

(No Model.)

4 Sheets—Sheet 1.

J. E. BOYLE.  
SIPHON WATER CLOSET.

No. 372,199.

Patented Oct. 25, 1887.

Fig. 1

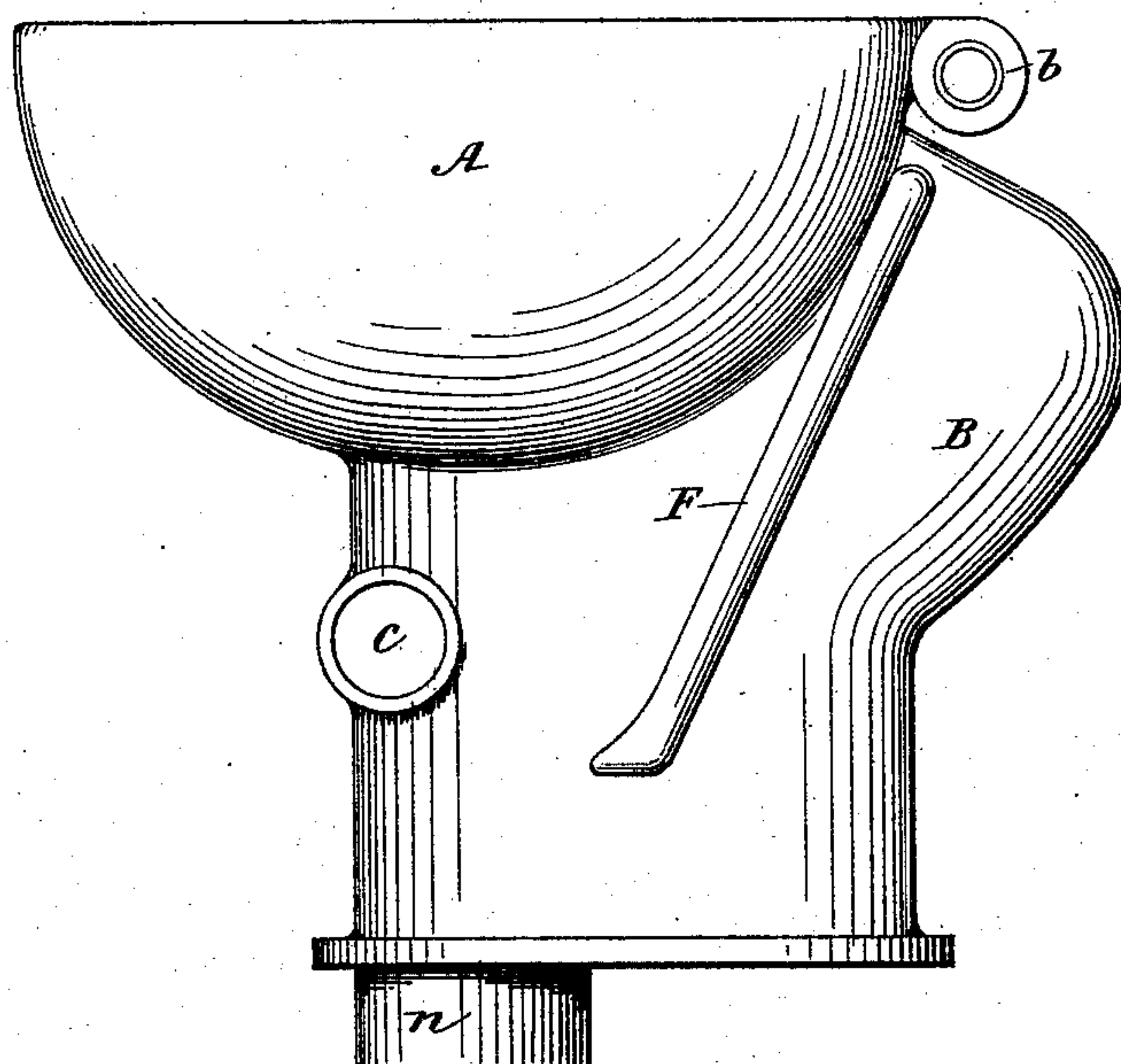
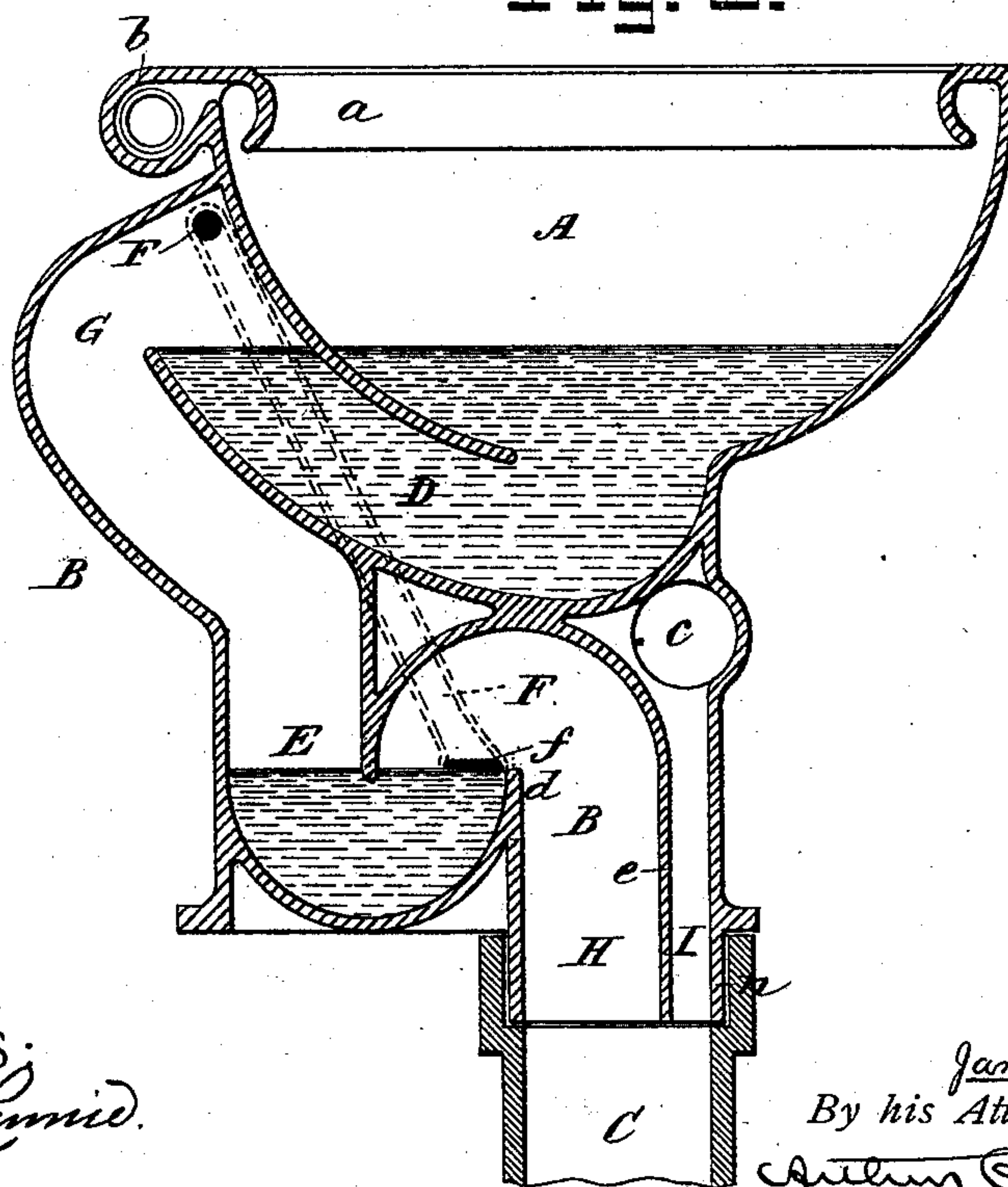


