

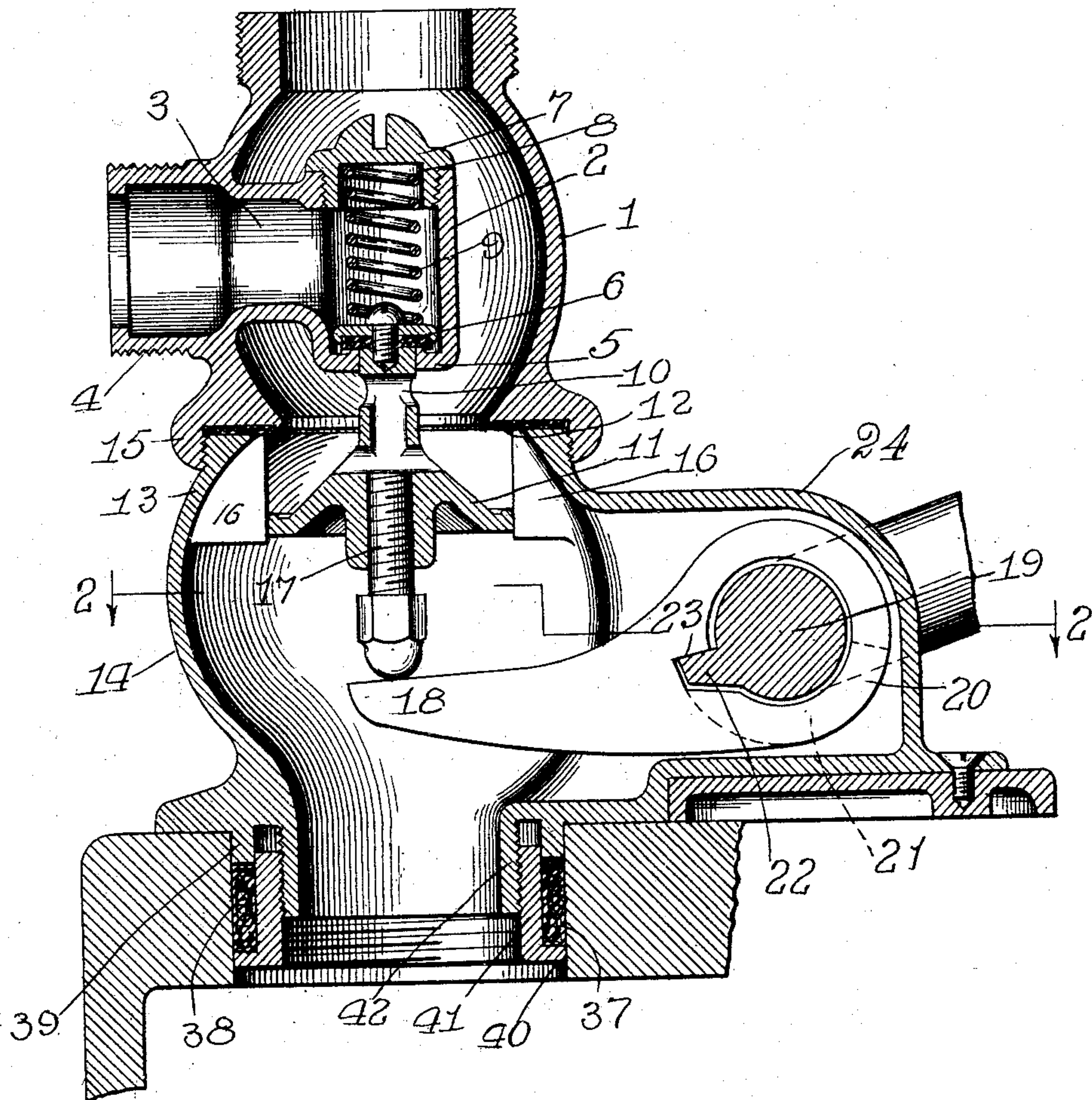
W. S. GRAHAM.
CLOSET FLUSHING APPARATUS.
APPLICATION FILED SEPT. 28, 1908.

970,214.

Patented Sept. 13, 1910.

