P. J. MADDEN.

FLUSHING ATTACHMENT FOR WATER CLOSETS.

APPLICATION FILED JULY 27, 1909.

978,914. Patented Dec. 20, 1910.

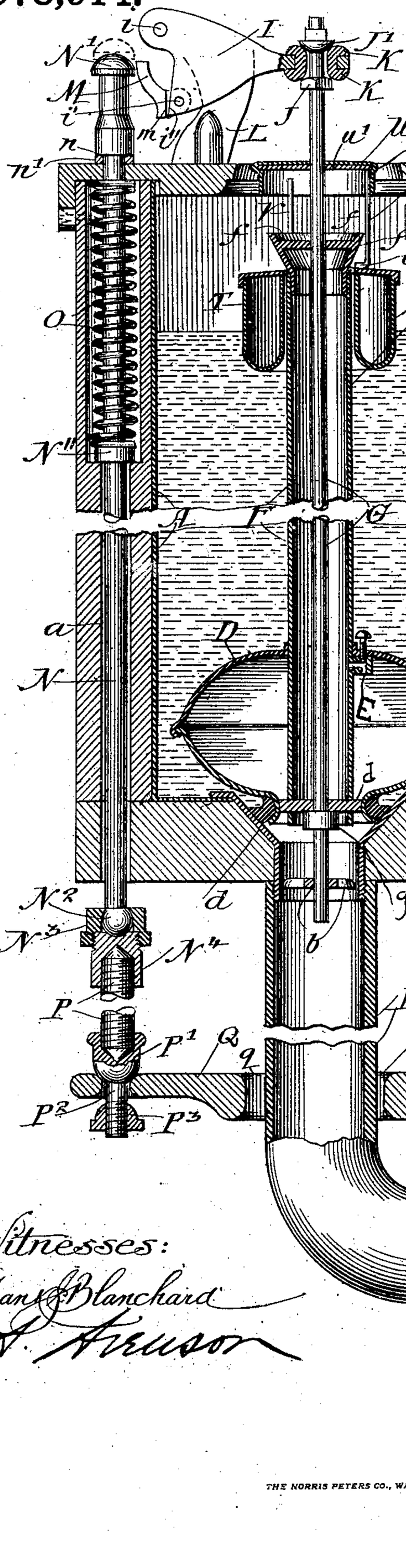

Fig. 1.

