Nov. 17, 1953 C. GRIFFON 2,659,089

FLUSHING DEVICE FOR WATER CLOSETS

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Fig.1

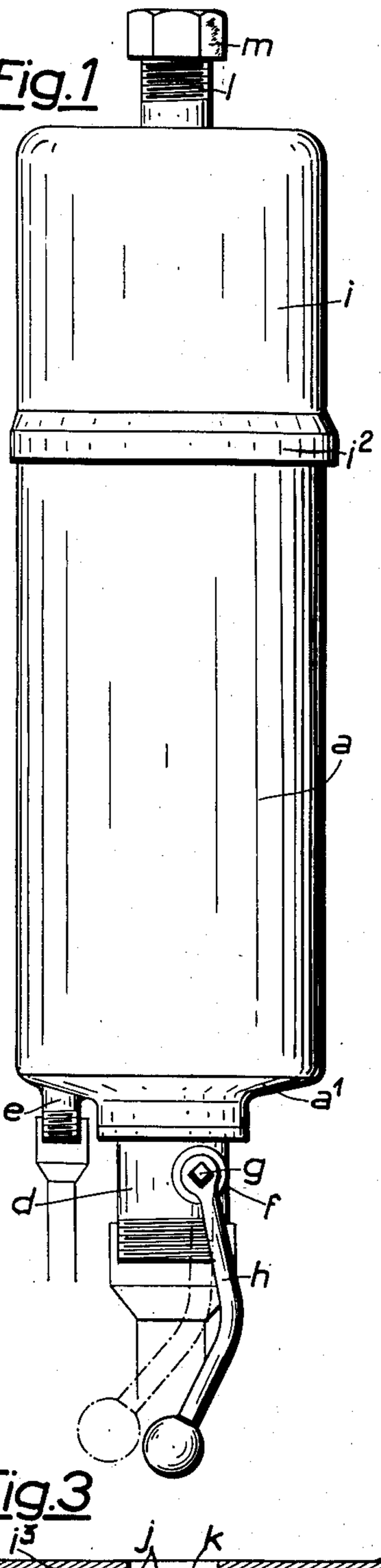

Fig.2

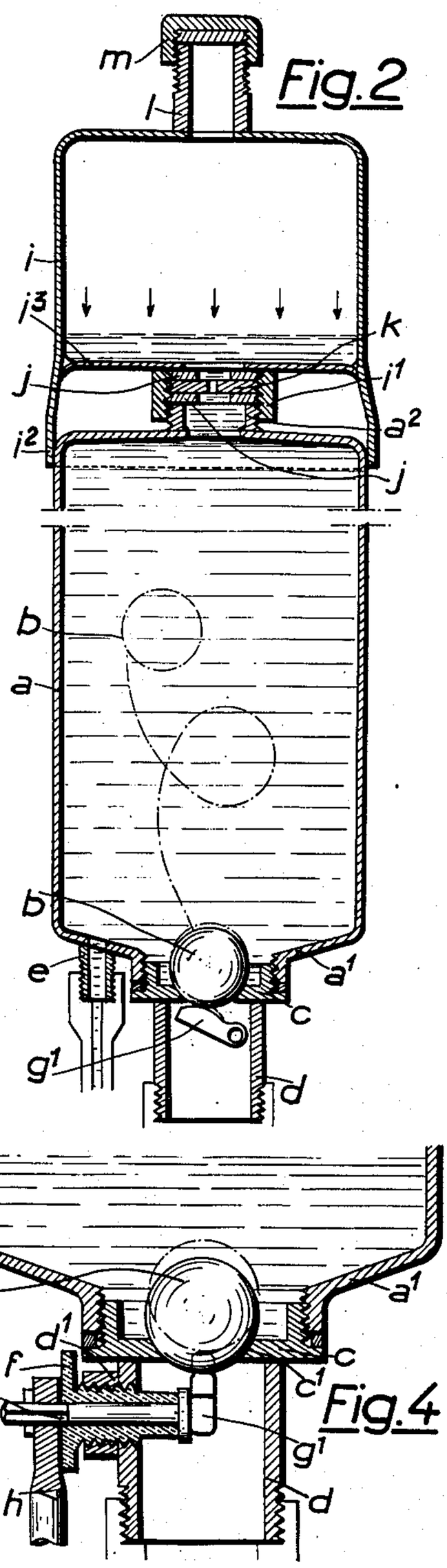

Fig.3

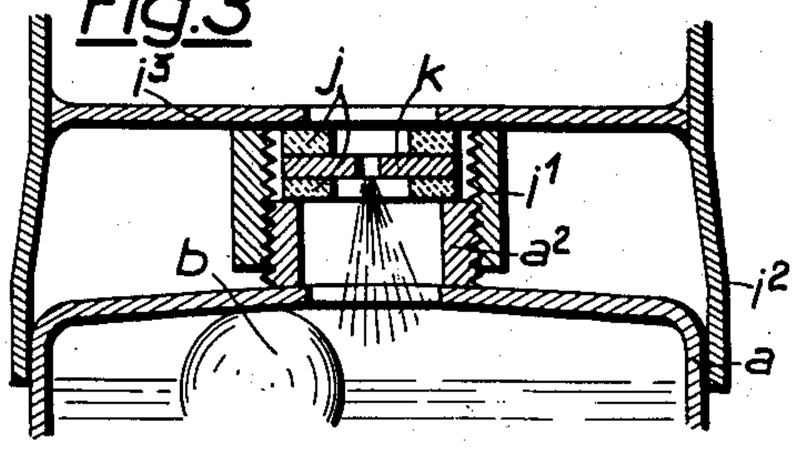

Fig.4

