T. W. CHRISTY.

FLUSHING APPARATUS.

APPLICATION FILED OCT. 28, 1908.

939,123.

Patented Nov. 2, 1909.

3 SHEETS—SHEET 1.

Fig. 1.

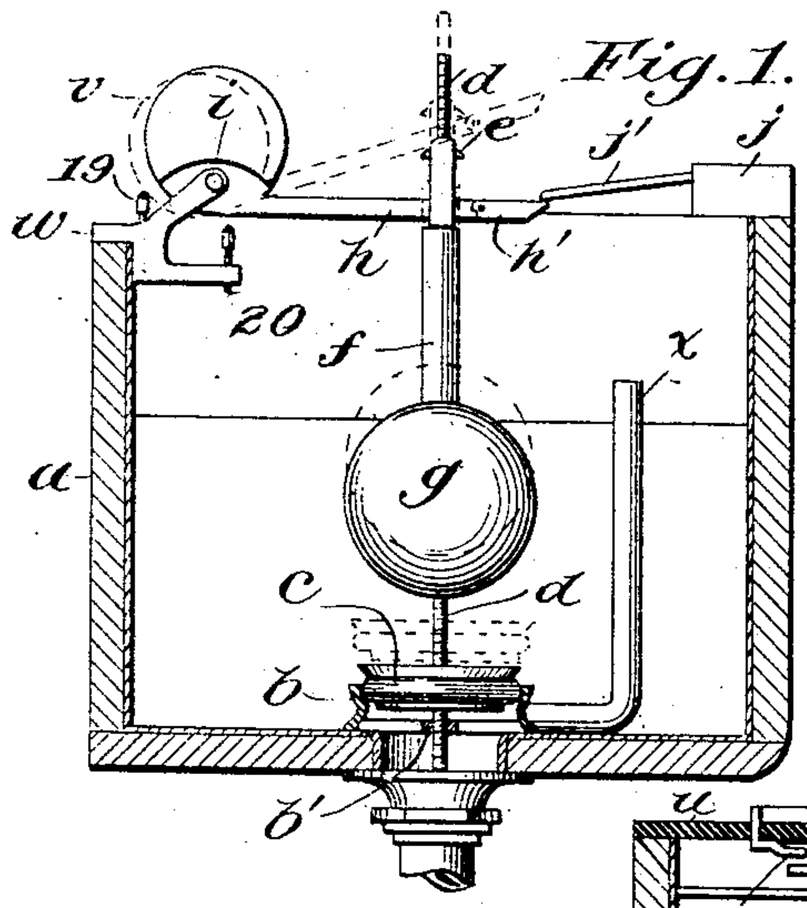


Fig. 2.