3 SHEETS—SHEET 1.

Fig. 1



Witnesses:
R. A. White.
Harry R. L. White

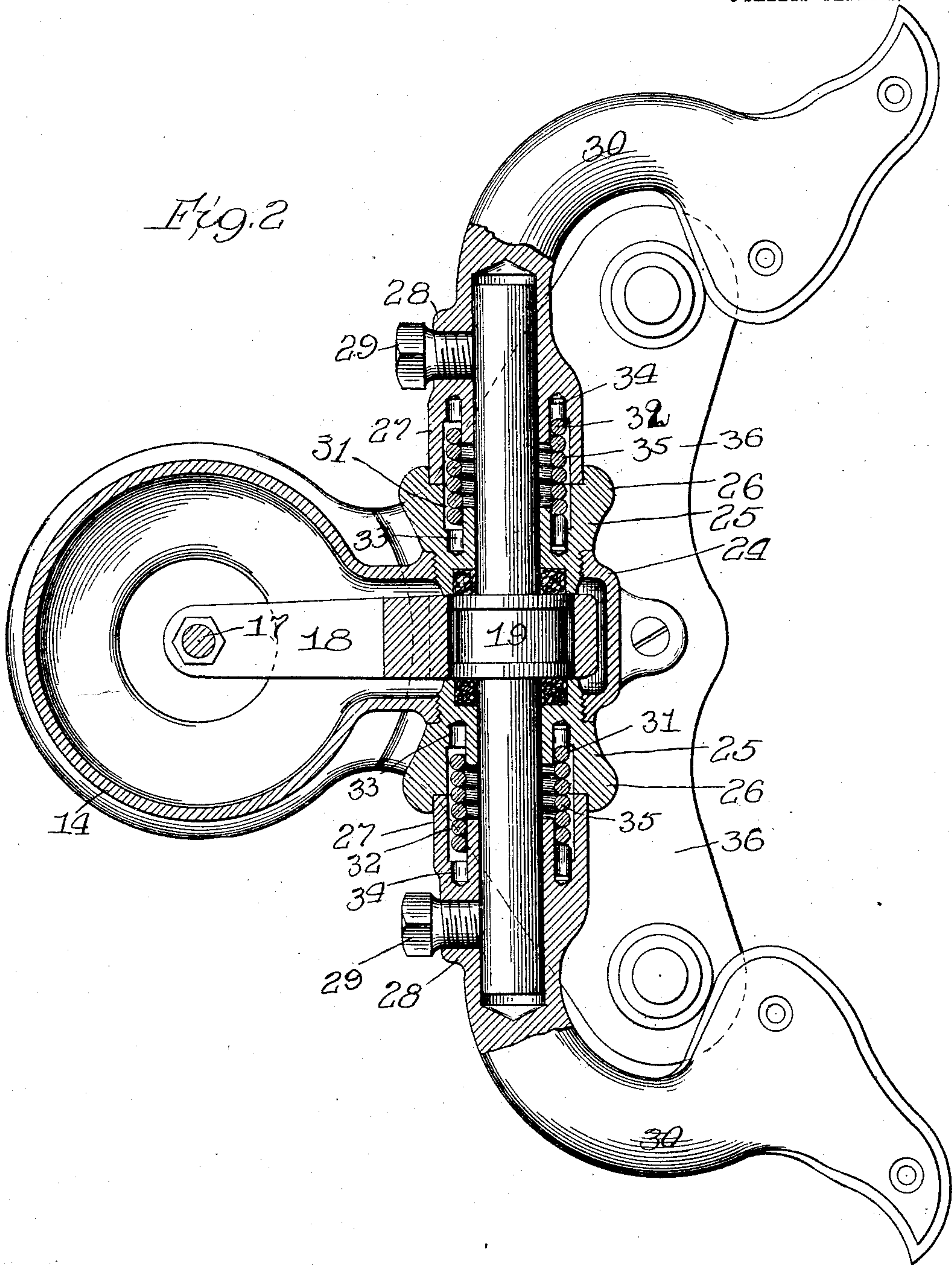
Inventor:
William Sydney Graham
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3 SHEETS—SHEET 2.



