

(No Model.)

3 Sheets—Sheet 1.

W. SMITH.
URINAL.

No. 594,438.

Patented Nov. 30, 1897.

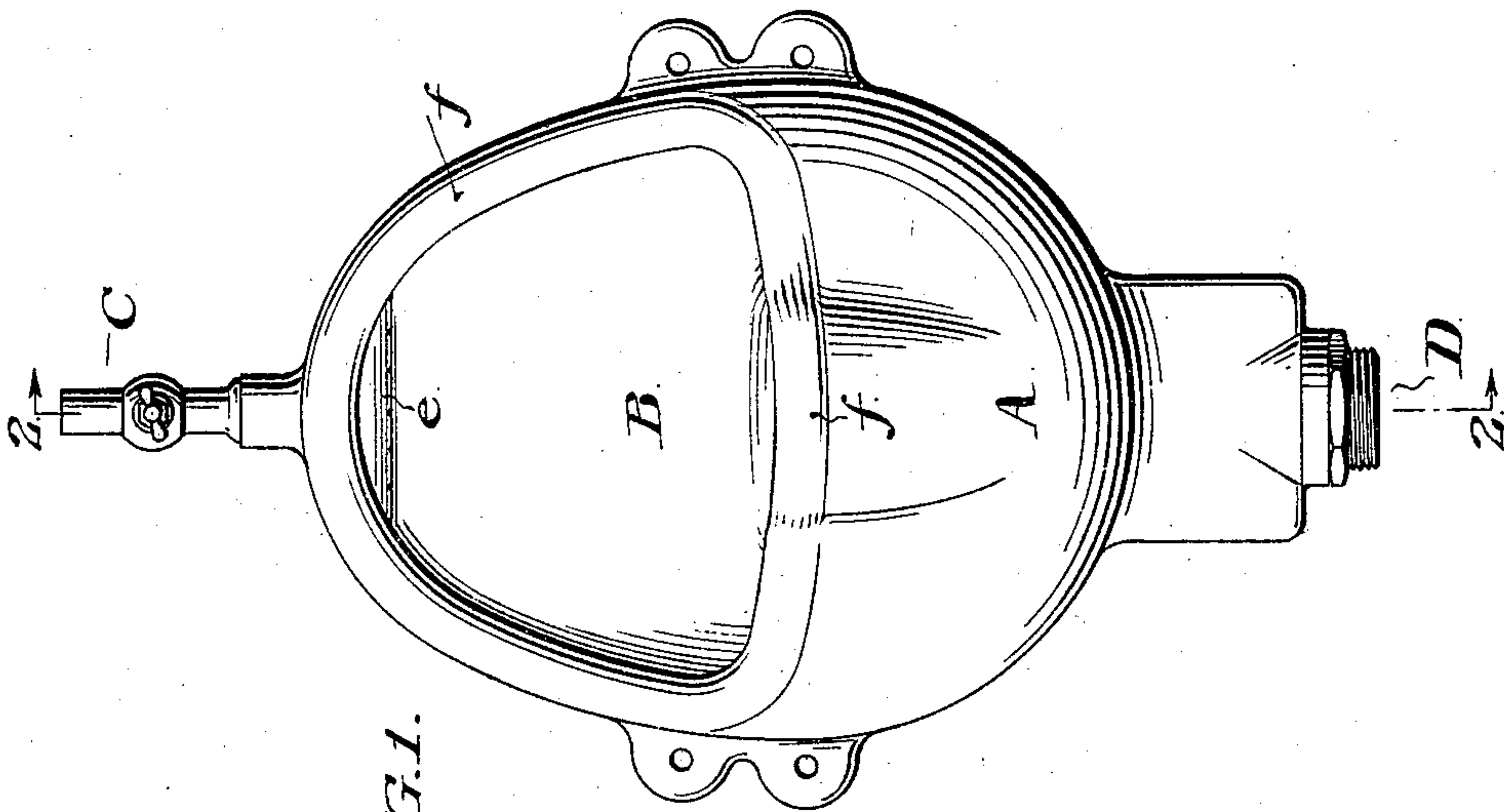


FIG. 1.

