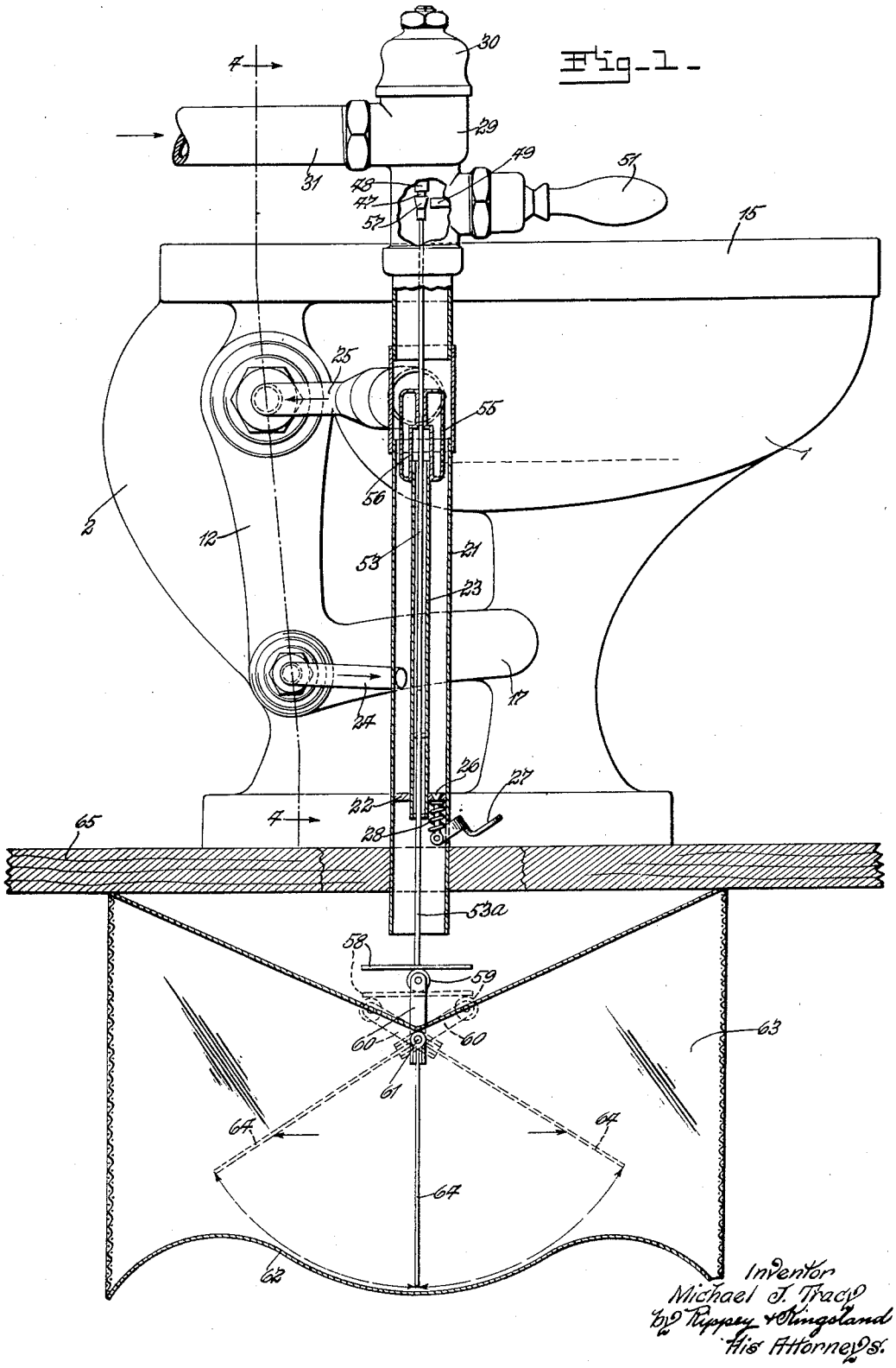
Oct. 24, 1933. M. J. TRACY 1,932,002

SAFETY FLUSHING APPARATUS

Filed April 21, 1933 4 Sheets-Sheet 1

Fig. 1.