Witnesses
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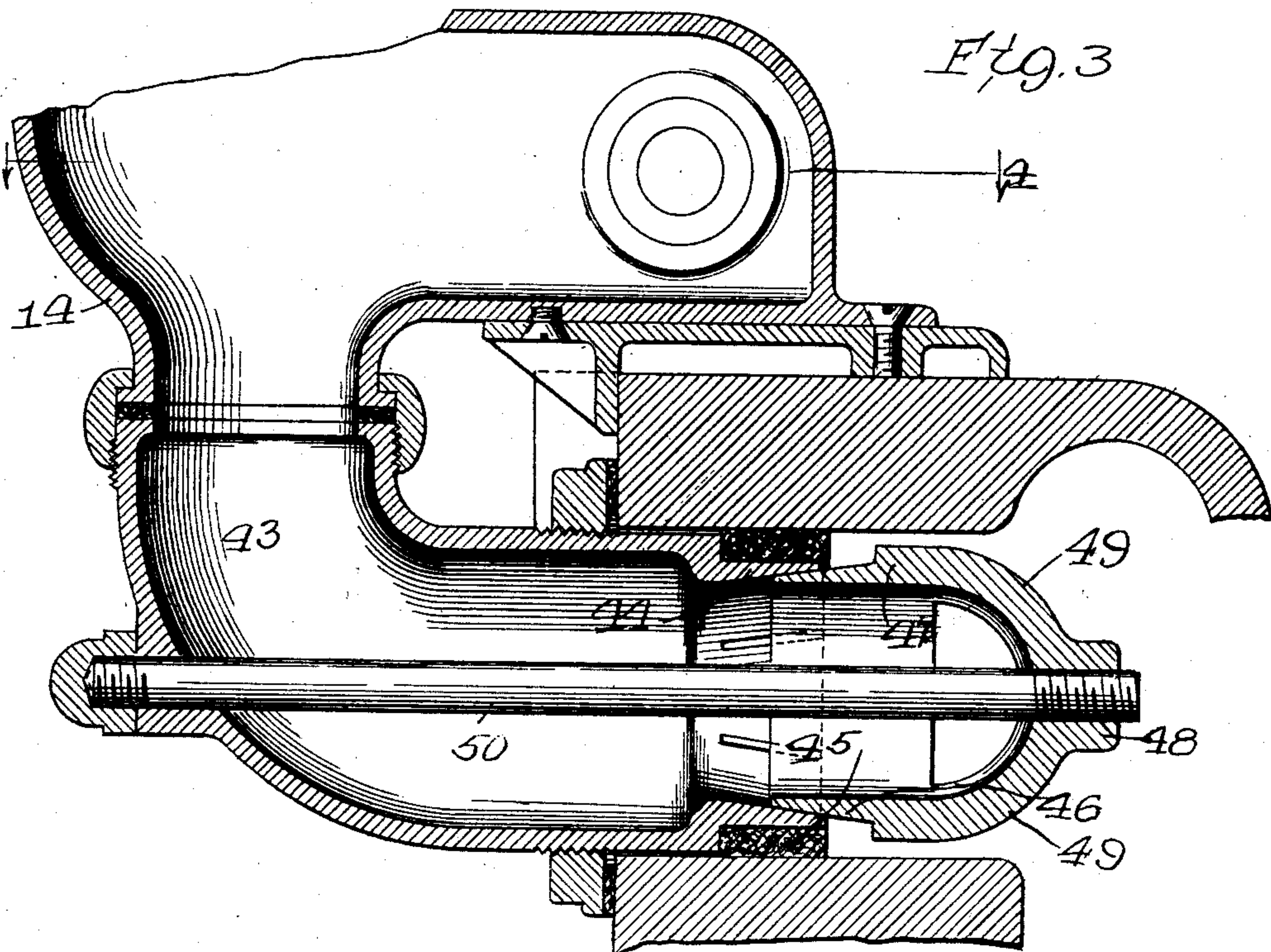