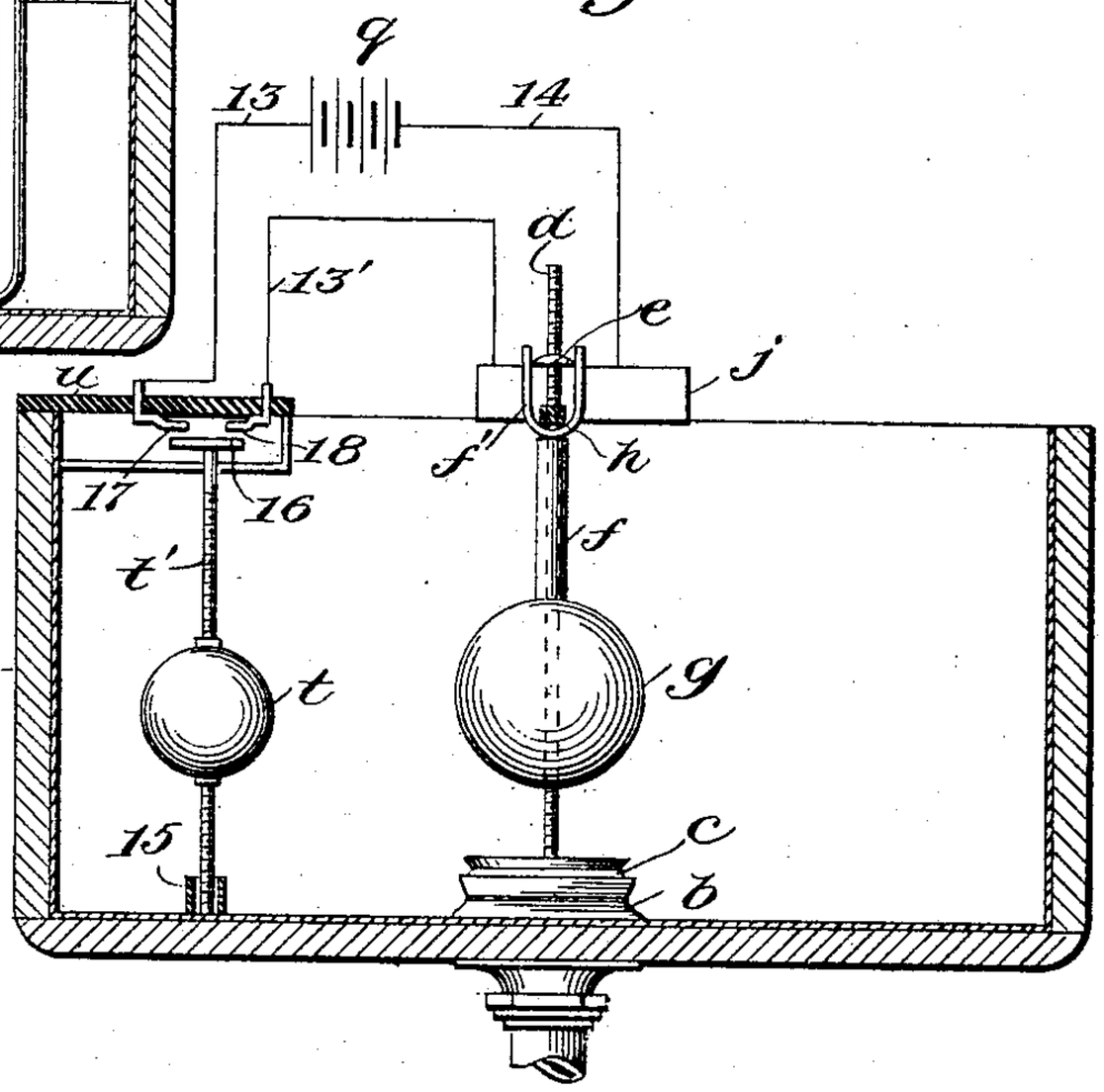


Fig. 9.

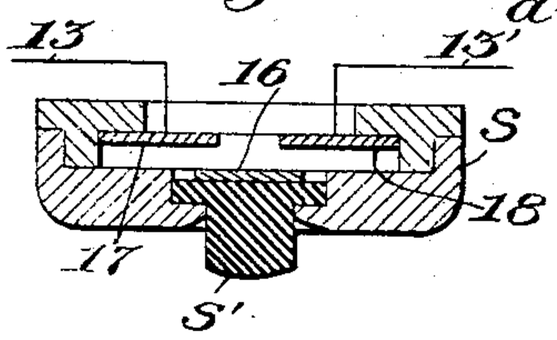


Fig. 7.

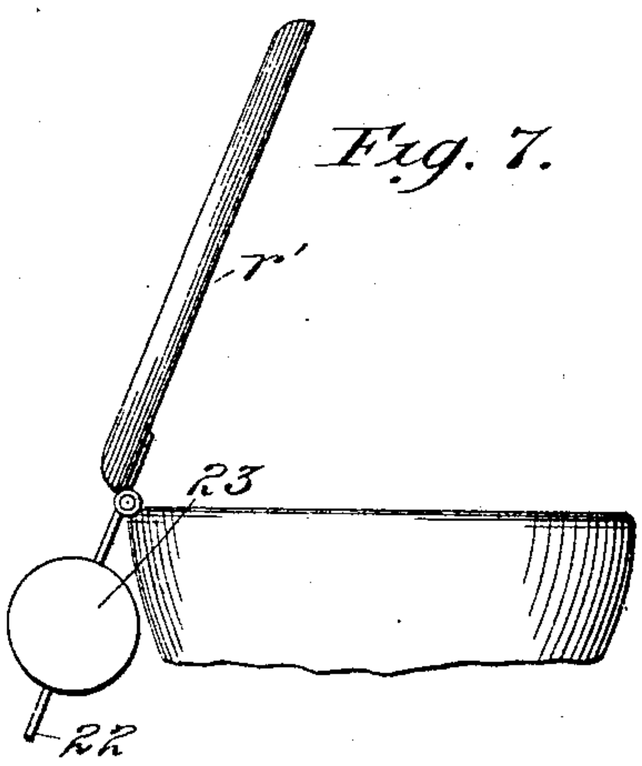
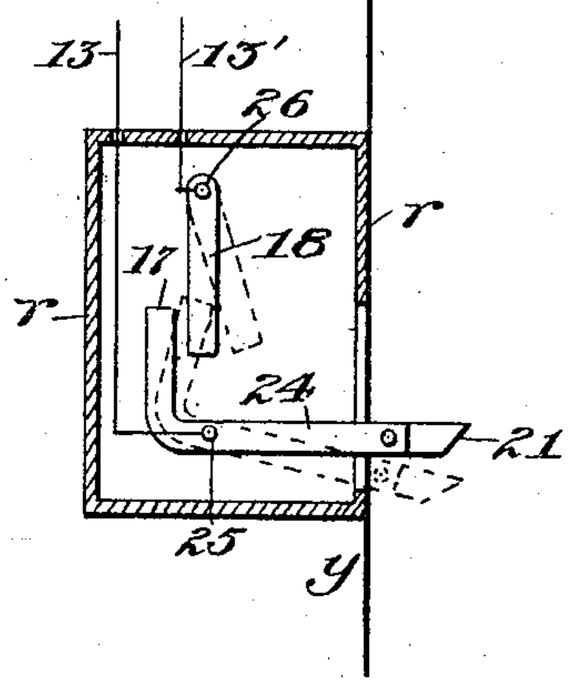


Fig. 8.



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3 SHEETS—SHEET 2.

Fig. 3.