Fig. 2.



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Fig. 7.

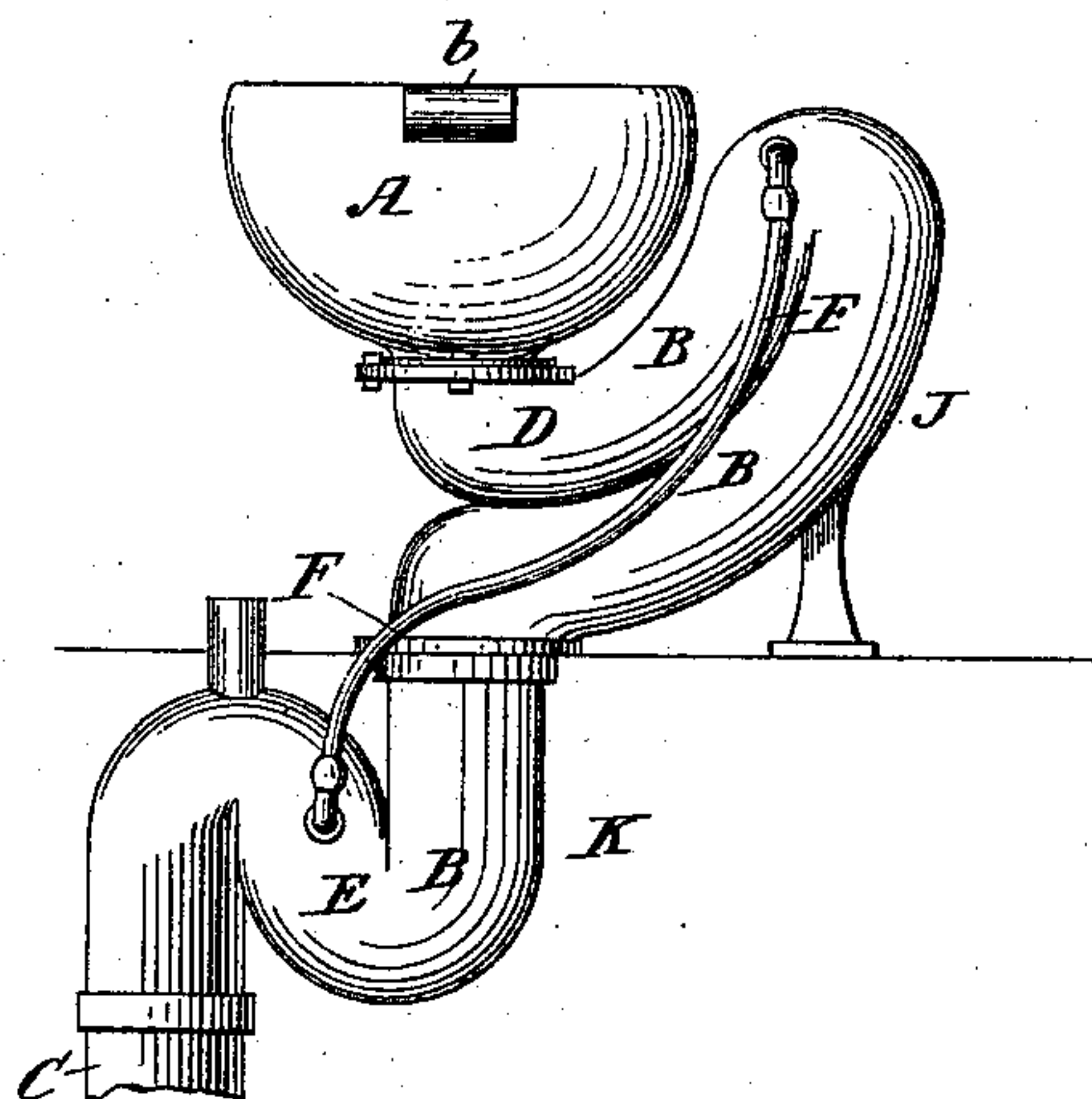
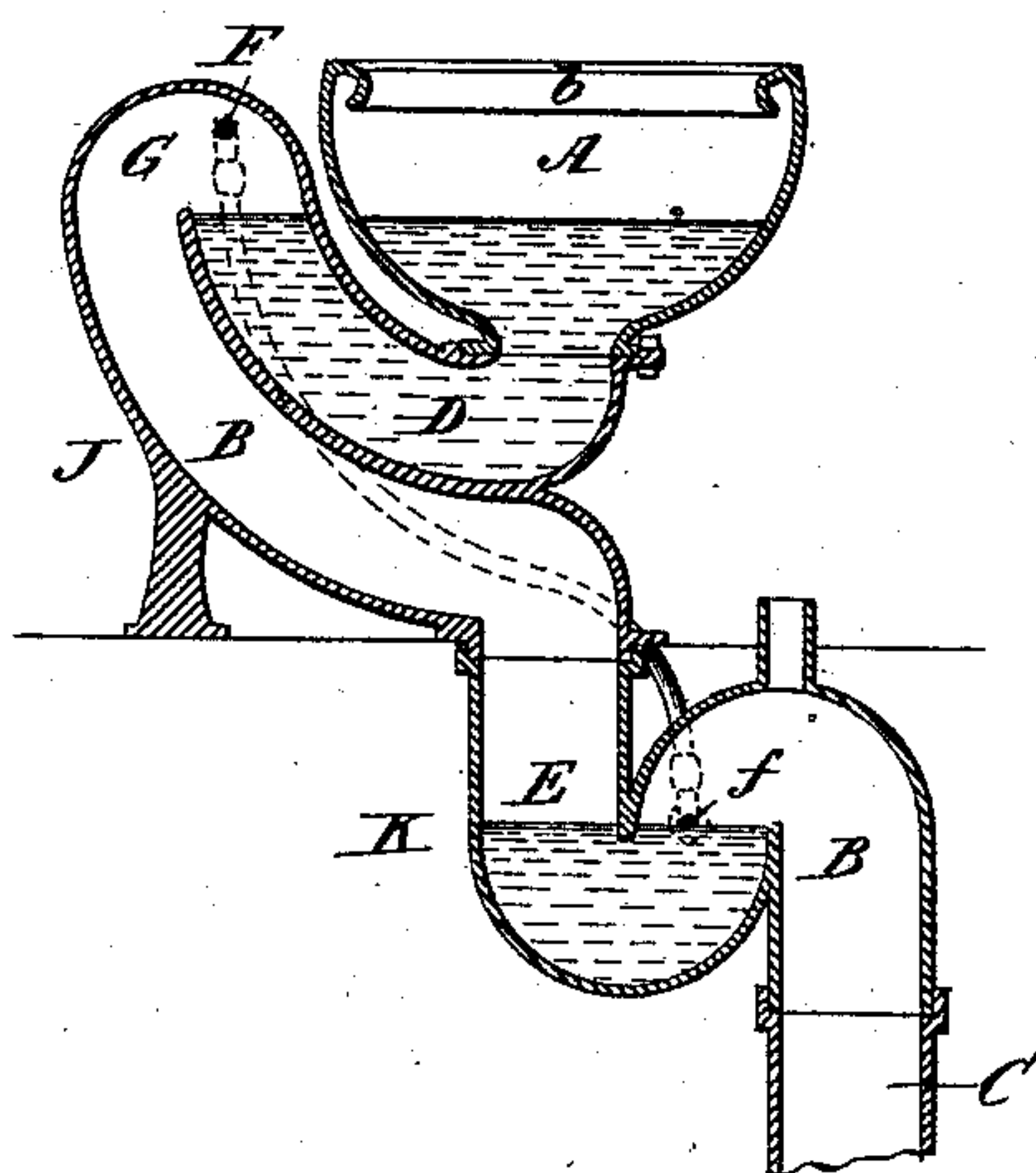