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Fig.5

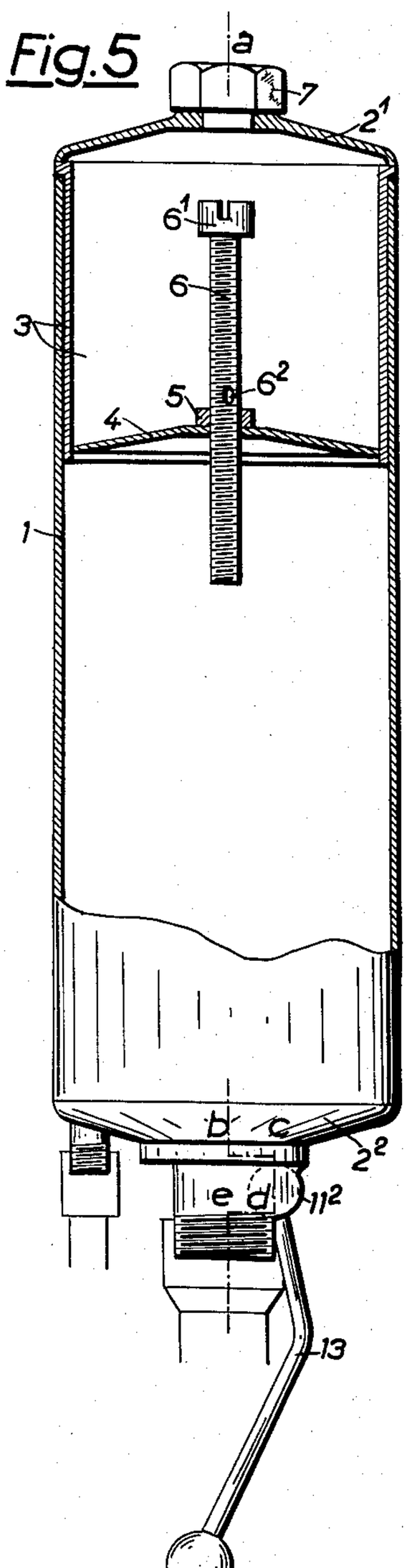
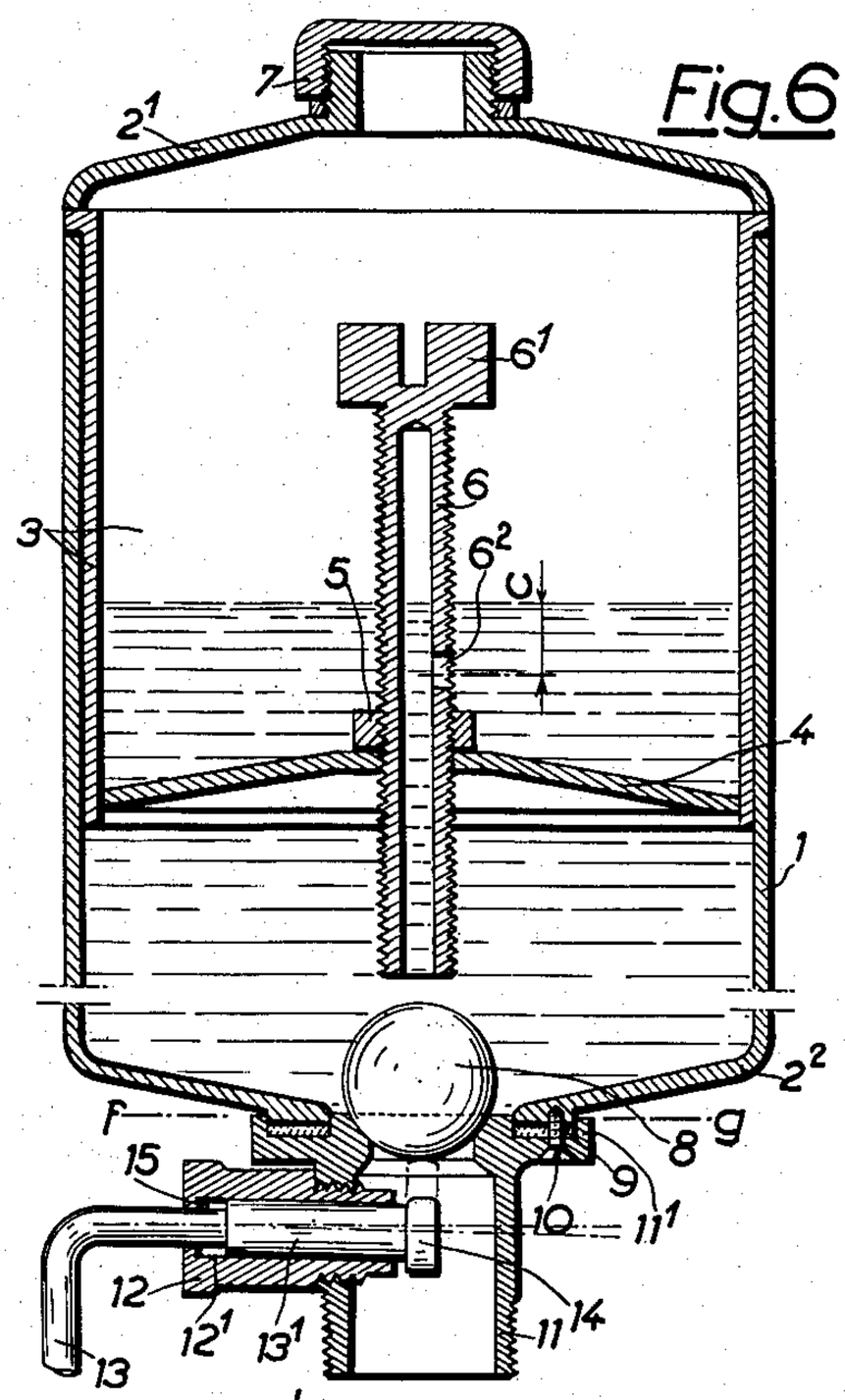