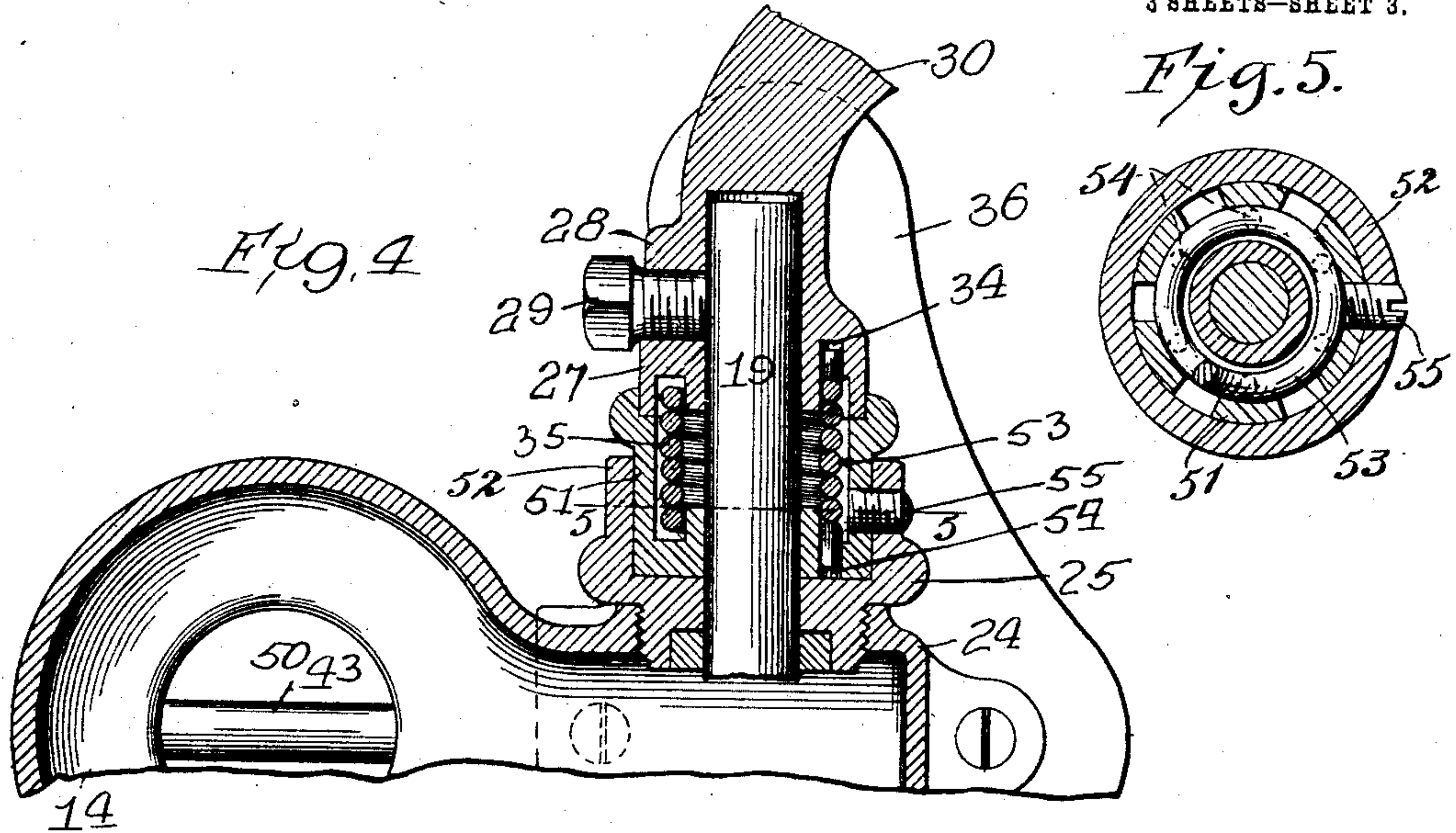
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3 SHEETS—SHEET 3.