Fig. 8.



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Fig. 9.

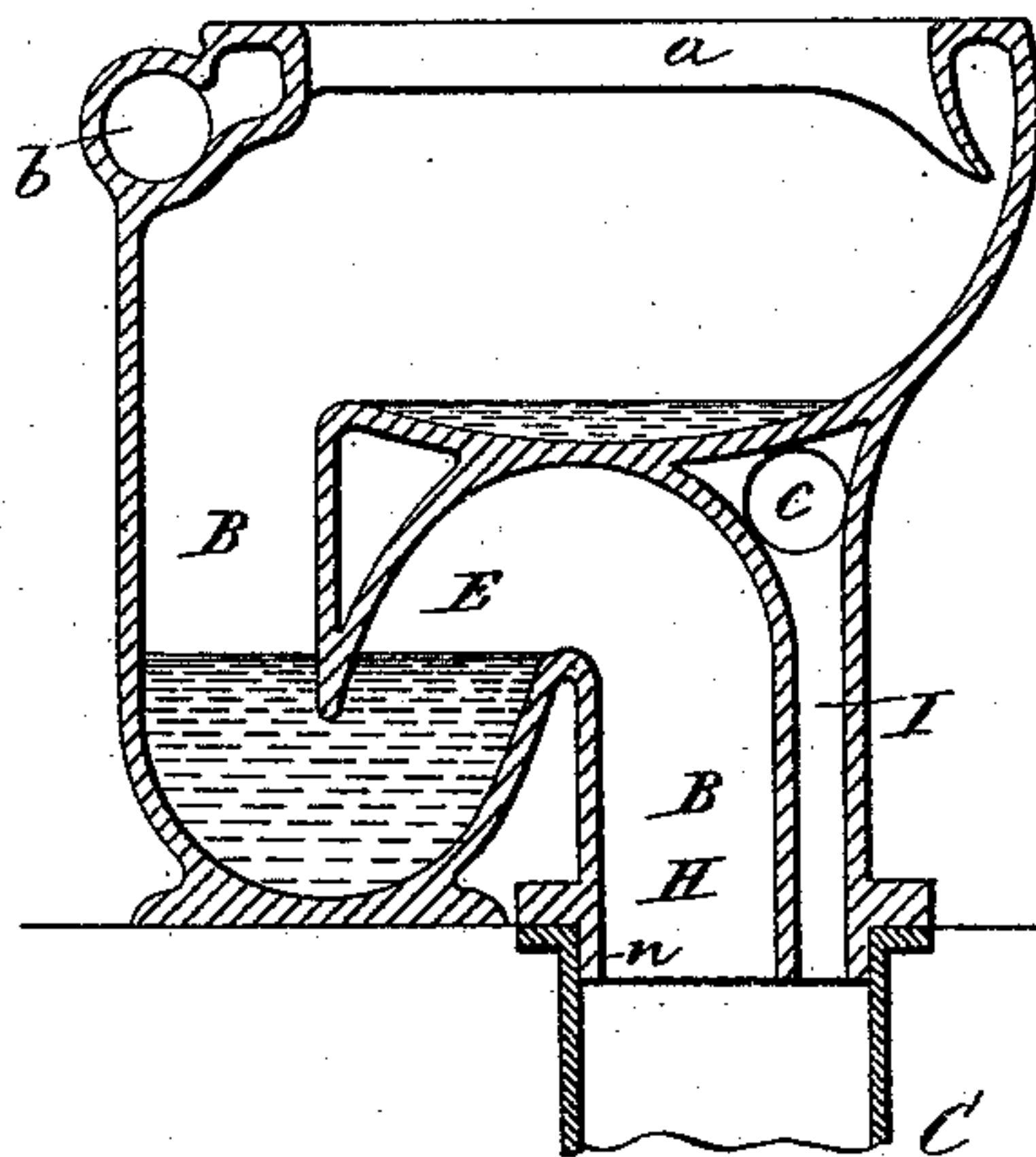
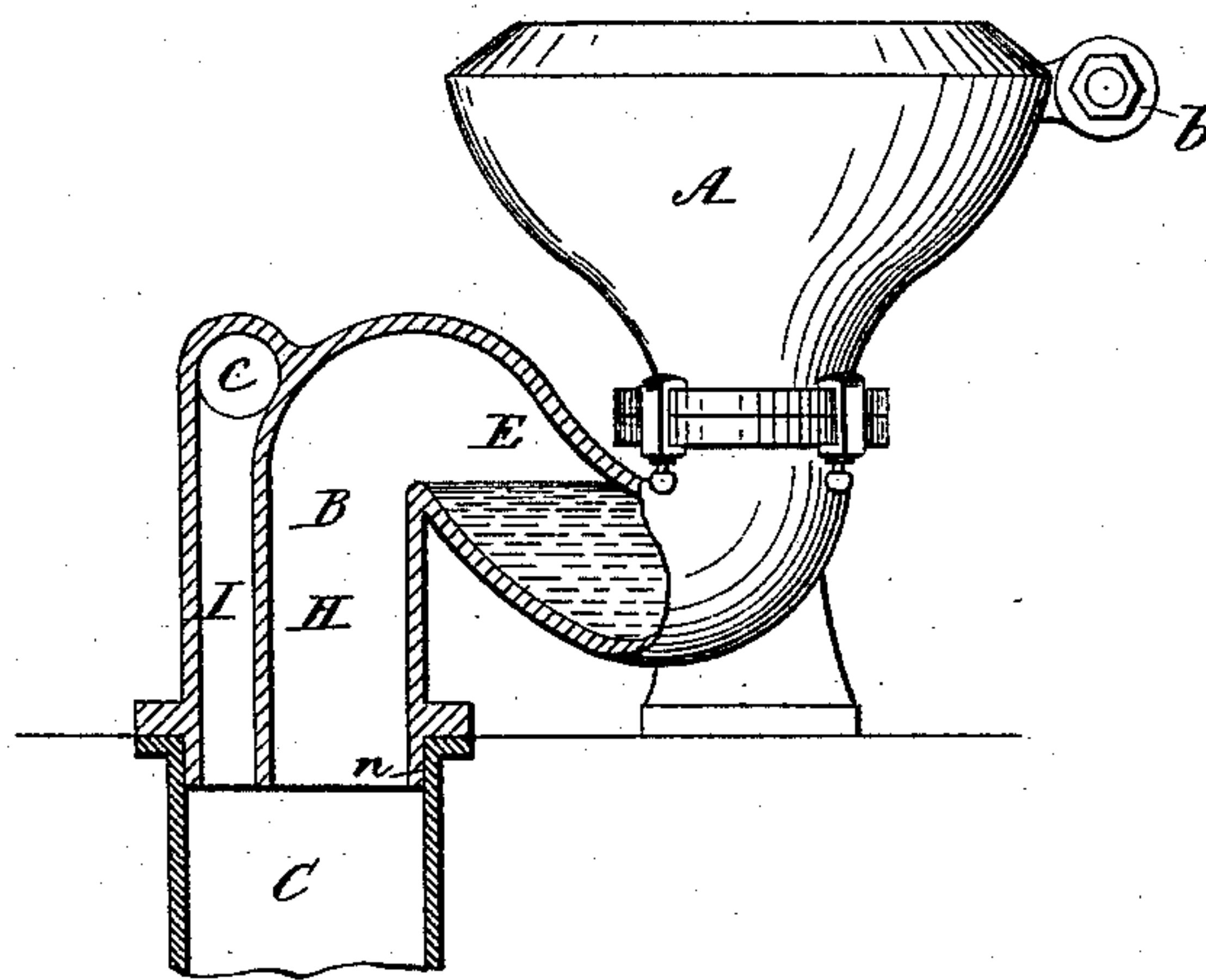