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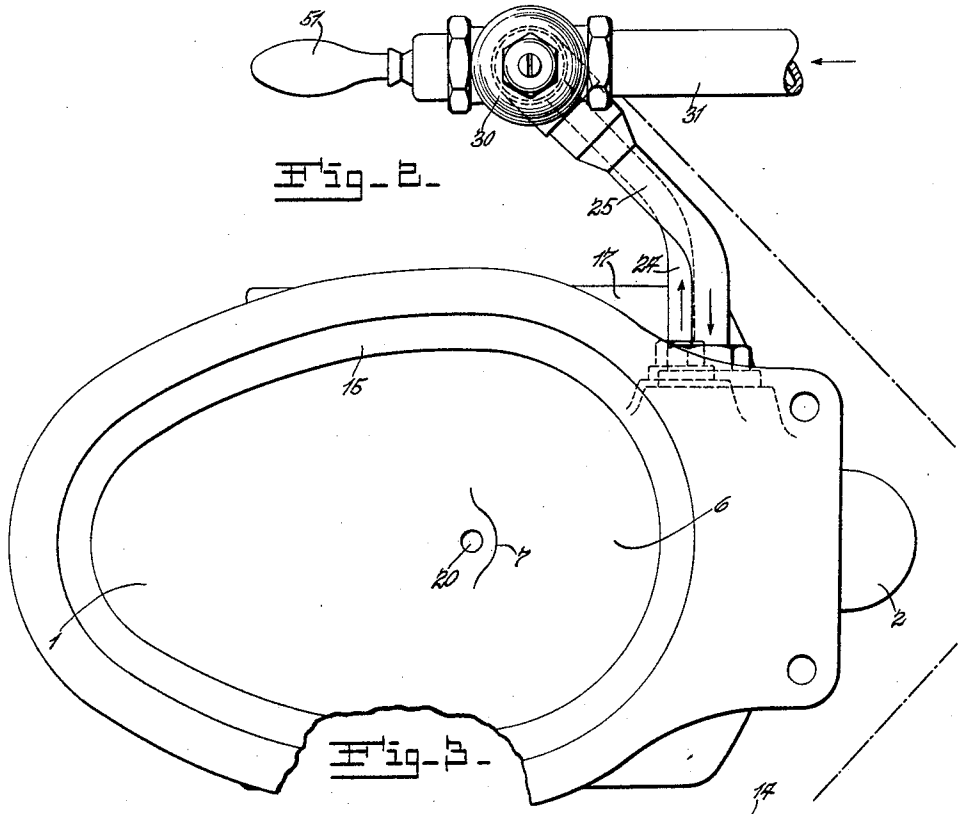