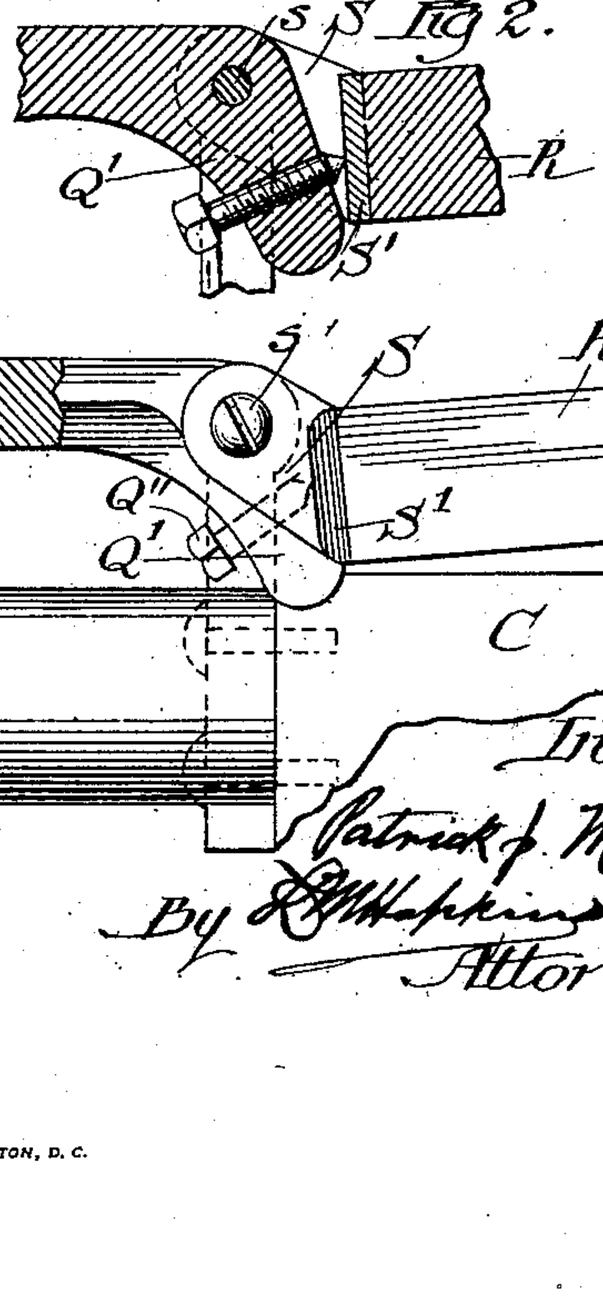

Fig 2.

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FLUSHING ATTACHMENT FOR WATER-CLOSETS.

978,914. Specification of Letters Patent. **Patented Dec. 20, 1910.**

Application filed July 27, 1909. Serial No. 509,910.

To all whom it may concern:

Be it known that I, PATRICK J. MADDEN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Flushing Attachments for Water-Closets, of which the following is a specification.

The present invention relates to that class of flushing attachments in which the water is contained in an elevated tank or cistern having an outlet opening under the control of a hollow valve which is held normally seated by the pressure of the water upon it and which when lifted from its seat is held up by its own buoyancy until the air is expelled from it through a leak-hole, whereupon it automatically reseats and closes the opening, a flushing attachment of this type being shown and described in U. S. Letters Patent No. 656,990 which were issued to me September 1, 1896.

The invention consists in the features of novelty that are hereinafter described and in order that it may be fully understood I will describe it with reference to the accompanying drawing in which;

Figure 1 is a sectional elevation of a flushing attachment embodying the invention. Fig. 2 vertical section showing, in detail, the seat connection.

A represents the elevated tank or cistern having an outlet opening from which a pipe B. leads to the bowl, a fragment of which is shown at C. D is the hollow float valve closing the outlet opening, said valve being itself open at bottom for the admission of water, and provided at or near the top with a leak-hole E for the escape of air, said leak-hole being shown as discharging into the overflow pipe F which passes completely through the hollow valve and extends from the bottom thereof to a point above the high water line of the tank. All of these parts are constructed and arranged substantially as shown and described in my patent aforesaid and operate in the manner there described.

G is the valve stem which passes through the overflow pipe F. Near its lower end it is guided and confined against any considerable lateral movement by a spider *b* and above this it is provided with a shoulder in the form of a nut *g*, which engages the under side of a spider *d* secured to the valve D. Near its upper end it passes through a spider *f* carried by the overflow pipe, whereby the overflow pipe is confined against any considerable lateral movement. The stem passes upward through an opening in a bridge-plate H which spans the tank from side to side and is secured to it by means of screws and above this it passes through an eye in a lever I, nuts J and J′ being turned onto it above and below the eye so that it will partake of the movement of the lever in both directions. Preferably the eye is lined with a packing ring or sleeve K having a groove in which the margin of the lever surrounding the eye fits. Preferably also the engaging face of the nut J′ is rounded in order to avoid lateral strains upon the stem. The lever I is fulcrumed at *i* to a post or standard L rising from the bridge plate H.

M is a latch fulcrumed to the lever I at *i′*. This latch has a shoulder *m* which is adapted to engage a corresponding shoulder *i″* on the lever I, said shoulders forming a stop by which the movement of the latch about its fulcrum *i′* is limited.