Witnesses:
R. A. White.
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Inventor:
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UNITED STATES PATENT OFFICE.

WILLIAM SYDNEY GRAHAM, OF CHICAGO, ILLINOIS, ASSIGNOR TO FEDERAL-HUBER COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

CLOSET-FLUSHING APPARATUS.

970,214.

Specification of Letters Patent. Patented Sept. 13, 1910.

Application filed September 28, 1908. Serial No. 455,178.

To all whom it may concern:

Be it known that I, WILLIAM SYDNEY GRAHAM, 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 Closet-Flushing Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to a novel construction in seat operated flushing mechanism for water-closets, the object being to provide simple and efficient means for alternately filling the flush tank and discharging the contents therefrom and consists in the features of construction and combinations of parts hereinafter fully described and claimed.

In the accompanying drawings illustrating this invention: Figure 1 is a central, vertical, longitudinal section of a valve-casing and valve-mechanism constructed in accordance with my invention. Fig. 2 is a plan section of the same on the line 2—2 of Fig. 1, showing the connection between the operating lever and the closet-seat. Fig. 3 is a fragmentary central longitudinal section showing a modified form of construction whereby the connection between the bowl and the flush tank is made at the rear of the bowl. Fig. 4 is a fragmentary detail section showing a modified form of construction of the connection between the valve actuating mechanism and the closet seat whereby the tension of the springs supporting the latter may be easily adjusted. Said section being on the plane indicated by the section line 4—4 of Fig. 3. Fig. 5 is a detail section on the line 5—5 of Fig. 4, showing the means employed for adjusting the tension of the seat supporting springs.

My invention relates particularly to valve mechanism for that class of flushing apparatus in which the water under pressure is introduced into a hermetically sealed flush tank compressing the contained air in the latter so that upon opening the discharge valve the contents of the tank are ejected at corresponding pressure, that is to say, the initial pressure of discharge would be equal to the service pressure and such pressure would gradually decrease in accordance with the expansion of the air.

The main object of my invention is to provide simple valve-mechanism controlled and actuated by the closet-seat, which, when the latter is depressed, will open the valve controlling the service pipe and close the discharge valve of the tank, thereby connecting the service pipe with the tank and cutting off flow to the bowl, and which, when the seat is released, will permit the supply valve to the tank to close and simultaneously open the flush valve, thereby causing the water contained in the tank to be ejected into the bowl.

A further object of my invention is to provide suitable means for permitting proper adjustment of the operating parts of the device and to so construct the device as to permit ease of disassembling for purposes of adjustment and repair.

This invention consists particularly in the relative arrangement and disposition of the valves and the means operating the same whereby all of said mechanism is enabled to be disposed in a casing mounted upon the closet-bowl, and in so constructing the device as to render assembling and disassembling easy and rapid of accomplishment.

The invention consists further in the means provided for securing the device firmly upon the closet-bowl in such a manner as to provide a fluid tight joint between the same.

Referring now to said drawings, (1) indicates a valve casing, centrally of which is a hollow cylindrical tube (2) connected by means of a lateral passage (3) with the service pipe, the mouth of said passage consisting of an externally threaded flange (4) projecting laterally from the casing. In the lower end portion of said cylinder (2) is an inwardly extending annular flange (5) constituting a valve seat, upon which the valve (6) seats. In the upper end portion of said cylindrical tube is a cap (7) threaded therein and which is provided with a central recess (8) in which the upper end of a compression spring (9) is held, said spring serving to maintain the valve (6) normally closed.

The valve (6) is disposed upon the upper end of a skeleton stem (10), which at its lower end terminates in a tapered valve (11) seating upon the valve seat (12) formed by the annular shoulder at the lower end of the casing (1) projecting inwardly of the

flange (13) of a casing (14). The valve casing (1) is provided at its lower end and surrounding the said valve seat (12) with an annular, internally, threaded flange (15), which engages the externally threaded cylindrical flange (13) of said casing (14). The said flange (13) is equipped with vertical inwardly projecting ribs (16) which at their inner or free ends form guides for the valve (11). Disposed in a central threaded opening in said valve (11) is a set screw (17), upon which the free end portion of a lever (18) is adapted to bear, said lever being loosely mounted upon a shaft (19) passing laterally through said casing (14). The hub portion (20) of said lever (18) is provided with a segmental recess (21) communicating with the opening therein through which the said shaft (19) passes, and in said recess (21) a projection (22) of said shaft (19) is adapted to move, said projection being adapted to engage the end wall (23) of the said segmental recess when said shaft is turned in a direction to turn said lever in a direction to raise said valves (11) and (6). The said shaft (19) projects at its ends beyond the side walls of said casing (14), the same passing through what may be termed an arm (24) of said casing. The latter is provided in its side walls with threaded openings of larger diameter than said shaft (19) which receives removable bearing (25) in which said shaft (19) is journaled. Each of said bearings (25) is provided with an annular flange (26) which is cut away internally at its free end portion to receive the inner end of the annular flange (27) of a sleeve (28) secured upon the free end of the shaft (19) by means of a set screw (29), said sleeve (28) being integral with the hinge (30) secured to the closet-seat. In the bottoms of the annular recesses (31) of the bearings (25) and the recesses (32) of said sleeves (28) are openings (33) and (34) respectively in which the opposite ends of the spiral springs (35) are received. Said springs serve to normally maintain the closet-seat elevated in a well known manner. The said casing (14) may be secured to the closet-bowl by means of bolts passing through openings in a flange (36) to which said casing, may be secured, and also by means of an expansion washer (37) compressed against the wall of the flush opening (38) of the bowl, said washer being compressed between an annular flange (39) on the base of said casing (14) and the annular flange (40) of a threaded sleeve (41), which engages a threaded annular flange (42) disposed concentric with and inwardly of the flange (39) and which also is integral with said casing (14).