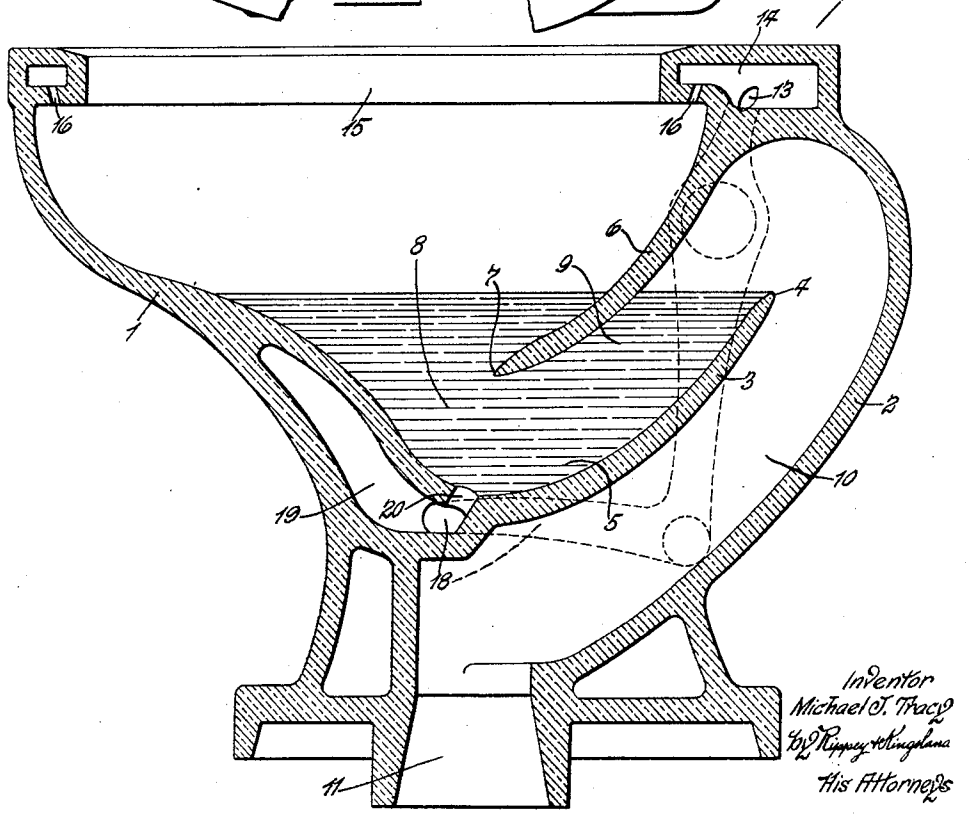

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SAFETY FLUSHING APPARATUS

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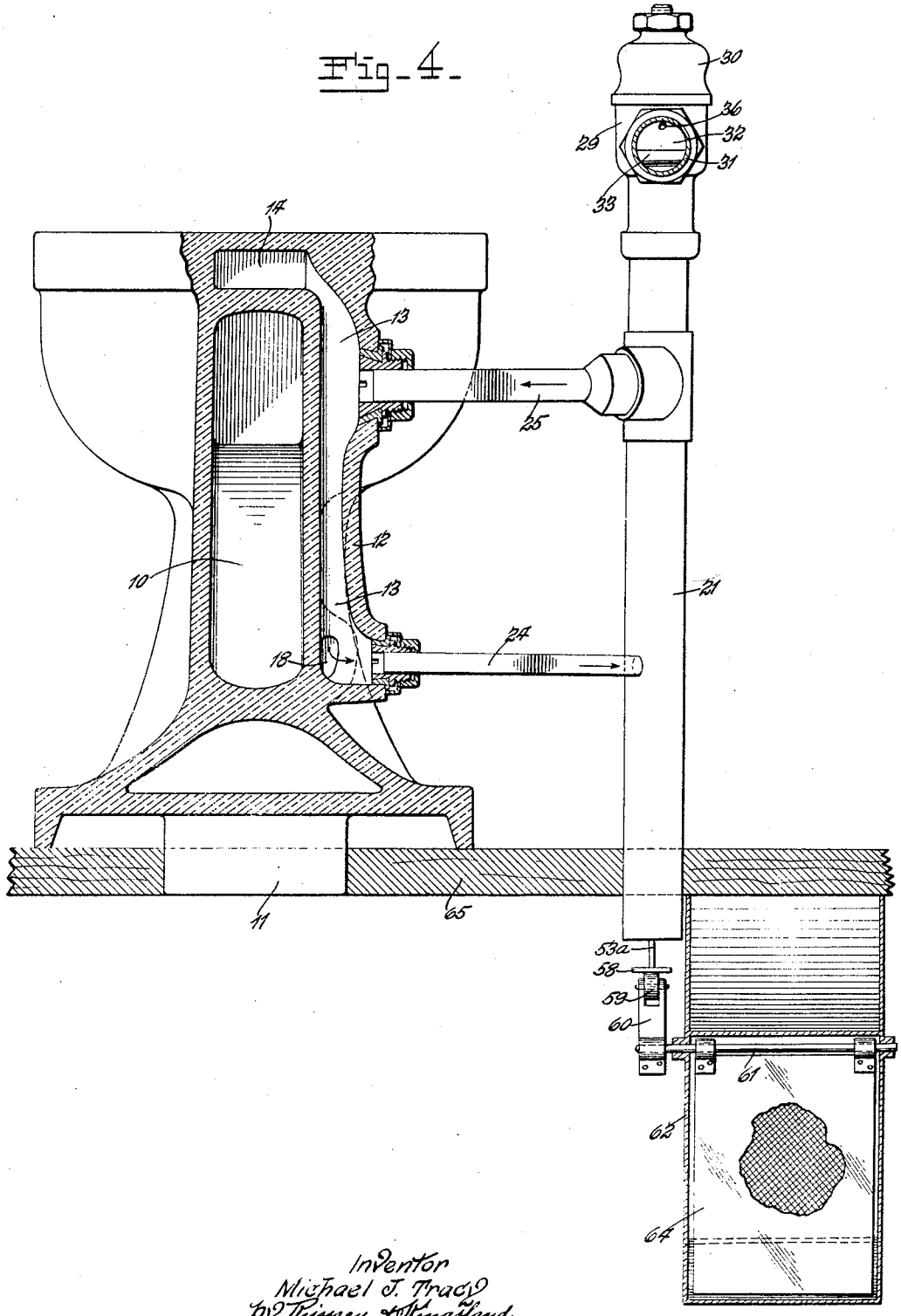
Fig. 4.