N. is the upper section of a two-part thrust rod, which upper section passes through a vertical passage *a* formed through the wall of the tank and has above the bridge-plate H, through which it also passes, a shoulder *n* between which and the plate H is interposed an elastic washer or packing *n′*. At its upper end it is provided with an enlarged head N′ which provides a shoulder adapted to be engaged by the latch M in the manner hereinafter described. The upper part of the passage *a* is enlarged and in this enlargement is disposed a coiled spring O which surrounds the rod and bears upward against the upper side of the plate H and downward against an annular enlargement N″ on the rod, the tendency of the spring being to force the rod downward. At its lower end the rod-section N is swiveled to the upper end of the rod-section P, only fragments of which are shown in the drawing the intermediate portion being broken away. The swivel connection is made by providing the rod-section N at its lower end with a spherical enlargement N^2 which fits in a nut N^3 which in turn is screwed onto an end piece N^4 into which the upper end of the rod-section P is screwed. The lower end of the rod-section P screws into an end piece P′ having a reduced stem P^2 which passes through an

opening in the rearwardly extending horizontal or partially horizontal arm of a lever Q, and onto which, below the lever, is screwed a nut P^3, the upper face of the nut P^3 and the shoulder of the end piece P′ being rounded for the purpose of preventing unequal lateral strains upon the rod. The lever Q is preferably provided with an opening *q* through which the pipe B passes, so that the thrust-rod may be located behind the pipe, whereby it is protected and more or less concealed. The lever is jointed to the seat R in such manner that the seat may be elevated without disturbing the lever, while, at the same time depression of the seat below a given position will cause the outer end of the lever to be lifted. This is preferably accomplished by securing to the seat an arm S perforated for the passage of a bolt or pin *s* which passes through a like perforation in the lever Q, the axis of the bolt *s* being coincident with the axis of the seat hinge. The short arm, Q′, of the lever projects downward from its pivotal support and engages the rear edge of the seat, or a metallic plate S′ which as here shown is the base-plate of the arm S, through the medium of a set screw Q″, thereby forming a stop for limiting the downward movement of the seat relatively to the lever, and providing means for adjusting the lever.

Surrounding the overflow pipe is a closed annular float T which is adapted to move freely upon the overflow pipe. Above the overflow pipe the valve stem G passes through a cap U which is in the form of an inverted cup having within it an annular groove *u* in which fits the margin of a packing disk or washer *u′*. This cap is adapted to slide freely upon the valve stem, and is in fact a valve adapted to seat upon and close the upper end of the overflow pipe. In order to guide it and limit its movement with relation to the overflow pipe it is provided with three or more arms V, extending downward and having inturned portions *v* adapted to engage the enlarged or flaring upper end *f′* of the pipe.

Assuming the parts to be in normal positions, that is in the positions shown in the drawing, the operation is as follows: The expansive force of the spring O is exerted upward against the bridge-plate H and downward against the shoulder N″ of the thrust-rod. This force tends to thrust the rod downward and this thrust is exerted upon the outer end of the lever Q, whereby the lever is held in the position shown. While in this position the short arm Q′ engaging the seat R will hold its forward side slightly elevated, the spring O supplemented by the weight of the thrust rod and lever Q being sufficient for this purpose. When the seat is depressed acting upon the short arm Q′, it will throw the rearwardly projecting arm of the lever Q upward and this upward movement will move the thrust rod upward until the shoulder at its upper end passes the upper end of the latch M. The parts will remain in these positions until the pressure upon the seat is removed, whereupon the spring O will draw down the thrust rod, and its downward movement transmitted through the trip connection will unseat the valve in the following manner. The shoulder on the rod will engage the upper end of the latch M and move it downward. This downward movement of the latch M will move the lever I about its fulcrum, elevate the free end of it and, through the medium of the valve stem G, lift the valve D from its seat. When lifted the water will escape from the tank A until the valve is reseated. This reseating is accomplished automatically by the entrance of water into the valve, the air being expelled through the opening E. So long as the valve remains open the annular float T will gradually fall with the water level and in falling will permit the cap U to fall and seat itself upon the upper end of the overflow pipe. This closes the upper end of the overflow pipe so that when the valve D is again reseated, the upper end of the overflow pipe will be closed to atmosphere, save for the very small annular space between the valve stem and the cap U. When the upper end of the overflow pipe is thus closed the water within the pipe B is held up by atmospheric pressure and can escape therefrom only as fast as the air leaks into the upper end of the overflow pipe through the annular space aforesaid. In this way the pipe B is made to perform the function of an after-fill chamber, since the escape of water from it will be so slow that enough water for an after-fill of fixture will remain in it after the siphonic action of the trap has ceased. As the tank refills, after the seating of the valve D, the float T will be carried upward and engaging the lower ends of the arms V can lift the cap U to the position shown in the drawing, thus uncovering the overflow pipe.