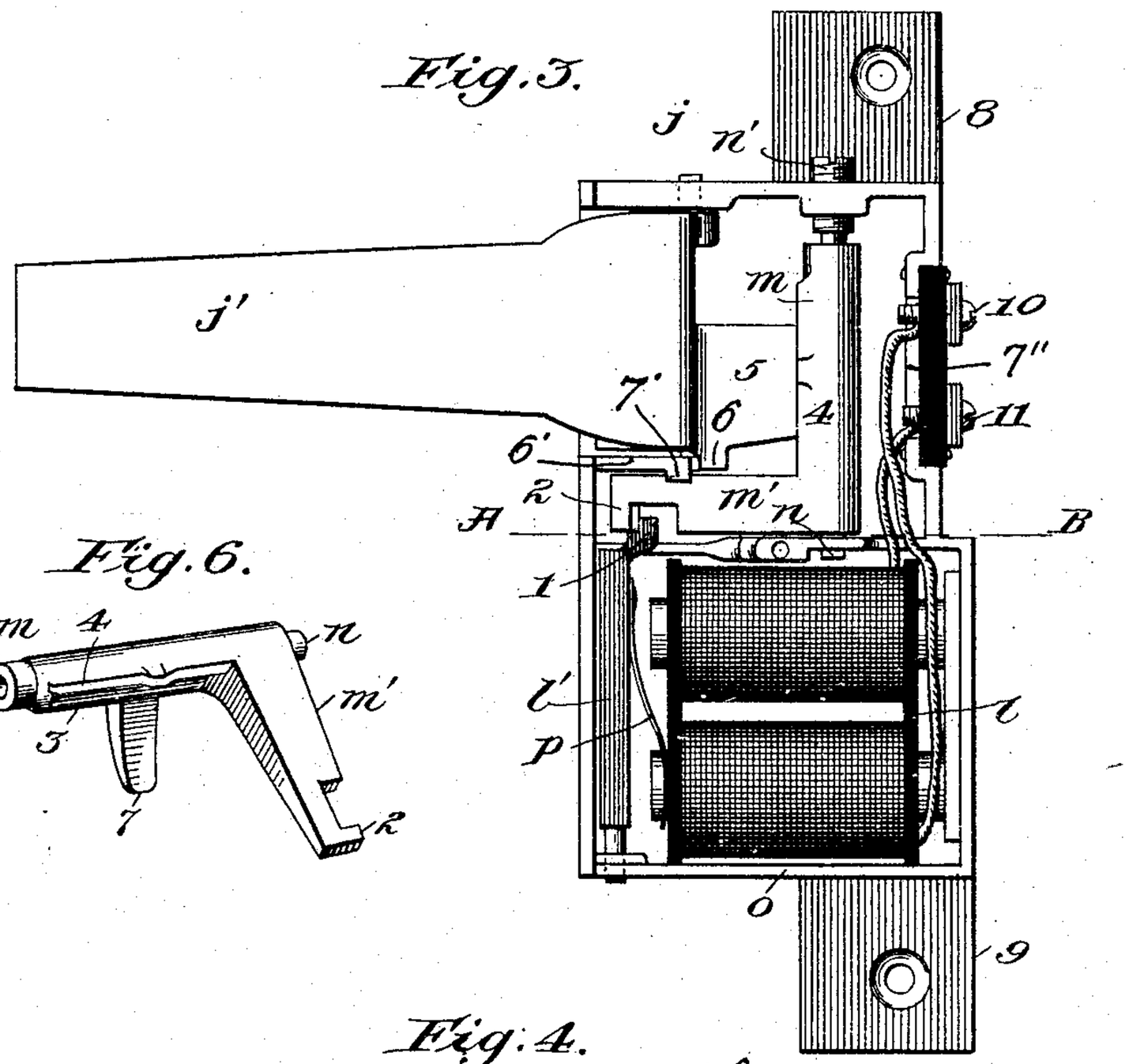


Fig. 6.

Fig. 4.