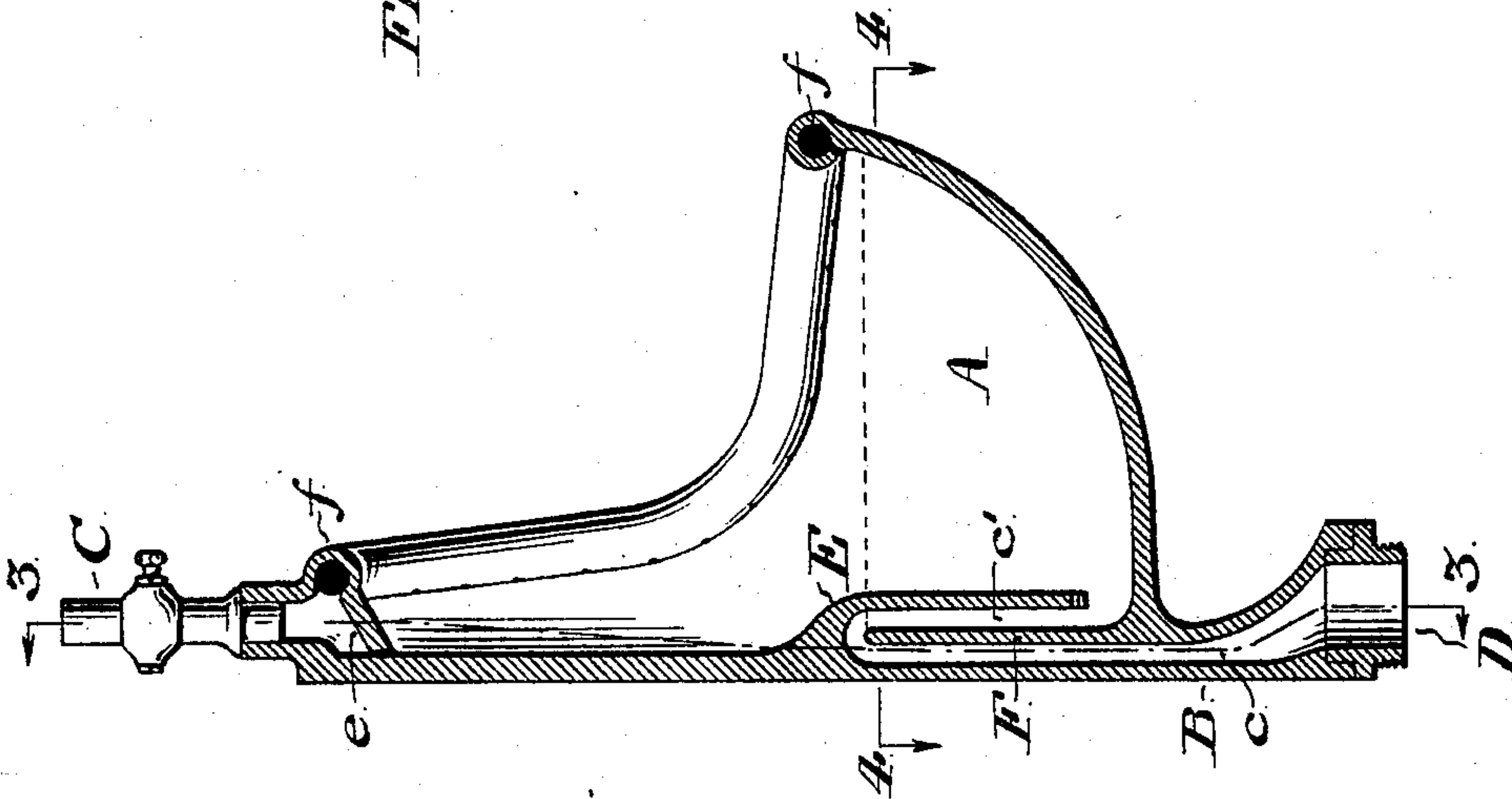


FIG. 2.