The position of the fulcrum *i* with relation to the fulcrum *i′* the position of the latch M with relation to its fulcrum *i′* and with relation to the direction of movement of the thrust rod and the stop for limiting the movement of the latch M, with relation to the lever I should be substantially as shown in the drawing if it is desired to reduce the movement of the thrust rod to a minimum. By disposing the fulcrum *i′* below the horizontal plane of the shoulder of the thrust-rod when the latter is at the limit of its downward movement or in other words by disposing it below the horizontal plane of the point on the latch at which said shoulder engages it, said latch will occupy a substantially upright position and

will normally rest against the side of the enlarged head of the thrust-rod, and this enables the shoulder to be brought into engagement with the end of the latch by a very slight vertical movement of the rod. It is manifest that the closer the radius of the latch (meaning thereby a line drawn from its axis of movement to its point of contact with the thrust-rod) approaches a position parallel with the direction of movement of the thrust-rod, the less will be its vertical movement necessary to carry it through a given horizontal displacement. In practice the face of the latch overlaps the shoulder of the thrust rod one-eighth of an inch and its uppermost extremity must, therefore be displaced horizontally through a similar distance before the latch can fall back beneath the shoulder. I have, therefore, adopted such an arrangement of centers with relation to the point of contact between the latch and rod that the movement of the rod may be confined if desired, to one-half an inch or even less. In practice I prefer to so arrange the parts that the rod has a travel of about five-eighths of an inch, which, allowing one-eighth of an inch for lost motion between the latch and rod, leaves one-half an inch of movement for lifting the valve. This slight vertical movement will cause the shoulder to pass the end of the latch after which the latch will fall toward the rod its movement in this direction being limited by the stop to only what is necessary to bring the end of the latch beneath the shoulder. Having reached this position, the stop prevents any further movement of the latch about its fulcrum *i'* so that when the rod moves downward, the end of the latch will move in an arc about the fulcrum *i*, thus enabling the disengagement of the latch from the shoulder of the rod before the rod has reached its normal position. This movement of the latch away from the shoulder, practically in a direction which is at right angles to the rod, is due to the above described disposition of the radius of the latch with relation to the direction of movement of the thrust-rod.

The subject-matter of the present application was shown, described and claimed in an application filed by me October 22, 1900, under Serial No. 33,891, which application was allowed December 17, 1904, and became forfeited; was renewed December 7, 1906, under Serial No. 348,251, was again allowed November 7, 1907 and again became forfeited.

What I claim as new is:

1. In a flushing attachment, the combination of a tank, a valve, a vertical thrust-rod movable endwise, the rear wall of the tank being provided with a vertical passage located wholly within said wall and between the planes of its inner and outer surfaces through which said thrust-rod passes, a spring arranged in said passage and exerting its pressure downward upon the rod, means for resisting the upward pressure of the spring, a trip connection between the upper end of the thrust-rod and the valve, and means for transmitting movement from the lower end of the thrust-rod to the seat, substantially as set forth.

2. In a flushing attachment, the combination of a tank, a valve, a vertical thrust-rod movable endwise, the tank being provided, within one of its walls, with a passage through which said thrust-rod passes, the upper part of said passage being enlarged, and the thrust-rod being provided with an annular enlargement occupying the enlarged portion of the passage, a coiled spring surrounding the rod within the enlarged portion of the passage and bearing downward upon said annular enlargement, means for resisting the upward pressure of the spring, a connection between the upper end of the thrust-rod and the valve, and means for transmitting movement from the lower end of the thrust-rod to the seat, substantially as set forth.