Fig.6



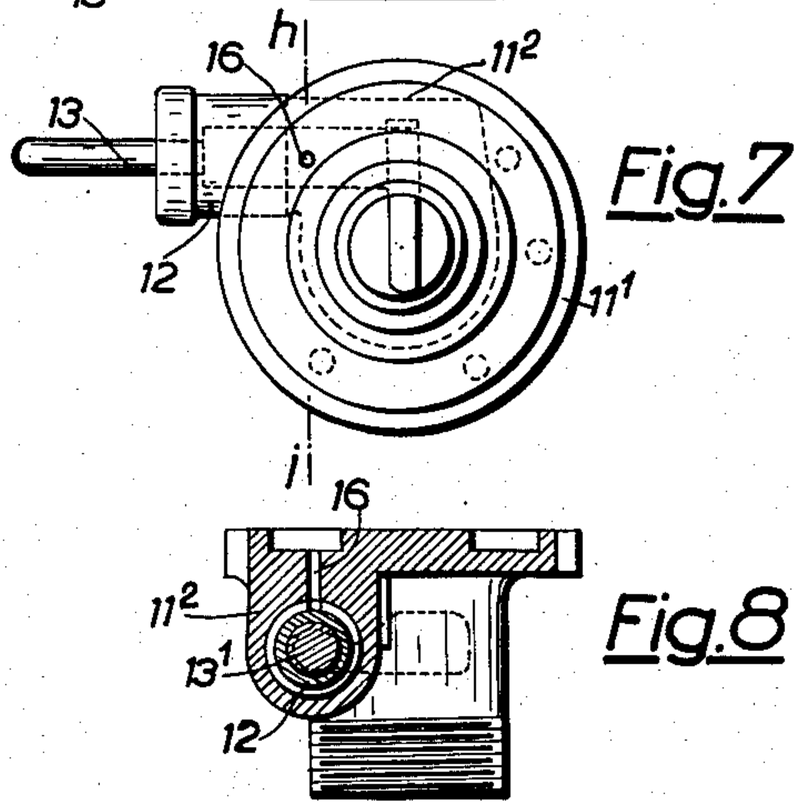


Fig.7

Fig.8

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FLUSHING DEVICE FOR WATER CLOSETS

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Claims priority, application France June 3, 1950

3 Claims. (Cl. 4—28)

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The present application is a continuation-in-part of my copending specification Ser. No. 140,030, now Patent No. 2,589,691. It has for its object an improved flushing system adapted to provide a preliminary restricted flow of water which ensures a novel, easy and smooth operation.

An object of my invention is a flushing system including two separate containers of which the upper one is smaller and is adapted to receive a comparatively small amount of water that is all the smaller when the pressure from the mains assumes a smaller value, while a higher pressure applied to the flushing is adapted to increase the pressure of the entrapped air cushion and consequently the flushing pressure.

My invention has also for its object an extremely simple device wherein the two containers are connected through a tubular connection provided with a removable washer having a reduced gauged opening.

According to a still further object of my invention there are provided means for adjusting the pressure of water in the feed circuit.

Further and advantageous features of my invention will appear in the reading of the following description, reference being made to accompanying drawings given by way of a mere exemplification.

In said drawings:

Fig. 1 is a general outer view on a reduced scale of the water closet flushing system according to my invention, in which dot and dash lines show the operative position of the lever controlling the flushing and the exhaust of the water.

Fig. 2 is a general view in longitudinal cross section on a reduced scale of a double flushing container, the dot and dash lines illustrating the movements of the pusher member and of the rubber ball valve produced through a rocking of the control lever.

Fig. 3 shows on a larger scale, the securing of the upper container on the lower container together with the fluid-tight and exhaust packings. The liquid is illustrated as being exhausted through the agency of a cushion of compressed air from the upper into the lower container.

Fig. 4 illustrates also on a larger scale the arrangement of the control lever with reference to the rubber ball valve at the lower end of the lower container, the dot and dash lines showing the displacement of the pusher member and of the ball valve, provided for exhausting the water contained in the lower container.

Fig. 5 shows on a reduced scale and in part sectional view a further modification.

Fig. 6 is a cross-section on a larger scale through line *a—b—c—d—e* of Fig. 5 to show certain details of the latter.

Fig. 7 is a plan view through line *f—g* of Fig. 6.

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Fig. 8 is a sectional view through line *h—i* of Fig. 7.