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SAFETY FLUSHING APPARATUS

Filed April 21, 1933 4 Sheets-Sheet 4

Fig. 5.

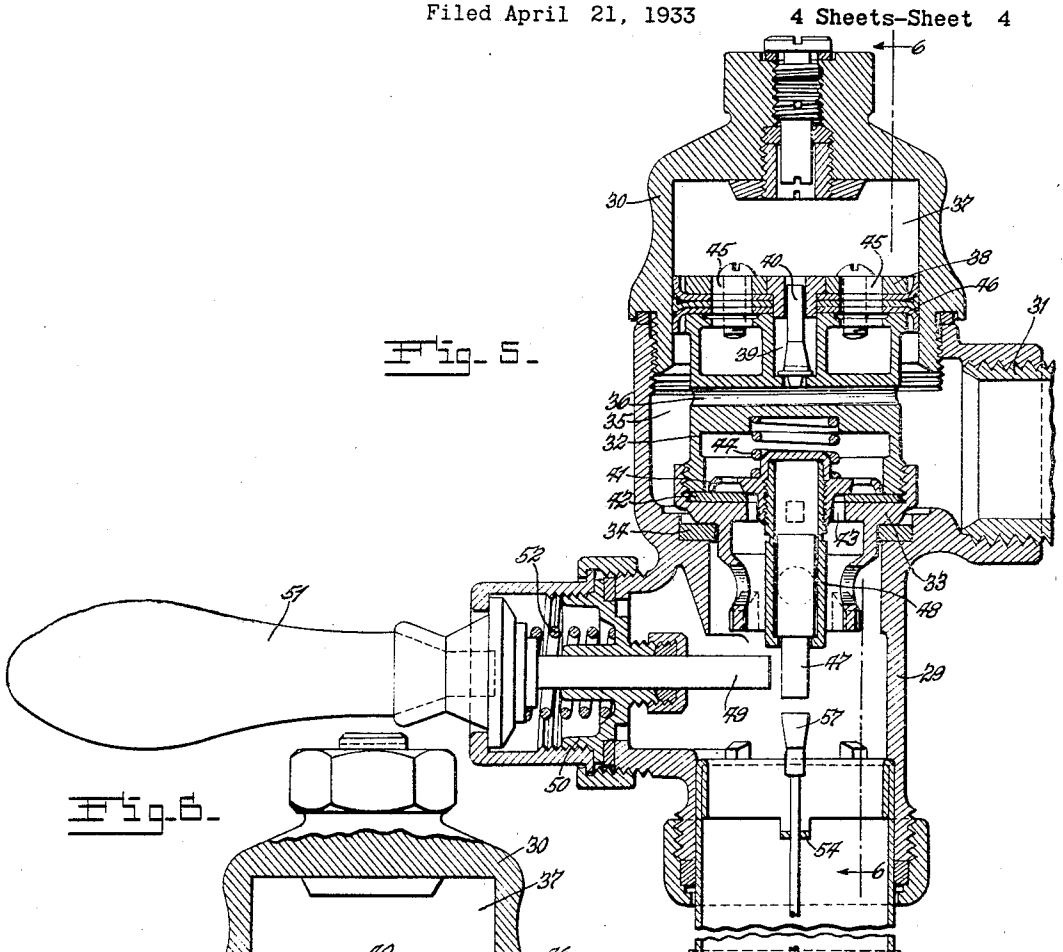
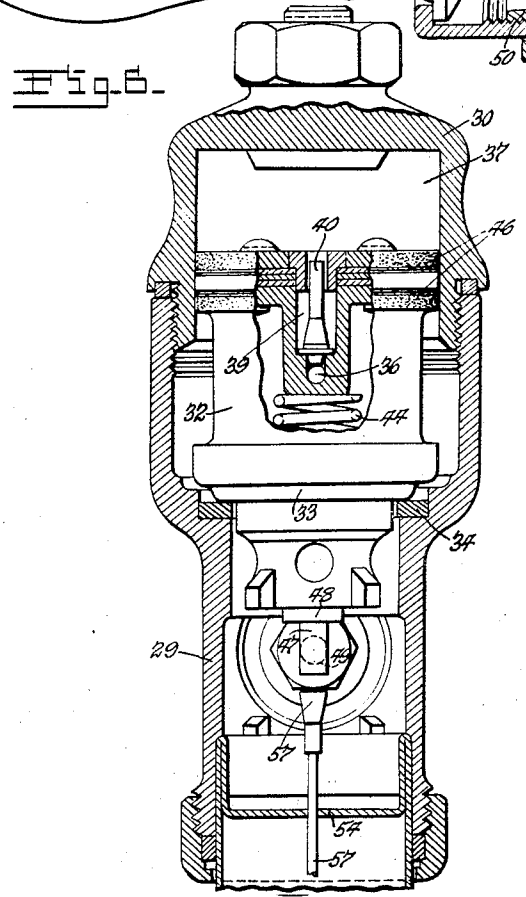