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Attorney

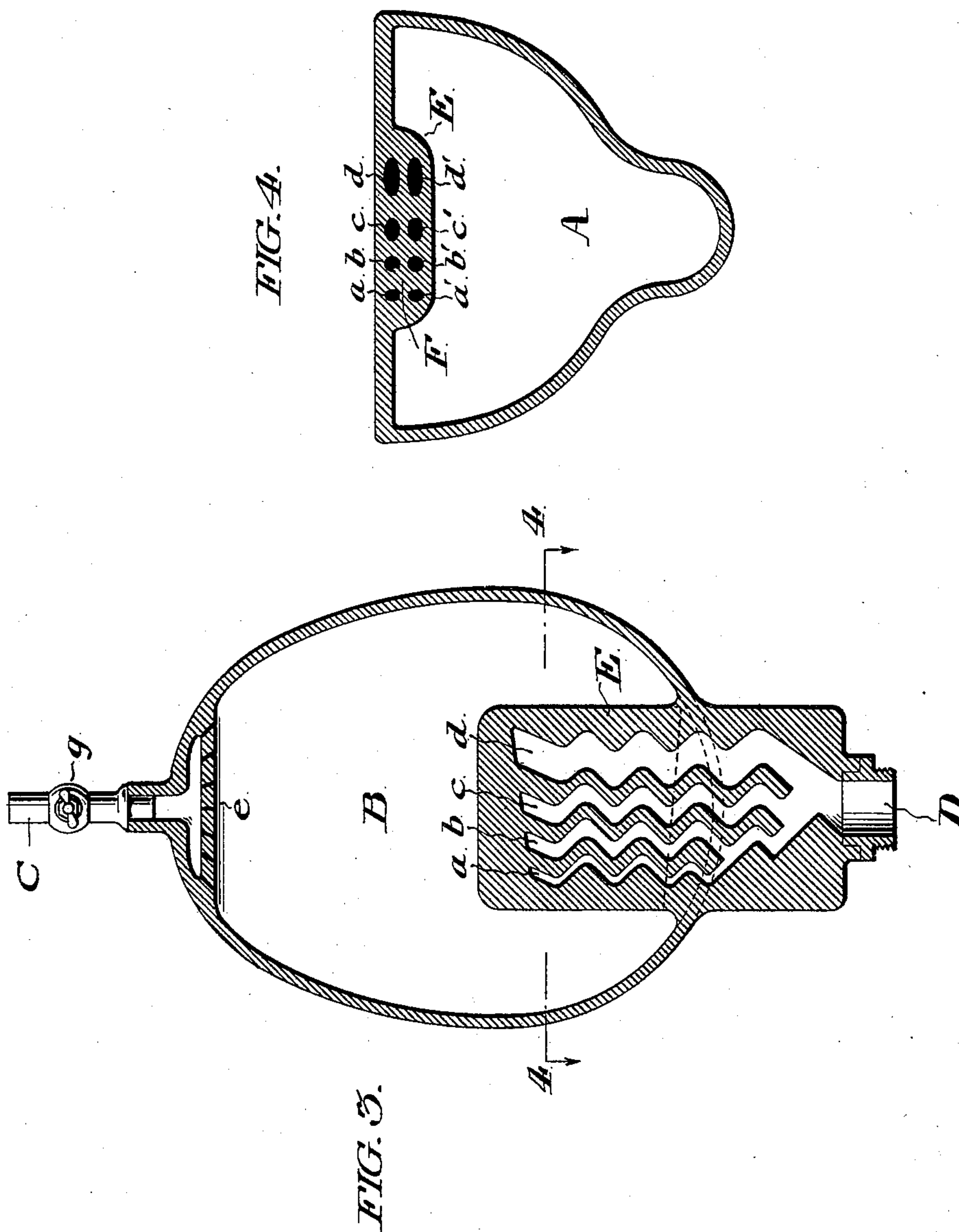
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WITNESSES:

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3 Sheets—Sheet 3.