As apparent from the drawings, the double flushing container according to the invention includes a lower container having a predetermined capacity suiting the application required for the flushing system. Said lower container *a* is made of stamped and welded metal sheets so that it may be fluidtightly sealed except for the openings mentioned hereinafter. Said container is illustrated as assuming a cylindrical shape in the drawing, but obviously this shape may be modified so as to suit the application considered, the appearance required and the intended manner of securing the container, while retaining in all cases the same operative features.

The bottom *a1* of the container *a* assumes a slope that is sufficient for furthering the exhaust of water and the return into its lowermost normal position of a ball valve *b* engaging, when the water has been exhausted, the seat formed by the opening *c1* in the sleeve *c* that is welded or screwed with the interposition of a packing into the bottom *a1* of said container *a*. A pipe *d* including a threaded connection forms an extension for the opening *c* in the sleeve *c1*, through which the exhausted water is removed.

A threaded connection *e* is eccentrically welded to the bottom *a1* of the container *a* and is adapted to be connected with the water feeding pipe.

The ball valve *b* is made of rubber having a suitable structure so as to match the periphery of the seat *e1* in a fluidtight manner and to form a joint therewith while retaining a sufficient hardness to prevent too speedy a wear.

To the pipe *d* is welded a lateral connection *d1* (Fig. 4) inside which is threadedly engaged a sleeve *f* opening inside the pipe *d*. A spindle *g* is revolubly mounted in said sleeve *f*. A pusher member *g1* welded to the inner end of said spindle forms a radial projection inside the pipe *d* so as to register with the opening in the seat *c1*. A control lever *h* that is secured to the outer end of the spindle *g* through a pin engages the square-shaped extension or terminal portion of the spindle.

To the upper end of the container *a* is welded a connection *a2* that is threaded outwardly and over which is screwed a connection *i1* correspondingly provided on the lower end of the upper container *i* (Figs. 2 and 3).

The upper container *i* assumes a shape similar to that of the lower container *a* but its volume is a reduced one. Its size should be selected carefully in order to obtain a predetermined pressure for the cushion of compressed air formed at the moment of the filling of the lower container *a* to an extent such that the water enters the lower part of said container *i* up to a predetermined level. Said container *i* is per-

fectly fluidtight. Its lower periphery forms a flaring flange *i2* capping the upper part of the lower container *a* at the moment of the screwing of the connection *a2* inside the connection *i1*. The bottom *i3* of the upper container that is located above the terminal lower edge of the flange *i2* carries the connection *i1* referred to hereinabove.

A plurality of elastic washers *j* are provided as packings between the cooperating connections *a2* and *i1* and the container bottom *i3* in the manner illustrated in Fig. 3 and said washers are positioned to either side of an exhaust washer *k* provided with an axial opening that has a reduced size of a predetermined diameter. The upper or covering wall of the container *i* is open axially to carry a threaded connection *l* engaging a tapped cover *m* with the interposition of a packing. The opening thus provided through the connection *l* allows when required an adjustment of the pressure prevailing inside the upper container *i*.

It will be immediately remarked that the mechanism of said flushing system is exceedingly simple and allows an easy mounting which leads to the advantages disclosed hereinabove while removing prior drawbacks.

The operation of the arrangement is as follows: when the water is exhausted from the lower container *a* which is thus drained, the ball valve *b* engages its seat *c1* and closes the bottom of the container. Fresh water is then admitted through the connection *e* and the associated feed water pipe whereby the lower container *a* is filled. This filling has a double result; on one hand, it urges with an increasing force the ball valve *b* against its seat *c1* so as to close perfectly the exhaust opening and, on the other hand, it compresses gradually the air contained in the superposed containers. This compression of the air increases gradually and reaches a maximum pressure of predetermined value that equilibrates the thrust of the incoming water fed through the connection *e*. The size and capacity of the upper and lower containers are selected in a manner such that when equilibrium is reached, the water has entered the upper container *i* up to a level very little above its bottom *i3*. The cushion of air compressed in the upper portion of the container *i* balances thus the pressure of water.