The flush tank before referred to is so well known that illustration thereof is deemed unnecessary.

The operation of my device is as follows: The closet-seat is normally maintained elevated to substantially vertical position and when depressed against the action of said springs (35) does not during its initial downward movement actuate the valve mechanism, but when depressed to an incline of fifteen or twenty degrees above horizontal the projection (22) of the shaft (19) engages the end wall (23) of the segmental recess (21) of the lever (18) thereby raising the free end portion of said lever. By the engagement of the latter with the head of said set screw (17) the valves (11) and (6) are raised against the action of the spring (9), the valve (6) opening and the valve (11) closing, thereby shutting off communication between the tank and said casing (14), and at the same time establishing communication between said tank and the service pipe. Water now enters the casing (1) through the opening controlled by the valve (6) and passes upwardly around the cylinder (2) into the tank compressing the air therein in a well known and obvious manner. The flow from the service pipe into the tank will obviously cease the moment the pressure in said tank equals the service pressure. As soon as the seat is released the springs (35) will obviously raise the latter, this action being accelerated by the spring (9) and the service pressure, thereby causing the valve (6) to close and the valve (11) to open, whereupon the contents of the tank will be ejected through the casing (14) into the closet-bowl.

In order to effect repairs such as replacing the rubber disks of the valve (6) and the valve seat (12) it is only necessary to separate the casings (1) and (14), whereupon access may easily be had to all parts of the valve mechanism. The parts connected with the shaft (19) are likewise easily accessible and easily adjusted, such adjustment being primarily effected by removing the hinges from the closet-seat loosening the screws (29) and removing the sleeves (28). The position of the springs (35) with relation to the bearings (25) may then be adjusted as desired, and in replacing said sleeves (28) the hinge leaves may, if desired, be turned to extend vertically above said sleeves, or even at an incline toward the casing (1), and when the ends of the springs (35) have been received in openings (34) in said sleeves (28), the set screws (29) are turned to secure said sleeves against rotation on the shaft (19). The closet-seat is then secured to said hinges and the device is then ready for operation.

In Fig. 3 I have illustrated a modified form of construction showing an elbow outlet or horn (43) on the casing (14) which is necessary to effect a connection with the rear of a closet-bowl, and in addition thereto I

have shown a modified form of construction of expansion joint between the said horn or elbow and the wall of the opening in the bowl receiving the same. At its free end
 5 said horn (43) is provided with an internally tapered flange (44) which is offset annularly inwardly to provide an annular recess in which the gasket (45) of rubber or the like is received. The said flange (44) is
 10 longitudinally split at intervals to render the same expansible and receives the externally tapered flange (46), of a ring (47) equipped with a hub (48) having a central, threaded opening, said hub being supported
 15 on the arms or spokes (49) integral therewith. A bolt (50) passing loosely through an opening in the end wall of the horn (43) enters the said threaded opening in the hub (48) and serves when turned in one direction to draw the said tapered flange (46)
 20 into the tapered flange (44) to expand the latter thereby expanding the gasket (45) against the wall of the opening in the bowl.