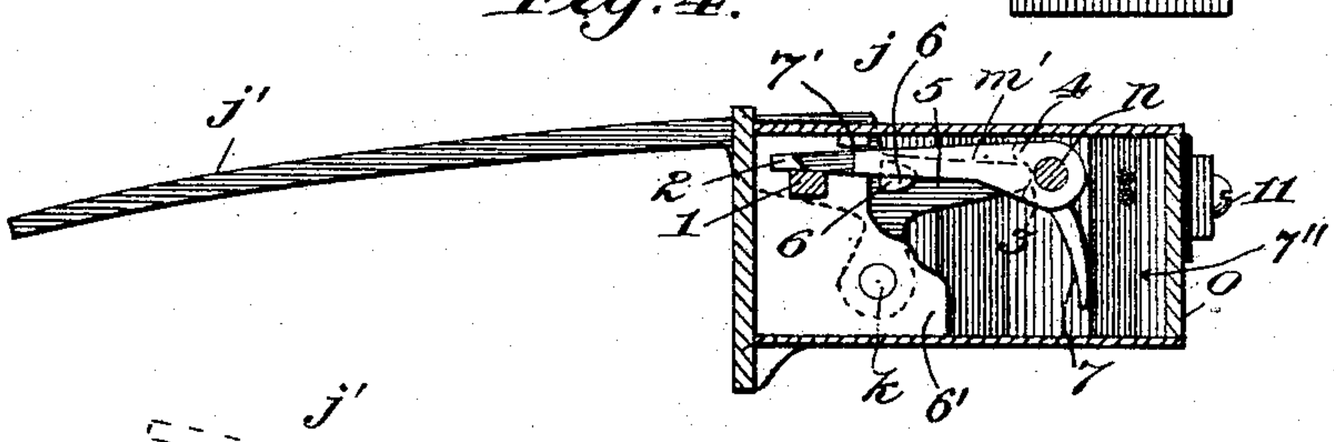
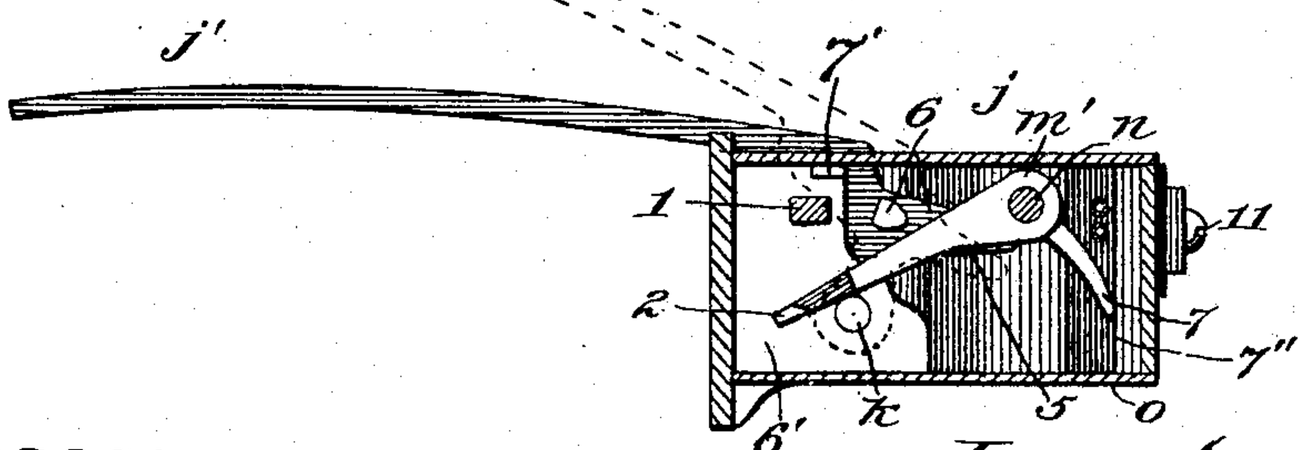


Fig. 5.



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3 SHEETS—SHEET 3.

Fig. 10.

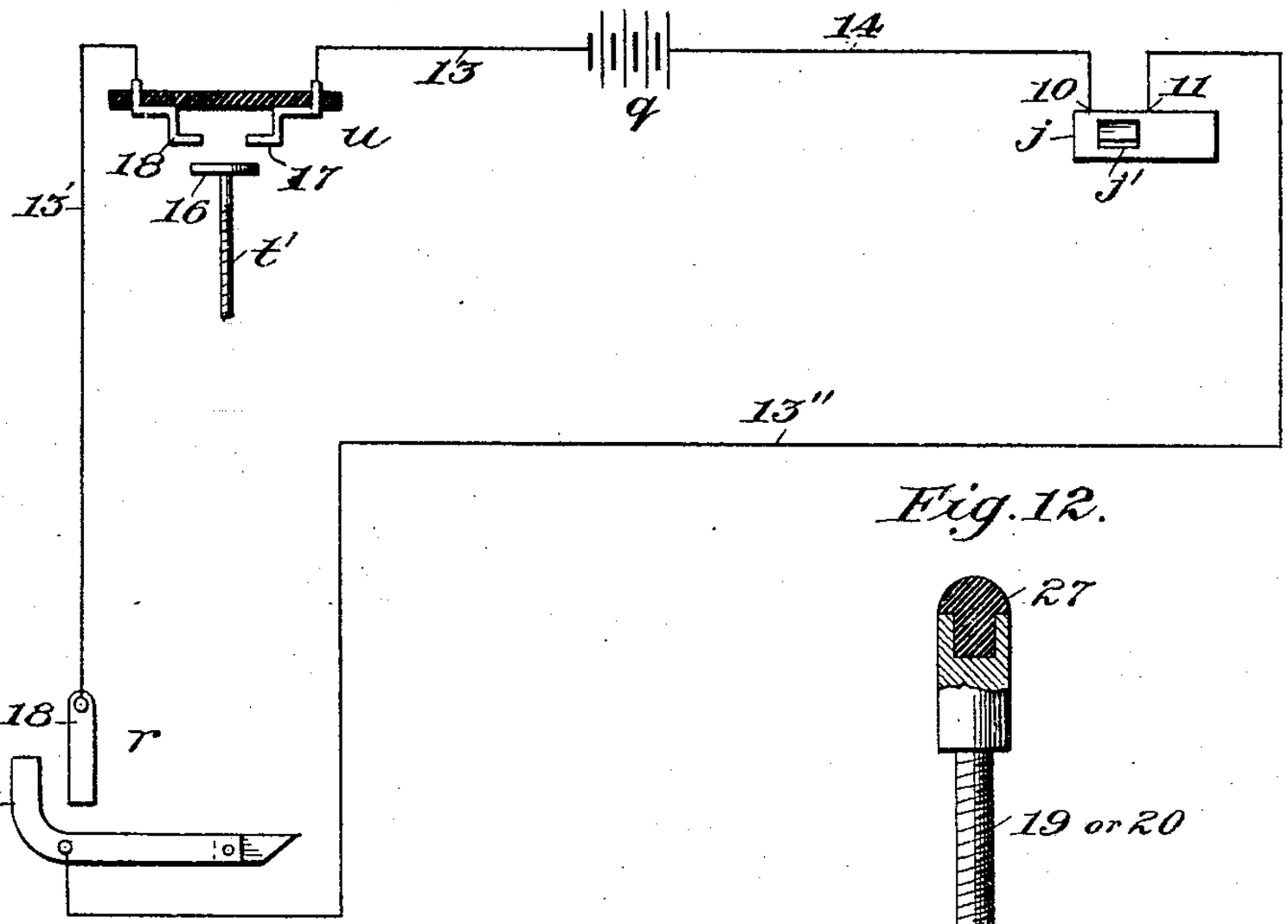

Fig. 12.