When the operating lever *h* is caused to pivot into its position drawn in dot and dash lines in Fig. 1, the pusher member *g1* lifts the ball valve *b* off its seat *c1* (Fig. 4) and said ball valve rises with an eddying motion inside the lower container *a*. The pressure of the cushion of compressed air being first exerted on the water inside the upper container *i*, there is provided a preliminary reduced flow of water through the exhaust pipe *d* during the few seconds required for the water in container *i* to flow into the container *a* through the exhaust washer *k*. At this moment the pressure of the compressed air cushion is exerted directly through the opening in the washer *k* on the water in the lever container *a*, which water is then expelled violently and rapidly through the exhaust pipe *d*. The filling of the container is then resumed systematically as disclosed hereinabove.

Turning now to Figs. 5 to 8, the arrangement remains the same as precedingly inasmuch as it includes an upper pressure-equilibrating container, a lower water-storing container and narrow communication means between the containers while a single rubber ball forms a valve during the filling operation and may be released from its seat through a lever control when it is desired to provide for the flushing.

In the modification illustrated in Figs. 5 to 8, the superposed containers are enclosed in a vertical casing **1** made of sheet metal and welded or otherwise attached to its covers **2¹** and **2²**.

Inside the upper portion of the casing **1** is fitted coaxially the cylindrical wall of the upper container **3** that is closed on one hand at its upper end by the cover **2¹** and, on the other hand, at is lower end by a concave bottom plate **4** providing a better resistance against internal pressure. The bottom **4** and the boss **5** welded thereto are provided with a vertical opening through which is screwed a tube **6** threaded throughout its length and ending at its upper end with a slotted head **6¹** so as to allow a vertical adjustment of the tube inside the container **3** and to shift vertically, as desired, the port **6²** provided radially in the wall of the tube **6** and assuming a predetermined diameter. Said adjustment is operated by screwing as obtained by turning the head **6¹** of the tube through the port in the cover **2¹** that is normally closed by a nut **7**.

The volume comprised between the bottom plate **4** and the lower cover **2²** forms the lower container that is filled with water for flushing purposes. The cover **2²** assumes again a slope to further the flow of water and the ready positioning of the ball valve **8** while its axial opening has a circular bearing for the recessed collar **11¹** of the sleeve **11** secured through the screw **10** with the interposition of a packing **9**.

Said sleeve **11** forms at its upper end a conical bearing which serves as a seat for the ball valve **8**.

The sleeve **11** is also provided outwardly and to one side thereof with a boss or projection **11²** (Fig. 8) in which is formed a tapped bearing inside which a tubular support **12** is screwed home until the shoulder on said support **12** engages the outer surface of the boss **11²**. Inside the inner chamber **12¹** formed by the support is revolubly held without any clearance the shoulder **13¹** of the bent control lever **13**, which latter is rigid at its inner end with the radial pusher member **14** lying inside the sleeve and that may thus be controlled through the rocking of the lever with a view to urging the ball valve upwardly.

It will be noticed in this embodiment that there is provided a slight slope for the shoulder **13¹** on the bent part of the control lever **13** by reason of the sloping of the tubular support **12** inside the bearing provided in the boss **11²**. Through its very design, the chamber **12¹** inside the support **12** is longer than the shoulder **13¹** on the control lever and thereby there remains, to the outside of said shoulder, a small annular chamber **15** (Fig. 6) that has for its object to recover the drop or drops that may ooze at the moment of the release of the flushing, said drops being immediately thenafter sucked and carried along into the flushing pipe.

A particular arrangement is also provided through the combination of a slight clearance between the corresponding threads of the support **12** and of the bearing **11²** of the sleeve **11** with a very small sized port **16** provided for connecting the above mentioned threads with the bottom of the recess in the upper surface of the collar **11¹** of the sleeve **11** (Figs. 7 and 8). With this arrangement and when the flushing is at an end, the ball valve **8** returns over its seat with-

out it bounding upwardly again or operating jerkwise, which would lead to shocks or ramming effects of a very objectionable nature. This smooth positioning of the ball valve is due to the fact that the flushing produces a suction inside the container through the clearance formed between said threads and the associated port 15, said suction being exerted on a certain amount of air that prevents any jerkwise and violent engagement of the ball valve on its seat.