In the construction illustrated in Fig. 2
 25 it will be observed that in order to effect adjustment of the springs (35) to a tension sufficient to support the closet-seat in its vertical position it is necessary to remove the said seat from the hinges. This is very
 30 inconvenient, and I prefer, therefore, to employ the construction shown in Fig. 4 in which sleeves (51) are rotatably mounted on the shaft (19) between the bearings (25) and the sleeves (28) at the ends of the
 35 hinges (30), said sleeves (51) being received in the annular recesses, between the annular flanges (52) of the bearings (25) and the shaft (19). Each of said sleeves (51) is provided in one end with an annular
 40 recess (53) in the bottom of which a plurality of recesses (54) are provided to receive one end of the springs (35), the other ends of the latter being received in the recesses (34) in the sleeves (28) of the
 45 hinges (30) as previously described. Said sleeves (51) are provided on their exposed end portions with polygonal surfaces to receive a wrench in a well-known manner requiring no illustration, thus enabling the
 50 tension of the springs (35) to be adjusted by turning said sleeves (51). The latter are provided with peripheral openings to receive the ends of set-screws (55) disposed in threaded openings in the flanges (52),
 55 said set-screws serving to hold said sleeves against rotation relatively to said bearings. This construction confers many advantages over the construction shown in Fig. 2, not only with regard to ease of adjustment, but
 60 also with regard to the necessity of loosening the set-screws (29).

My device is neat and compact, offers all necessary or desirable latitude of adjustment at all points and obviates the necessity
 65 of using heavy springs at any point, the use

of the latter being particularly undesirable by reason of the greater strains on certain parts and also their liability to wear out faster. For example, the fact that the valve (6) closes with the pressure enables a very
 70 light spring to be employed to normally maintain said valve closed, and the use of two light springs to support the closet-seat instead of one heavy spring distributes strain and decreases wear and tear. The
 75 means provided for adjusting the tension of the last-named springs is also advantageous as it enables the normal angle of support of the seat to be adjusted as desired and also enables any weakening of the springs
 80 to be taken up, thus obviating the necessity of providing new springs at as frequent intervals as would be necessary were the adjusting means omitted.

I claim as my invention:

85 1. In combination with a flush-tank and closet-bowl, a member intermediate of said tank and bowl whereby the water is conveyed from the former to the latter, a second member located within the other and
 90 having an opening whereby communication between the two members is had, said second member having a service-pipe connection, a valve normally seated in the opening in the second member, a second valve intermediate of the first mentioned valve and the
 95 bowl-connecting end of the first mentioned member, means whereby said valves are operatively connected, and a lever adapted to be operated by the closet-seat and arranged to actuate said means to force one
 100 of said valves from its seat while the other valve is forced toward its seat.

2. A closet-flushing apparatus comprising
 105 a flush-tank and a closet-bowl, a casing communicating at its opposite ends with the tank and bowl and provided with a service-pipe connection intermediate of its ends, a pair of operatively connected valves adapted to control the service-pipe connection and
 110 the communication with the bowl, means whereby the valves are maintained in normal position so that the bowl connection is established while the service pipe connection is cut-off, means whereby the valves are
 115 guided in their movement, in combination with a spring-controlled closet-seat and a lever operatively connected therewith, said lever being adapted to oscillate and control the position of said valves.
 120

3. In a closet flushing apparatus, a casing having normally open communication at opposite ends with a flush tank and closet-bowl respectively and communicating between its ends with the service-pipe, a valve-seat on the lower end of said casing, an oppositely disposed valve-seat disposed between the ends of said casing, valves having
 125 a common stem and seating on said respective valve-seats and controlling the connec-
 130

tions between said casing and said closet-bowl and service-pipe respectively, a spring normally maintaining said valves in position to maintain the service connection
 5 closed and the closet-bowl connection open, and a lever operatively connected with the closet-seat and serving when the latter is depressed to reverse the positions of said valves.

10 4. In a closet flushing apparatus, a member connected between its ends with the service pipe, a centrally disposed cylinder therein closed at its upper end and equipped with a valve seat at its lower end interposed
 15 in said service pipe connection, a valve seat on the lower end of said member, a reciprocating member equipped at its ends with valves seating on said respective valve seats, one of said valves being normally closed
 20 and the other open, connection between said member at opposite ends with a flush tank and closet bowl respectively, one of said valves controlling the closet bowl connection, and means actuated and controlled by
 25 the closet seat and operatively engaging said reciprocating member to actuate said valves.