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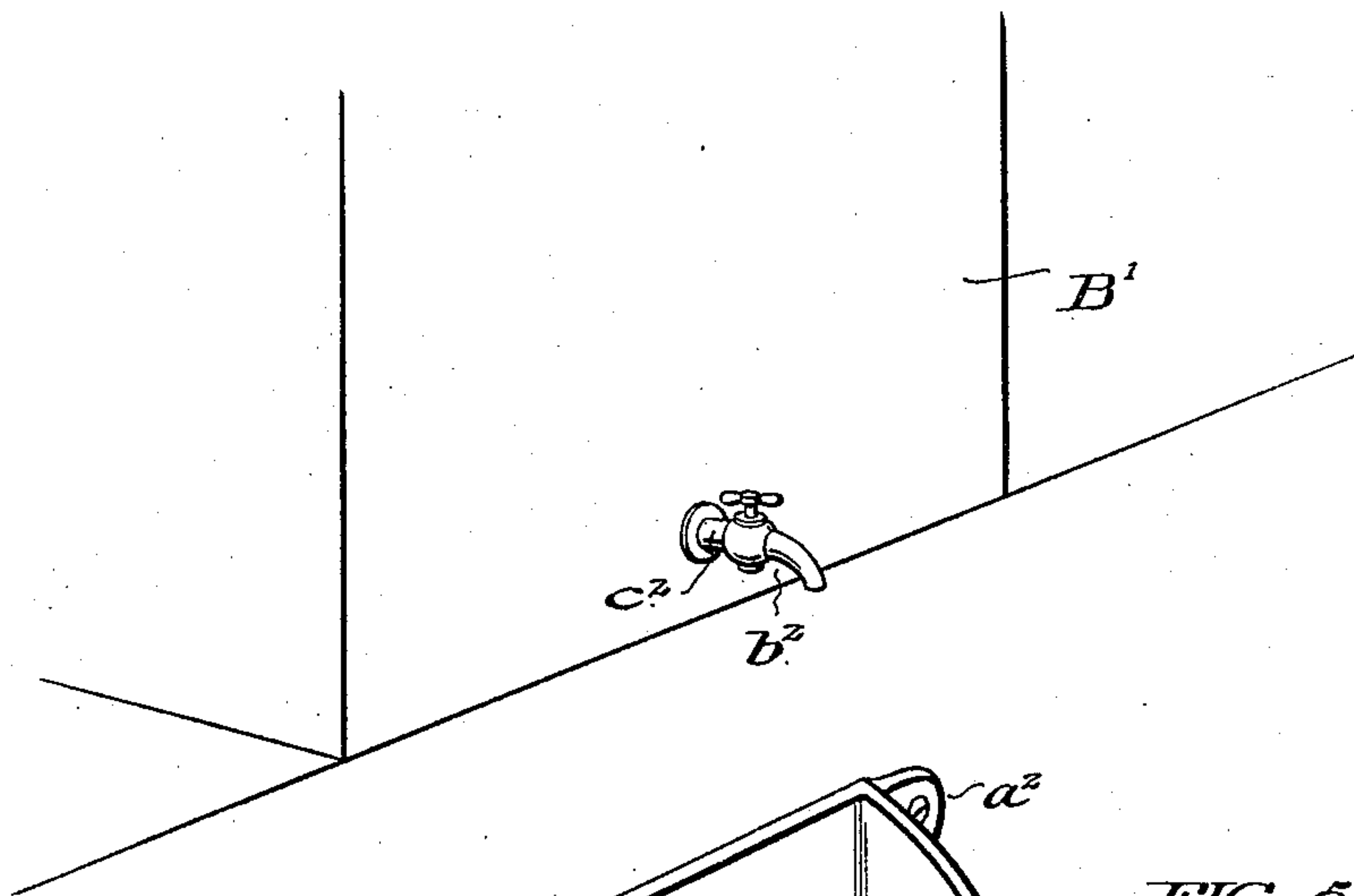


FIG. 5.

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UNITED STATES PATENT OFFICE.

WILLIAM SMITH, OF TRENTON, NEW JERSEY.

URINAL.

SPECIFICATION forming part of Letters Patent No. 594,438, dated November 30, 1897.

Application filed June 24, 1895. Serial No. 553,834. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM SMITH, a citizen of the United States, residing at Trenton, in the county of Mercer and State of New Jersey, have invented certain new and useful Improvements in Urinals, of which the following is a specification.

My invention relates to receptacles having an inlet-duct and an outlet-duct, such as urinals and apparatus for measuring liquids; and the object of my invention is to combine with such structures means whereby the liquids entering such receptacles are permitted to accumulate therein to a fixed quantity and are then automatically discharged therefrom through a compound siphon.

Heretofore urinals have been commonly provided with a water-supply pipe, and a hand-faucet in said pipe has regulated the flow of water into the bowl. Urinals so arranged are not flushed at regular intervals, and persons using them rarely turn on the water to cleanse the bowl after use, and consequently they become not only unclean and offensive, but naturally dangerous to health unless daily cleaned by hand. Other urinals have been provided with intermittent automatic flushing devices, but the excessive quantity of water required for flushing such urinals has always constituted an objection to their use, excepting in places where water for such purpose is cheap and plentiful and a sewerage system obtains.

My improved construction of urinal permits of a frequent efficient automatic flushing thereof by the use of a very small quantity of water and obviates the expensive, complicated, cumbersome, and unsightly apparatus which is the usual complement of automatically-flushed urinals.

In the accompanying drawings, forming a part of this specification, Figure 1 is a perspective view of one of my urinals. Fig. 2 shows a vertical cross-section of the same, taken on the line 2 2 of Fig. 1. Fig. 3 shows a vertical cross-section of the same, taken on the line 3 3 of Fig. 2. Fig. 4 shows a horizontal section of the same, taken on the line 4 4 of Fig. 2; and Fig. 5 is a perspective view of an apparatus for measuring liquids embodying my invention.

