermitting action of the siphon, due to the water delivered from the roof to the soil-pipes, as set forth.

3. The combination of an upwardly turned and flanged soil-pipe elbow, the flanged siphon-head or ball-chamber, the detachable ball-seat chamber interposed between the parallel flanges of the head and soil-pipe elbow, and bolts engaging with said flanges for clamping the ball-seat chamber in position, and for enabling it to be removed laterally without disturbance of the soil-pipe or said head, substantially as described.

4. The combination, with the flanged siphon-head or ball-chamber, flanged soil-pipe, elbow, and bolts, of the ball and the detachable ball-seat chamber composed of transparent glass, substantially as described, whereby the ball-seat chamber can be readily detached from the siphon-head and soil-pipe and the ball-seat rendered accessible for convenient observation and a non-corrosive seat afforded for said ball, as set forth.

5. The combination, with the soil-pipes, of the ball-siphon, the ball-tripping rod, and a tripping-tank alternately filled and emptied for operating the ball-rod and tripping the ball, substantially as described.

6. The combination, with the main soil-pipe and the flushing-siphon embodying a ball and a seat for said ball, of a ball-tripping rod, a tank supported by a spring for operating said rod, and pipes for connecting said tank with said soil-pipe and also with the open air, substantially as described, whereby liquid from the soil-pipe, by rising into said tripping-tank, causes the latter to descend and release or trip the ball from its seat in the siphon, and also whereby, after the siphon has ceased to operate, the tripping-tank is emptied and caused to resume its normal position, as set forth.

HARVEY C. LOWRIE.

Witnesses:
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