Fig. 11.

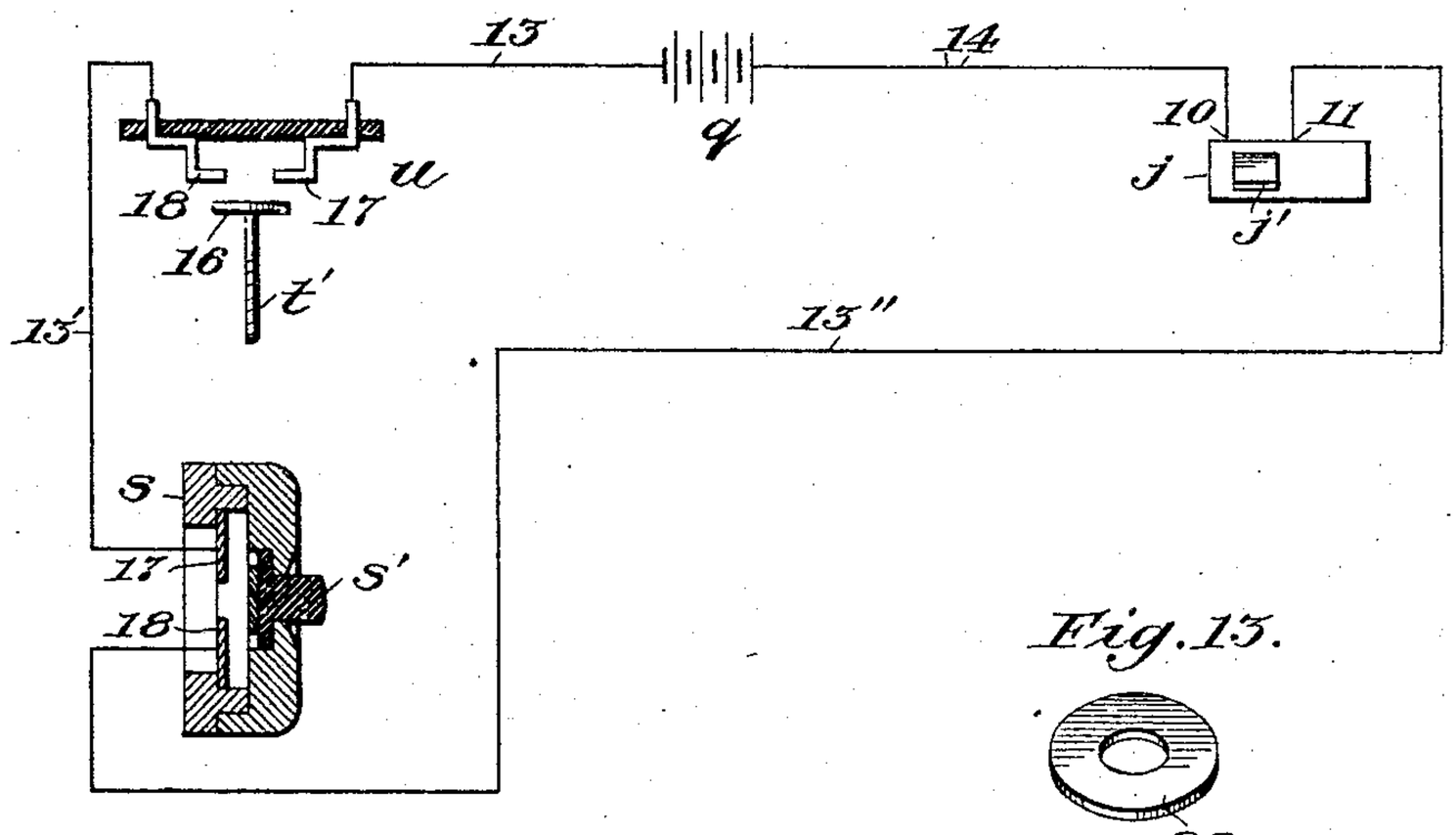

Fig. 13.

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UNITED STATES PATENT OFFICE.

THOMAS W. CHRISTY, OF NEW YORK, N. Y.

FLUSHING APPARATUS.

939,123. Specification of Letters Patent. **Patented Nov. 2, 1909.**

Application filed October 28, 1908. Serial No. 459,889.

To all whom it may concern:

Be it known that I, THOMAS W. CHRISTY, a citizen of the United States of America, and a resident of the city of New York, borough of Brooklyn, in the State of New York, have invented a new and useful Improvement in Flushing Apparatus, of which the following is a specification.

This invention relates to the flushing apparatus of water closets and urinals, and to means for operating the flush valves of such apparatus.

The invention consists in an electric flushing apparatus, and in each and all of certain novel combinations of parts embodied therein, as hereinafter described and claimed.