In the drawings, A is the bowl of the urinal. B is the back wall thereof.

C is the water-supply pipe.

D is the outlet.

E is a projection extending from the back wall to a point near the bottom of the bowl A and forms, with the part F, the short legs of the siphons hereinafter referred to.

F is a partition-wall rising from the foot of the urinal and is joined by several vertical partitions with the projecting wall E, and by other vertical partitions with the lower section of the back wall B.

a, *b*, *c*, and *d* are the long legs or channels of siphon-passages, and *a'*, *b'*, *c'*, and *d'* are the short legs of such siphon-passages.

e is a fan or spreader, and *f* is a flushing channel or tube passing from the water-inlet at the mouth of the water-supply pipe around the edge of the bowl B.

The urinal is made of earthenware in one piece and is molded and formed as hereinafter described. The mold is formed of the general shape indicated in the drawings and is provided at its edge with the inclosed channel *f*, which, when it is desired, receives a supply of water from the supply-pipe C, the water passing from said channel *f* through the usual small openings on the under side of the channel into the bowl and down the sides thereof.

On the inside of the urinal, near its top, is formed a partition *e*, which constitutes a spreader and has a number of small perforations leading through it, through which water coming from the supply-pipe passes down the face of the back wall of the urinal and falls into the bowl A.

In that part of the urinal formed by the parts B, E, and F are formed a number of channels which constitute a series of siphonic ducts. The shorter legs of these siphonic ducts are formed between the parts E and F, said parts being joined by several vertical partitions. (See Fig. 4.) The short legs *a'*, *b'*, *c'*, and *d'* of these siphonic ducts are preferably made straight from the bottoms to the tops thereof. The longer legs *a*, *b*, *c*, and *d* of these ducts are formed between the back wall B and the part or wall F and extend down from the top bends of the ducts or the

unions of their respective short and long legs, being separated from each other by zig-zag partitions joining the wall B and the part F. (See Fig. 3.) The long leg *a* of the first siphonic duct opens at its lower end into the long leg *b* of the next similar duct, and the said leg *b* opens into the leg *c*, and the leg *c* opens into the leg *d*, which in turn discharges through the outlet D. It will of course be observed that the lengths of the legs *a*, *b*, *c*, and *d* vary, *a* being the shortest and *d* the longest. The short legs *a'*, *b'*, *c'*, and *d'* of these passages or ducts also vary slightly in length, the mouth of the leg *a'* opening on a plane slightly above the mouth of *b'*, which in turn is a little higher than the mouth of *c'*, while the mouth of *d'* is the lowest of the series. The bends in these siphonic ducts or the unions of their respective legs *a a'*, &c., also lie in a slightly-inclined plane, the bend or union of *d d'* being at the highest point and the bend of *a a'* being at the lowest point, the bends of *b b'* and *c c'* being fixed at intermediate altitudes. The capacities of these ducts also vary, and I prefer diameters of ducts about as follows: *a a'*, three-eighths of an inch; *b b'*, three-quarters of an inch; *c c'*, an inch and a quarter, and *d d'* two inches. The larger ducts being oval in cross-section, I give them greater diameters.

Having thus described the construction of my urinal, I shall now explain the operation of it.

The supply of water to the urinal is regulated entirely by the cock *g* in the supply-pipe C, and accordingly as the water is allowed to descend into the bowl in greater or less quantity the urinal is flushed more or less frequently. Assuming that a slow flushing is desired, the cock is turned to permit the water to trickle down from the pipe C upon the wall *e*, whence it passes through the small perforations at the base of the wall *e* down the back wall of the urinal in a thin sheet, which entirely covers the back wall and into the bowl thereof, where it is held until it gradually rises and attains the level indicated in Fig. 2. At this time it has filled the short legs of all the siphonic ducts and then fills the bend or union of the legs *a a'* of the smallest duct and, flowing down the long leg *a*, sets up a siphonic action in the first duct. The bends in the leg *a* greatly assist in inducing siphonic action, as the water in its descent is retarded at each bend and has a tendency to accumulate there and so completely close the channel. It will be observed that the last or lowest section of the leg *a* is in line with the section of the leg *b* into which it opens. The water flowing down the leg *a* passes on out of the leg *a* straight across the mouth of the leg *b* and is accumulated at the lower end of that leg by reason of its striking against the wall of the partition between the legs *b* and *c*. This primes the second siphonic duct, consisting of the legs *b b'*, and the air therein being rarefied the water is drawn from the bowl