As already disclosed hereinabove, when the container is being filled, the air is gradually compressed up to a maximum pressure that balances the pressure of the water in the mains.

The size and volume of the containers are such that when balance is reached, water enters the upper container 3 through the pipe 6 and the port 6^2 to reach a low level inside said upper container. It has already been disclosed that when the flushing is controlled, the preliminary flow is produced for almost without any substantial pressure being provided, said preliminary flow corresponding to the time required for exhausting the water from the upper container 3, following which the pressure of the cushion of compressed air is exerted directly on the water of the lower container through the port 6^2 and the flushing is performed.

Accordingly, as the pressure of admission of air varies with the applications to be considered, the feed circuits and the like, the level of water in the upper container 3 may reach a level *c* above the port 6^2 that is much too high and consequently, the duration of the preliminary flow may be too long at the moment of the flushing, unless the pressure of the water is balanced before the level reaches the port 6^2. It is, as a matter of fact, possible to screw or to unscrew the tube 6 to adjust the vertical location of the port 6^2 and consequently to retain a value for the level at *c* that is substantially constant and corresponds to a proper operation. This adjustment is provided for generally at the moment of the mounting of the flushing device, but it may be easily modified.

Obviously and as already disclosed hereinabove, my invention is by no means limited to the application and embodiments of the different parts that have been disclosed more particularly and it covers all the modifications thereof falling withing the scope of accompanying claims.

What I claim is:

1. A flushing system for water closets and the like applications, comprising two superposed containers, a substantially vertical pipe opening into the lower container and extending upwardly into the upper container, vertically adjustable with reference to the containers and provided with a lateral port opening into the upper container at a level depending on the vertical adjustment of the pipe to provide a direct and permanent connection between the two containers, a connection for feeding water opening into the lower end of the lower container, an exhaust connection opening into the lower end of the lower container and an elastic ball valve adapted to close the end of the exhaust connection cooperating with the lower container for closing normally the latter and hand-operated means adapted to urge said ball valve away from its container-closing position into the mass of water filling the lower container.

2. A flushing system for water closets and the like applications, comprising two superposed containers, a common metal sheet member forming the upper cover of the lower container and the lower cover of the upper container and provided with a threaded opening, a vertical threaded pipe adjustably fitted in said opening, the lower end of which is in permanent connection with the lower container and the upper end of which is closed by a slotted head, said pipe being provided with a lateral port permanently opening into the upper container at a level depending on the vertical adjustment of the pipe, an opening on the upper end of the upper container and through which the slotted head may be reached for control thereof, a closure on said opening, a connection for feeding water opening into the lower end of the lower container, an exhaust connection opening into the lower end of the lower container and an elastic ball valve adapted to close the end of the exhaust connection cooperating with the lower container for closing normally the latter and hand-operated means adapted to urge said ball valve away from its container-closing position into the mass of water filling the lower container.

3. A flushing system for water closets and the like applications, comprising two superposed containers of which the upper container is smaller, a connection of small cross-sectional area connecting directly and permanently the upper end of the lower container with the lower end of the upper container, a connection for feeding water opening into the lower end of the lower container, an exhaust connection opening into the lower end of the lower container and an elastic ball valve adapted to close the end of the exhaust connection cooperating with the lower container for closing normally the latter, a tapped boss incorporated to the exhaust connection to form a lateral opening through the latter, a threaded support engaging with some clearance the tapping in said boss and provided with an elongated axial chamber closed at its outer end and slightly sloping downwardly towards the axis of the exhaust connection, a cylindrical member revolubly carried inside said chamber and extending over at least part of its length up to a point at a short distance from its outer closed end, a bent lever controlling the angular position of said cylindrical member and passing through the outer closed end of the support, a lateral projection rigid with the inner end of the cylindrical member inside the exhaust connection, a small bore connecting the clearance between the boss and support with the outer atmosphere, said lateral projection being adapted to urge the ball upwardly into the mass of water inside the lower container to open the communication between the exhaust connection and the lower container for a predetermined angular position of the spindle.

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