The leading objects of the invention are to adapt such flush valves to be operated or controlled by electricity, and thus to provide for instantaneously starting the flush by pushing a button, or automatically without the strain on the seat-hinges of closets which necessitates heavy and expensive fittings in connection with some forms of automatic flushing apparatus, or periodically under like electric control.

Other objects will be set forth in the general description which follows.

Three sheets of drawings accompany this specification as parts thereof.

Figures 1 and 2 represent vertical sections in planes at right angles to each other through one and the same flush tank; Fig. 2 showing diagrammatically one species of the electric connections; Fig. 3 is a top view on a larger scale of the electric catch of the flushing apparatus shown in Figs. 1 and 2, with its top plate removed; Figs. 4 and 5 represent vertical sections on the line A—B, Fig. 3, showing the moving parts in different positions with the aid of dotted lines in Fig. 5; Fig. 6 is a perspective view of one of the parts detached; Figs. 7, 8 and 9 are fragmentary views and Figs. 10 and 11 are diagrams illustrating additional species and modifications hereinafter described; and Figs. 12 and 13 are respectively sectional and perspective views showing certain details or accessories.

Like reference characters refer to like parts in all the figures.

In carrying this invention into effect, an ordinary flushing tank, *a*, Figs. 1 and 2, is provided in relation to its flush valve-seat, *b*, and flush valve, *c*, with a vertical valve stem, *d*, the lower end of which carries the valve *c* and is guided by a centering spider, *b'*, Fig. 1, within the valve-seat *b*, while its upper end is screw-threaded and provided with a regulating nut, *e*. Below said nut *e* the valve stem *d* is loosely embraced by the tubular stem, *f*, of a float, *g*, through which the lower end of said stem extends. The upper end of the stem is provided with a bifurcated extension, *f'*, adapted to straddle the nut *e*. The float *g* is normally held down, as in Fig. 2 and in full lines in Fig. 1, in a deeply submerged position, but out of contact with the valve *c*, by a superjacent lever *h* having a fixedly supported horizontal pivot, *i*, Fig. 1. The lever *h* interacts with the upper end of the stem *f* within the fork *f'*, as in Fig. 2; projects beyond the same and terminates in an upwardly yielding "trip", *h'*, Fig. 1, and this trip interacts with the extremity of the catch arm, *j'*, of an electro-magnetic catch, *j*, which is shown in detail by Figs. 3 to 6 inclusive. Said catch arm *j'* is movable on a horizontal pivot, *k*, Figs. 4 and 5, but is normally rendered rigid to adapt it to interact with said trip *h'* to hold the float *g* down as aforesaid. This is accomplished by the interaction of a pair of lugs, 1 and 2, projecting respectively from the armature, *l'*, of an electro-magnet, *l*, Fig. 3, and from a swinging arm, *m'*, which forms part of a rocking latch, *m*, shown detached by Fig. 6. The relative positions of the parts when the catch arm *j'* is latched in its rigid position are shown in Fig. 4; and their positions when the catch arm is unlatched, and swings upward, are represented by full and dotted lines in Fig. 5. The latch *m* is constructed with a pair of lips, 3 and 4, Fig. 6, on its horizontal body portion to interact with the extremity of a rigid projection, 5, on the pivot end of the arm *j'*. When the arm is rigid the interaction is between said projection 5 and the lower lip 3, as in Figs. 3 and 4. When the catch arm *j'* drops back by gravity, from the position in which it is shown in dotted lines in Fig. 5, its projection 5 interacts with the upper lip 4 to turn the latch *m* on its horizontal pivot, *n*—*n'*, and to turn the latch arm *m'* from its dropped position, Fig. 5, to its effective position, Fig. 4.

A pair of stop projections, 6 and 7, on the pivot end of the catch arm *j'* and on the latch *m*, respectively, interact with internal surfaces of an inclosing box, *o*, to limit the

displacement of the movable parts; and said box is provided with attaching means, 8 and 9, Fig. 3, and with insulated electric terminals, 10 and 11, for the respective extremities of the electro-magnet *l*. Said stop projection 6 contacts as an emergency stop with the adjacent edge of an internal part of the box *o*, shown at 6′ in Figs. 3, 4 and 5, at the limit of the downward movement of the catch arm *j*′. Said stop projection 7 contacts with the corresponding box surface 7″ directly behind it at the limit of the downward movement of the latch arm *m*′, as shown in Fig. 5. Another stop projection 7′ formed on said internal part 6′ of the box *o*, as shown in Figs. 3, 4 and 5, contacts with said latch arm *m*′, as in Fig. 4, at the limit of the upward movement of said latch arm. The armature *l*′ is normally held in its effective position by a retracting spring, *p*, Fig. 3, and is moved to release the catch arm *j*′ when attracted by the passage of the electric current through the magnet *l*. The current through the magnet *l* from a battery, *q*, Fig. 2, or a pair of line wires by way of wires, 13, 13′ and 14, and said terminals, 10 and 11, may obviously be controlled by a contact device, *r*, Fig. 8, operated automatically by the customary weight-lifted seat, *r*′, Fig. 7, of an "automatic" closet, or by an ordinary push button, *s*—*s*′, Fig. 9, as hereinafter more particularly described.