Fig. 10.



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# UNITED STATES PATENT OFFICE.

JAMES E. BOYLE, OF BROOKLYN, NEW YORK.

## SIPHON WATER-CLOSET.

SPECIFICATION forming part of Letters Patent No. 372,199, dated October 25, 1887.

Application filed June 20, 1887. Serial No. 241,824. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES E. BOYLE, a citizen of the United States, residing in Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Siphon Water-Closets, of which the following is a specification.

This invention relates principally to what I will herein refer to as "siphon" water-closets as contradistinguished from "pneumatic" closets. In the former the bowl is siphoned by an outflow which is started by running water into the bowl above its usual level, and thereby causing a strong outflow through the soil-passage. In the latter the bowl is siphoned by the suction of a partial vacuum formed by drawing the air from a confined space between two traps in the soil-passage. A pneumatic closet requires a pneumatic tank for operating it, with two pipes for water and air leading from the tank down to the closet-bowl. A non-pneumatic siphon-closet is operated by a simple flush tank, with only a single pipe connecting with the bowl. It thus is much cheaper than a pneumatic closet and considerably simpler. With these advantages it possesses the disadvantages of being sluggish in action, the bowl having to be filled up with water nearly to the flushing-rim before a sufficient outflow is established to start the siphon and empty the bowl, and of requiring a large amount of water to properly operate it.

My present invention aims to improve the construction of closets of this class and to overcome in some measure the disadvantages heretofore inherent in them.

According to my present invention I make the bowl and soil-passage, as heretofore, with two bends or traps—the upper one to hold a quantity of water in the bowl and the lower one to form a closed space below the upper trap when the outflow is taking place. The lower trap has heretofore been a mere water-pocket, with no isolation of the space above it when at rest. I make it with a dip in order that at all times it shall constitute a trap. I provide an air-passage extending from the upper part of the air-space between the traps and opening into the soil-passage beneath the lower trap in such position that when at rest its lower end shall be opened, but when the

outflow is taking place it shall be submerged in the outflowing water and thereby sealed; hence the air-space between the two traps is normally in communication with the soil-passage beneath, and is not a confined-air space until the outflow is started, when it at once becomes isolated and acts as the long leg of the siphon for drawing the water from the bowl.

My invention also introduces a feature of construction whereby the lower trap is made the short leg of a second siphon, which, when the bowl is in operation, coacts with the first to draw the water out of the bowl. To this end the soil-passage below the lower trap is divided by a vertical partition into two portions, the larger of which constitutes the long leg of the lower siphon and the smaller of which constitutes a "back-air" passage for connecting the soil-pipe to the "back-air pipe," by which it is ventilated. The latter portion of my invention is applicable also to "wash-out" and "hopper" closets.

In the accompanying drawings I have shown two constructions embodying my invention, in one of which the lower trap is above the floor and the closet is made of one piece of earthenware, and in the other of which the lower trap is beneath the floor and the closet is made of sections fastened together. Figures 1 to 6 show the former construction, and Figs. 7 and 8 the latter.

Fig. 1 is a side elevation. Fig. 2 is a vertical mid-section looking from the opposite side. Fig. 3 is a front elevation. Fig. 4 is a rear elevation. Fig. 5 is a section answering to Fig. 2, but showing the closet in operation. Fig. 6 is a transverse section cut in the plane of the lines 6 6 in Fig. 5. Fig. 7 is a side elevation, and Fig. 8 is a vertical mid-section looking from the opposite direction. Fig. 9 is a vertical section of a wash-out closet, and Fig. 10 is a similar section of a "short-hopper" closet.