5. The combination with a closet bowl having an opening therein for the admission
 30 of water to flush the same, of a casing supported upon the upper face of the closet bowl and communicating with the latter through the said opening, a flange on said casing entering said opening, an expansion
 35 gasket disposed between said flange and the wall of said opening, a member operatively engaging said flange and said gasket to laterally expand the latter, valve controlled connection between said casing and a flush
 40 tank, valve controlled connection between said flush tank and the service pipe, and means movable in said casing actuated by the closet-seat and operatively controlling said valve controlled connections.

45 6. In a seat operated flushing apparatus, the combination with the valves controlling the connection between the water supply and the bowl, and a rock-shaft operatively connected with and actuating said valves, of
 50 the closet-seat rigidly connected with the said rock-shaft, springs engaging said shaft to normally maintain said seat elevated, and members rotatable relatively to said shaft and its bearings and operatively con-
 55 nected with said springs to control the tension thereof, and means holding said members rigid with the bearings of said shaft.

7. In a seat operated flushing apparatus, the combination with the valves controlling
 60 the water connection with the bowl, and a rock-shaft operatively disposed relatively to said valves to actuate the same, of a casing provided in its side walls with bearings in which the said shaft is journaled between
 65 its ends, the closet seat rigidly connected

with said shaft at the free ends of the latter, spiral springs at one end operatively engaging said shaft at opposite end portions thereof, members rotatable relatively to said shaft and its bearings and operatively con- 70 nected with said springs, at their other ends, and means removably locking said members rigid with the said bearings, said members serving to adjust the tension of said springs, the latter serving to maintain the closet- 75 seat normally raised.

8. In a flushing apparatus, the combination with the closet-bowl provided with an inlet opening for water and adapted to be connected with the water supply, of a water 80 service connecting member provided with an annular flange entering said opening and of less length than said opening, a concentric externally threaded flange of smaller diameter and greater length than said first- 85 named flange, and an internally threaded sleeve having an external annular flange mounted on said last-named flange, an expansion gasket surrounding said sleeve and confined between the annular flange there- 90 on, and the lower end of the first-named flange, and adapted to be expanded against the wall of said opening in said bowl to secure said connecting member thereto, and form a fluid tight joint. 95

9. In a closet flushing apparatus, a rock-shaft to which the closet-seat is rigidly connected, members taking onto said shaft and adapted to be held against rotation there- with, the members being provided with 100 sockets, springs taking about the shaft and within said members and adapted to be held against rotation thereby, said springs being operatively connected with the shaft and so held within the members as to rock the 105 shaft and normally hold the seat in an elevated position.

10. In a closet flushing apparatus, a rock-shaft to which the closet-seat is rigidly se- cured, members taking about said shaft and 110 within which the shaft is adapted to rock, springs taking about the shaft and within the members, said members being formed to hold one end of the springs against rotation, and means whereby the relative position of 115 the members to the shaft is maintained and the desired tension of the springs secured to rock said shaft and maintain the closet-seat in an elevated position.

11. In a closet flushing apparatus, a rock- 120 shaft, a pair of hinge-members secured to a seat, adapted to receive the ends of the rock-shaft and provided with sockets in their ends, means for securing the hinge- members against rotation relative to the 125 shaft, members taking onto said shaft and held against rotation therewith, said members being provided with sockets, and springs taking about the shaft and in the sockets of the hinge-members and the second 130

mentioned members whereby the springs are held against rotation but so related to the shaft and hinge-members as to rock the shaft and return the seat to its normally raised position.

12. In a closet flushing apparatus, a rock-shaft, a pair of hinge-members secured to a seat adapted to receive the ends of the rock-shaft and provided with sockets in their ends, means for securing the hinge-members against rotation on the shaft, members taking onto said shaft and held against rotation therewith, said members being provided with sockets, springs taking about the shaft and in the sockets of the hinge-

members and the second mentioned members whereby the springs are held against rotation but so related to the shaft and hinge-members as to rock the shaft and return the seat to its normally raised position, and means whereby the tension of the springs may be regulated.

In testimony whereof I have signed my name in presence of two subscribing witnesses.

WILLIAM SYDNEY GRAHAM.

Witnesses:

RUDOLPH WM. LOTZ,
A. FRANCK PHILIPSON.