For periodically operating the flush valve by an "automatic" circuit breaker, the tank *a* is provided, internally, with a vertically movable float, *t*, Fig. 2, adjustable as to height on a screw-threaded stem, *t*′, the lower end of which is guided by a step 15, attached to the bottom lining of the tank, while its upper end is guided by a hole in the bottom of a contact box, *u*, attached to the upper edge of the tank, and carries a contact disk, 16, which, when the float *t* rises to the predetermined extent, presses against and temporarily connects a pair of "broken connection" contacts, 17 and 18, to which said wires 13 and 13′ are respectively connected. The current from the battery *q* or line wires is thus caused to pass through said wires 13, 13′ and 14, and through the magnet *l*, energizing the latter and attracting the armature *l*′, which releases the catch arm *j*′, as above described with reference to Figs. 3 to 6 inclusive. The released catch arm *j*′ in turn frees the lever *h*. The main float *g* is thus permitted to rise until it reaches the surface of the water or until its upward movement is arrested by the interaction of the heel end of the lever *h* with a stop screw, 19, Fig. 1. During this movement the upper end of the stem *f* turns the lever *h* on its pivot *i*, and through the medium of the lever *h*, regulating nut *e* and stem *d* lifts the valve *c*. The valve *c* is kept open during the flush by an eccentric weight, *v*, attached to or integral with the heel end of the lever *h* and eccentrically pivoted therewith by said pivot *i* to a bracket, *w*, which is attached to the upper edge of the tank *a* opposite the electric catch *j*. When the heel end of the lever *h* contacts with the stop screw 19, as in dotted lines in Fig. 1, the center of gravity of the weight *v* is to the left of the pivot *i* as viewed in that figure; and the weight, through the lever *h*, nut *e* and stem *d*, sustains the weight of the valve *c* and therewith that of the valve stem and nut, by its inertia. Meanwhile, the float *t*, stem *t*′, and contact disk 16 have dropped so as to again break the electric connection, the armature *l*′ has been retracted by its spring *p*, and the catch arm *j*′ has dropped back by gravity to its normal position, Fig. 4, and is again rendered rigid by the interaction therewith of the latch *m*. As the level of the water falls, the float *g* descends therewith; while the eccentric weight *v* through the lever *h*, nut *e* and stem *d*, holds the valve *c* open, as in dotted lines in Fig. 1, until the float *g* comes down on the valve. The weight of the float *g* and its stem *f*, added to that of the valve *c*, valve stem *d* and nut *e*, acting through said nut *e*, then brings the lever *h* back against a stop screw, 20, Fig. 1, with its trip *h*′ beneath the catch arm *j*′ which determines its normal position, represented by full lines in that figure. In that movement the center of gravity of the eccentric weight *v* passes to the right of the pivot *i*, as viewed in Fig. 1, and the weight then tends to quickly complete such return movement of the lever. Immediately previous to the action of said stop screw 20, the trip *h*′ passes the catch arm *j*′, preparatory to interacting therewith again, to hold the float *g* down until it is again electrically released. The valve *c* remains closed by its weight and that of the valve stem *d* and nut *e* until it is again lifted by the electrically released float *g*. An ordinary overflow communicating with the valve seat *b* beneath the valve *c* is represented at *x* in Fig. 1.

In the modification represented by Figs. 7 and 8, the contact device *r* is preferably located within an adjacent wall, *y*, behind the seat *r*′, except a protruding trip, 21, arranged to interact with the weight carrying arm, 22, Fig. 7, of the seat, which allows the seat to be lowered without effect on the contact device, and causes the same to operate the contact device automatically when the seat is reëlevated by the weight, 23, Fig. 7. The trip 21 is carried by a lever, 24, Fig. 8, which is movable on a horizontal brass post, 25, and also carries one of the contacts, 17 and 18; the other of which (18) is likewise movable on a horizontal brass post, 26, in the form of a pendant, so as to yield when the contact is closed, to prevent strain; the

wires 13—13′ leading from one pole of the battery *q* to one of the terminals 10 and 11 of the electric catch *j*, being extended by way of said contacts 17 and 18, Fig. 8.

In the modification represented by Fig. 9, the movable contact 16 is simply attached to or carried by the movable member *s′* of a push button; the normally separated or broken connection contacts 17 and 18 are attached to or supported within the push-button housing *s*, and the wires 13—13′ leading from one pole of the battery *q* are suitably extended by way of these contacts 17 and 18 to one of the terminals 10 and 11 of the electric catch *j*.

By simply changing the wiring represented diagrammatically in Fig. 2 the automatic or float controlled circuit breaker *t—u*, shown in that figure, may be and preferably is used in connection with either said seat-operated contact device *r*, Figs. 7 and 8, or said push-button device *s—s′*, Fig. 9, as a supplemental circuit breaker, to prevent wasting the battery or wearing the electric catch and producing noise by prematurely or unnecessarily operating the trip lever 21—24, or the push button *s′*. In this case the contact device *u* of said circuit breaker Fig. 2, and either of those represented by said Figs. 7 and 8, or Fig. 9 are electrically connected with the electric catch *j* in one and the same circuit, which must consequently be closed at both of the two points to operate the catch.

Fig. 10 represents diagrammatically a circuit including said seat operated contact device *r*, with the contact device *u* of said float-controlled circuit breaker. As here shown the wire 13, 13′, 13″, connecting one pole of the battery *q* with one pole of the electromagnet of the catch *j* may consist of three sections with said contact devices *u* and *r* interposed between the sections 13 and 13′ and the sections 13′ and 13″ respectively; while the wire 14 from the other pole of the battery *q* may simply connect the battery and catch magnet.