through the first two smaller ducts. By this augmented flow siphonic action is then induced in the third duct, consisting of the legs *c c'*, by the flow past its mouth, and finally, but quickly, the fourth and largest siphon is primed and set in action by the flow past its mouth and against its farther wall, and the bowl is quickly emptied, and the operation is repeated. As will be readily understood, the inlet-mouths of these several siphonic ducts being at varying altitudes the siphon in the first and smallest duct is surely broken by the time the last and largest siphon breaks, and thus a continuous siphonic action through the smallest siphon, which would prevent the thorough flushing of the bowl, is prevented.

From the description above given it will be seen that the minimum quantity of water necessary to prime the smallest siphon is all that is needed to induce an automatic flushing operation, and the intervals between the flushings may be reduced as desired simply by turning the cock *g* so as to permit the water to flow into the bowl more freely, when it will pass into the bowl not only through the perforations in the wall *e*, but through the channel *f* also. With siphonic ducts of the preferred diameters hereinabove specified a urinal infrequently used may be flushed and kept clean with an exceedingly small water-supply, as although the regular supply may not be sufficient to prime the smallest siphon use of the urinal when the bowl is filled will set up siphonic action and the bowl will be emptied.

I have described my invention as applied to urinals in what I consider its best form, but it is subject to various modifications. For instance, the number of siphonic ducts may be diminished or augmented, the longer legs of the ducts may be formed without the bends therein shown and still operate, though not so well, and other changes may be effected in the structure without departing from my invention.

As stated above, my compound siphon may be usefully applied to apparatus for measuring liquids and for other purposes. In Fig. 5 I have shown a perspective view of such apparatus for measuring liquids. In filling packages with liquids for transportation or sale an automatic feed and cut-off is a desideratum.

In my improved apparatus for measuring liquids A' is the receptacle made, preferably, of earthenware and having the desired capacity. It may be attached to a wall or standard by the ears *a² a³*, formed integral with the receptacle and perforated to admit of the passage therethrough of screws or other supporting devices. The back wall of the receptacle is preferably made flat, in order to assist in the maintenance of the receptacle in its proper position upon its support. In the said back wall of the receptacle I form a number of siphonic ducts, preferably made tortuous in their longer legs, the whole being formed similarly to the ducts shown in Figs. 2, 3, and

4, the several longer legs of the respective siphonic ducts connecting with each other and opening into the outlet of the receptacle. Over the receptacle A' is placed a cock b^2 , which controls the flow of liquid through the pipe c^2 , leading from a tank B', containing the liquid to be measured. Beneath the outlet-pipe d^2 of the receptacle A' is placed the package C' to be filled. The cock b^2 is then turned sufficiently to regulate the flow of liquid from the tank, as desired, and when the receptacle A' is filled sufficiently for the liquid to prime the smallest siphonic duct leading therefrom siphonic action is set up in all said ducts and the receptacle is quickly emptied of its contents, which pass into the package C'. Before the receptacle A' can be again filled for discharge the package C' may be removed and another substituted in its place to receive the contents of the receptacle A' at its next discharge. The operation of measuring and filling is thus indefinitely repeated, ample time being given for removal of the full and placing of the empty package. If desired, a number of these receptacles similar to A' may be placed in a row beneath as many regulating-cocks attached to the pipe c^2 , and a large number of hands may be employed in the placing and removing of the packages.

Having thus described my invention, what I claim is—

1. In a liquid-receptacle having an inlet and an outlet for the passage of water to and

from the same, the combination of a plurality of siphons of different capacities having tortuous longer legs, the longer leg of each siphon opening into the longer leg of the one of next larger capacity, and one or more of the siphons of smaller capacity arranged to discharge against the walls of those of larger capacity, substantially as shown and described.

2. The combination with the wall of a vessel, of a depending partition terminating above the bottom of the vessel, a second partition extending upward between the wall and the depending partition and terminating below the top of the same, and a series of transverse vertical walls dividing the space between the central and depending partitions into a plurality of communicating siphonic passages, substantially as described.

3. The combination with the wall of a vessel, of a depending partition terminating above the bottom of the vessel, a second partition extending upward between the wall and the depending partition, and a series of transverse vertical walls of varying height forming, in connection with the central and depending partitions, a plurality of communicating siphonic passages, substantially as described.

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Witnesses:

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