3. In a flushing attachment, the combination of a tank, a valve, a vertical thrust-rod movable endwise, and a trip connection between said rod and the valve, said trip connection having a lever, a latch fulcrumed thereto below the fulcrum of the lever and near the vertical line thereof and a shoulder carried by the rod and adapted to engage the latch, substantially as set forth.

4. In a flushing attachment, the combination of a tank, a valve, a vertical thrust-rod movable endwise and having a shoulder, and a trip-connection between the upper end of said thrust-rod and the valve, said trip-connection having a lever and a latch fulcrumed thereto and adapted to engage the shoulder of the thrust-rod, the fulcrum of the latch being at a point below the horizontal plane of the shoulder when the rod is at the limit of its downward movement, substantially as set forth.

5. In a flushing attachment, the combination of a tank, a valve, a vertical thrust-rod movable endwise and having a shoulder and a trip-connection between the upper end of said thrust-rod and the valve, said trip-connection having a lever and a latch fulcrumed thereto and adapted to engage the shoulder of the thrust-rod, the fulcrum of the latch being so disposed that the radius of the latch is inclined toward the direction of movement of the thrust rod, substantially as set forth.

6. In a flushing attachment, the combination of a tank, a valve, a vertical thrust-rod movable endwise and having a shoulder, and a trip connection between the upper end of said thrust-rod and the valve, said trip-connection having a lever, a latch fulcrumed to

the lever, the fulcrum of the latch being located beneath the fulcrum of the lever, and the latch being disposed with its radius inclined toward the direction of movement of the thrust-rod, substantially as set forth.

7. In a flushing attachment, the combination of a tank, a valve, a vertical thrust-rod movable endwise and having a shoulder, a trip-connection between the upper end of said thrust-rod and the valve, said trip-connection having a lever, a latch fulcrumed to the lever and adapted to engage the shoulder of the thrust-rod, the fulcrum of the latch being beneath the fulcrum of the lever, a stop for limiting the movement of the latch relatively to the lever, and means for limiting the movement of the thrust-rod and confining the travel of its shoulder between the horizontal plane of the fulcrum of the lever and the horizontal plane of the fulcrum of the latch, substantially as set forth.

8. In a flushing attachment, the combination of a tank, a valve, a vertical thrust-rod movable endwise and a trip connection between the thrust-rod and the valve, said trip connection having a lever, and a latch fulcrumed to the lever below the center of movement thereof, whence it proceeds upward, lying by the side of the thrust-rod, said rod being provided with a shoulder which moves both upward and downward past the end of the latch, substantially as set forth.

9. In a flushing attachment, the combination of a tank, a float-valve, an over-flow pipe carried by the valve, a cap adapted to seat upon the upper end of the over-flow pipe and close it and a float surrounding the over-flow pipe and adapted to lift the cap therefrom when the level of the water rises above normal, said float being independent of the valve and over-flow pipe and wholly unsupported thereby in the normal operation of the device, substantially as set forth.

10. In a flushing attachment, the combination of a tank, a float-valve, an over-flow pipe carried by the valve, a cap adapted to seat upon the upper end of the over-flow pipe and close it and a float surrounding the over-flow pipe and adapted to engage the cap and lift it, said float being movable vertically independent of the over-flow pipe and adapted to fall, as the level of the water falls, independently of the cap when the latter comes to a bearing upon the upper end of the over-flow pipe, substantially as set forth.

11. In a flushing attachment, the combination of a tank, a valve, an over-flow pipe carried thereby and having an enlarged upper end, a cap adapted to close the upper end of the over-flow pipe, arms projecting downward from the cap and engaging the enlarged head of the over-flow pipe, and an annular float surrounding the over-flow pipe and adapted to engage said arms for holding the cap normally elevated, substantially as set forth.

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Witnesses:
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