Fig. 11 represents diagrammatically a like circuit, including said push-button device *s—s′* with said contact device *u* of the float-controlled circuit breaker; the two contact devices being interposed between successive sections 13—13′ and 13′—13″ of the wire connecting one pole of the battery *q* with one pole of the electromagnet of the catch *j;* while the wire 14 from the other pole of the battery simply connects the battery and catch-magnet.

It will be understood that with either of the arrangements represented by Figs. 10 and 11, the automatic circuit breaker operates simply to close the circuit when the tank is full and to break the circuit when the flush is started, but cannot operate to start the flush until the seat controlled device or the push button is operated and in unison therewith. Also that the flush cannot be started by said seat-controlled device nor by the push button unless and until the circuit is also closed by said float-controlled device.

When the main parts of the improved flushing apparatus as above described with reference to Figs. 1 to 6 inclusive, are in what may be termed their "set" positions, represented by full lines in Fig. 1, and by Figs. 2, 3 and 4, before a flushing action, the opposing forces are the buoyancy of the main float, *g*, and the resistance of the armature, *l′* to the downward movement of the latch arm *m′*. Upon the release of said latch arm *m′* by the movement of the armature, said main float *g* lifts the lever, *h*, which in turn carries up the catch arm *j′* until the latter slips off the trip *h′* of said lever and drops back to its normal position, Fig. 4. In this downward movement of the catch arm *j′*, the rear projection, 5, of said catch arm, interacting with the lip, 4, of the catch, *m*, raises the latch arm, *m′* to its normal position and permits the armature projection 1 to pass beneath the latch arm projection 2. During the succeeding fall of the water in the tank, and the descent of the main float *g* therewith, the valve is kept wide open as long as may be required by the inertia of the eccentric weight, *v*, in its position represented by dotted lines in Fig. 1. When said main float in its descent reaches the open valve *c*, the weight of the two with that of their stems and the regulating nut, *e*, overcomes such inertia of the weight *v*, and the valve is quickly closed; the trip *h′* having meanwhile interlocked afresh with the arm *j′* of the electric catch. The water then rises, and acting through said main float *g*, and its stem *f*, and the lever *h*, presses the trip *h′* against the rigid catch arm *j′*, when the flushing device is again "set."

The heads of the stop screws, 19 and 20, are preferably provided with cushions, 27, Fig. 12, and a cushioning washer, 28, Fig. 13, is interposed between the lever *h* and the nut *e*, to prevent noise.

The shapes and proportions of the various mechanical and electrical devices may obviously vary without materially affecting the mode of operation hereinbefore described, and other like modifications will suggest themselves to those skilled in the art.

Having thus described said improvement, I claim as my invention and desire to patent under this specification:

1. An electric flushing apparatus having, in combination, an electro-magnetic catch including an armature, a pivoted latch normally interlocked with said armature, a pivoted catch arm rendered rigid by the inter-

action of said armature and latch, a lever terminating in a trip which normally interlocks with said arm, a normally submerged float interacting with said lever, a flush valve controlled by said float, means for electrically operating said catch to release said float, and means for transmitting motion from the released float to said valve to open the latter.

2. The combination, in a flushing apparatus, of a vertically movable flush valve, a superjacent float, means for transmitting motion from said float to open said valve, means for keeping said float normally submerged and for releasing the same including an electro-magnetic catch having its normally retracted armature and an adjacent pivoted latch provided with normally interlocked projections, a catch arm movable on a horizontal axis and normally interlocked with said latch, a lever having a horizontal pivot and a trip normally interlocked with said catch arm, a normally open electric circuit, and means for closing the same through the magnet of said catch to operate said armature and release said float.

3. The combination, in a flushing apparatus, of a vertically movable flush valve, a superjacent float, means for transmitting motion from said float to open said valve, means for keeping said float normally submerged and for releasing the same including an electro-magnetic catch including an armature, a pivoted latch normally interlocked with said armature, a catch arm movable on a horizontal axis and rendered rigid by the interaction of said armature and latch, a lever having a horizontal pivot and a trip normally interlocked with said catch arm, a normally open electric circuit, and means for periodically closing said circuit through the magnet of said catch to operate said armature and release said float; such circuit-closing means including a vertically movable float having a stem movable therewith and provided with a contact disk, and broken-connection contacts arranged to interact with said disk.

4. The combination, in a flushing apparatus, of a vertically movable flush valve having a vertical stem provided with a regulating nut, a lever movable on a fixed horizontal pivot to interact with said nut for opening the valve and provided with an eccentric weight, a normally submerged float having a stem arranged to interact with said lever, and means for rendering said lever normally locked to hold the float down and for releasing the same; said weight operating through said lever, said nut and the valve stem to hold the valve open during each flushing operation.

5. The combination, in a flushing apparatus, of a vertically movable flush valve having a vertical stem provided with a regulating nut, a lever movable on a fixed horizontal pivot to intersect with said nut for opening the valve and provided with an eccentric weight, a normally submerged float having a stem arranged to interact with said lever, and means for rendering said lever normally locked to hold the float down and for releasing the same; said weight being constructed and arranged to operate through said lever and said stem of the float to assist in restoring the parts to normal condition after each flushing operation, substantially as hereinbefore specified.

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