Referring to the drawings, let A designate the bowl or basin of the closet, of which *a* is the flushing-rim; B, the soil-passage leading from the bowl to the sewer-pipe; C in Figs. 5, 7, and 8, the usual iron soil pipe; D, the upper trap or bend in the soil-passage, by which water is retained in the bowl, and E the lower



trap or bend. The pipe-connection for the flushing-pipe is lettered *b*, and that for the back-air pipe is lettered *c*.

Between the two traps D and E is an air-space, G, in the soil-passage, and from the upper part of this air-space an air passage or duct, F, extends downward and opens into the soil-passage beyond the lower trap, entering it by an opening, *f*, which is located above the water-level in the lower trap, so that it is not sealed thereby when the water is at rest, and at such height that when the water is overflowing the lower trap the opening becomes sealed by the water which rises up and submerges it. I prefer to elongate the opening *f* and arrange it just above the water-level, as shown in Fig. 2. The dip of the lower trap is very shallow, in practice being only about a half or quarter inch, while that of the upper trap is of the usual depth. Heretofore in closets of this character the lower trap has been a mere water-pocket without any dip, so that when the closet was at rest the air-space G had free communication with the soil-pipe through this trap. In my new closet the air-space is in communication with the soil-pipe through the passage F when the closet is at rest.

The operation is as follows: When the closet has been used and is to be flushed, the flushing-tank is operated and a full stream of water flows into the bowl through its flushing-rim. The level of water in the bowl is thus raised, and the water consequently commences to flow out through the trap D into the air-space G and down into the trap E. The first effect of this is to displace some of the air in the air-space G, and consequently to slightly compress this air; but this compression is instantly relieved by an escape of air out through the passage F, the opening *f* of which is not yet sealed. The outflow increases, and as the water flows through the lower trap and sweeps over the dam *d* thereof its level adjacent to the dam rises, and it submerges and seals the opening *f*. The air-space G now becomes a confined-air space, which constitutes this portion of the soil-passage the long leg of a siphon, the short leg of which is the upper trap, D. The outflow through the siphon thus formed quickly produces a suction, (on the well-understood principle by which siphons operate,) and the water is presently drawn from the bowl with a rush, creating a strong and full current, as indicated in Fig. 5, which continues until so much of the water is drawn out of the bowl that the dip of the trap D is unsealed and air is admitted to the space G, which momentarily breaks the vacuum and checks the siphoning, which, however, is quickly resumed as soon as the inflowing flushing-water has so far filled the bowl as to again seal the trap D. The vacuum may thus be broken once, twice, or more while the flush continues, air being each time drawn in from the bowl, whereby all foul odors resulting from the use of the closet are drawn into the sewer-pipe. Finally, the supply of flush-

ing-water stops and the vacuum is finally broken, whereupon the siphoning operation ceases and the parts come to rest. The bowl is then nearly empty, but is slowly refilled by a small stream or "after-wash" which trickles down to it from the flushing-tank, and which stream continues until the bowl is quite full.

During the siphoning operation water is drawn up by the suction from the trap E into the passage F, thus first by drawing water from the trap hastening the siphonic outflow and by its weight maintaining subsequently the vacuum in the air-space.

It will be understood that the water-level in the bowl is first raised above the normal until the suction commences, and is then drawn down until the bowl is siphoned and the vacuum broken, as in all closets of this class. The preliminary raising of the water in the bowl does not continue so long in my closet, nor does the water-level rise so high as in siphon-closets heretofore made. In previous closets the action is delayed by the preliminary compression of the air in the space between the two traps, which, being "air-bound," presses back against the water in the upper trap and resists the flow of water from the bowl. In my closet this compression is avoided by means of the air-passage F, which permits the compressed air to escape, and the action is consequently much more prompt.

In the construction of closet shown in Figs. 1 to 6 the several parts are made in one piece of porcelain and the lower trap comes above the floor. The passage F is molded upon the exterior of the structure, as shown in Fig. 1, its shape in cross-section being shown in Fig. 6. The dimensions for such a closet that are enforced by custom and convenience necessitate a "fall" of only about eight inches from the upper to the lower trap—a length for the long leg of the upper siphon which is hardly sufficient of itself to produce a desirably forcible outflow. On this account I construct a lower siphon to co-operate with the upper one, and thereby secure a greater total fall. The passage B beyond the lower trap curves around the edge of the dam *d* and extends down to the bottom of the neck *n* of the bowl, being bounded by a partition, *e*, which divides the interior of the cylindrical standard beneath the center of the bowl into two portions, H and I, as shown in Figs. 2 and 6. The portion H constitutes the long leg of the lower siphon, and the portion I constitutes an air-passage for connecting the back-air connection *c* with the soil-pipe C beneath the neck *n*. Were this partition omitted the soil-passage just beyond the lower trap would be connected with the back-air pipe, and hence could not act as a siphon, since its suction would be destroyed by air entering through the back-air pipe; but by thus isolating this portion down to the bottom of the neck it is constituted a part of the siphon and an additional fall of about five inches is secured. At the same time the soil-pipe is as perfectly back-



aired as if the portions H and I were not separated.

The construction shown in Figs. 7 and 8 does not include the feature of my invention last described. The bowl A alone is here made of porcelain, and it is fastened to a cast-iron bag-trap, J, above the floor. Beneath the floor is an iron-trap casting, K. The upper trap is formed in the casting J and the lower trap in the casting K, as shown. The fall between the respective traps is so great that there is no need of continuing the lower trap to form a second siphon H, as above described. The air-passage F is formed by means of a lead pipe, the opposite ends of which are joined to couplings which are screwed to the castings J and K, respectively.

Fig. 9 shows a wash out closet to which a part of my invention is applied. The standard beneath the bowl is divided by a partition, e, into two parts, H and I, the former of which constitutes the down-leg of the trap and continues an unbroken siphon down to the outlet from the bowl, while the portion I forms a back-air passage for connecting the soil-pipe with the back-air-pipe connection c, as already described. The isolation of the long leg of the trap from the back air constitutes it a siphon and causes a more powerful outflow through the trap. It results from this that the trap can be given a deeper dip than usual, thus more effectually excluding sewer gas from the room.

Fig. 10 shows the same construction applied to an ordinary trapped hopper-closet. The bowl A and trap portion J are made in separate pieces of earthenware, as usual, and joined together by means of flanges. The descending leg of the trap portion is divided by a partition, e, into the down leg H of the trap and the vent-passage I, leading to the back-air connection, c, as already described.

My invention is susceptible of considerable modification in proportions, material, and details of construction, as will be understood by those skilled in the art.

What I claim as my invention in water-closets is the following defined novel features or combinations, substantially as hereinbefore specified, namely:

1. A water closet consisting of the combination of a bowl, a soil-passage leading therefrom, an upper trap in said passage by which water is retained in the bowl, a lower trap therein by which an air-space is formed between the two traps, and an air-passage leading from said space and opening into the soil-passage beyond the lower trap and above the water-level therein, in such position as to be

unsealed when the closet is at rest and submerged when the outflow is taking place.

2. A water-closet consisting of the combination of a bowl, a soil-passage leading therefrom, an upper trap in said passage by which water is retained in the bowl, a lower trap therein by which an air-space is formed between the two traps, and an air-passage leading from the upper part of said space and opening into the soil-passage beyond the lower trap close above the water-level therein and adjacent to the dam thereof, whereby it is unsealed when the closet is at rest and submerged when the water is flowing out over the dam.

3. A water-closet consisting of the combination of a bowl, a soil-passage leading therefrom, an upper trap in said passage by which water is retained in the bowl, a lower trap therein by which an air-space is formed between the two traps, and an air-passage leading from said space and opening into the soil-passage beyond the lower trap and above the water-level therein, all formed in one piece of porcelain.

4. A water-closet consisting of the combination of a bowl, a soil-passage leading therefrom, a trap in said passage, a back-air connection, and a partition in the soil-passage constructed to separate the down leg of said trap from the back-air connection and thereby constitutes said leg the long leg of the siphon.

5. A water-closet consisting of the combination of a bowl, a soil-passage leading therefrom, a trap in said passage, a back-air connection at the crown thereof, and a partition in the soil-passage extending downwardly from said connection and constructed to separate the down leg of said trap therefrom and to form a separate vent-passage extending from said connection to the neck of the trap, where it connects with the soil-pipe.

6. A water-closet consisting of the combination of bowl A, soil-passage B, bent to form traps D and E, with intervening air-space G, back-air connection c, and partition e, dividing the lower portion of the passage into a siphon-leg, H, forming a continuation of the lower trap, and a vent-passage, I, communicating with said connection, whereby the soil-passage forms a continuous siphon from the bowl through the lower trap and down to the bottom of said partition.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JAMES E. BOYLE.

Witnesses:

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GEORGE H. FRASER.