Fig. 6.



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UNITED STATES PATENT OFFICE

1,932,002

SAFETY FLUSHING APPARATUS

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Application April 21, 1933. Serial No. 667,205

20 Claims. (Cl. 4—8)

This invention relates to safety flushing apparatus, and has special reference to safety flushing apparatus constructed and designed for use on railway and other coaches and vehicles and includes means for preventing effective operation of the flushing apparatus when the coach or vehicle is stationary or is not traveling at a predetermined speed.

Objects of the invention are to provide an improved safety flushing apparatus designed and adapted for use on railway coaches and other vehicles, and including equipment controlling the effective operation of the apparatus in such a way that the apparatus may not be operated or flushed when the coach or other vehicle is stationary or is traveling slower than a predetermined rate of speed; to provide means for preventing effective operation of the flushing apparatus when more than a desired amount of water or material is contained in the apparatus, as when the discharge outlet becomes choked, and will not discharge the contents of the flushing apparatus through the waste outlet; to provide improved means for completely draining the flushing apparatus and conditioning the same so that no effective flushing operation may be performed during the time that the coach or vehicle remains stationary; and to provide means for conditioning the apparatus for successive intermittent operations automatically and as an incident to movement of the coach or vehicle at a predetermined rate of speed.

Other objects will appear from the following description, reference being made to the annexed drawings, in which—

Fig. 1 is a side elevation with parts in section of my improved safety flushing apparatus.

Fig. 2 is a plan view.

Fig. 3 is a vertical front to rear sectional view of the bowl or receptacle.

Fig. 4 is a vertical sectional view on the line 4—4 of Fig. 1.

Fig. 5 is an enlarged vertical sectional view of the valve device and mechanism for controlling the same.

Fig. 6 is a vertical sectional view of the valve on the line 6—6 of Fig. 5.

My present invention comprises a bowl or receptacle of novel construction. As shown, the bowl comprises an enclosing wall 1 extending along the front and sides of the bowl and formed in unitary connection with the rear wall 2. The bowl further comprises an upwardly and rearwardly curved wall 3 formed in integral connection with the lower portion of the front wall 1 and curving upwardly and rearwardly in integral connection with the front and side portions of the wall 1 and having its upper edge 4 terminating considerably below the top of the bowl. This construction provides a basin 5 which will receive and hold water up to the edge 4 of the wall 3.

A downwardly and forwardly curved wall 6 is formed in integral connection with the upper portion of the rear wall 2 and with the side portions of the wall 1 and has its lower edge 7 separated from the front portion of the wall 1 by a space 8 opening into the space 9 between the walls 3 and 6. The space 9 at the upper edge 4 of the wall 3 opens into the waste discharge passage 10, which has a discharge outlet 11 to the outside of the bowl.

One side of the bowl is in connection with a wall 12 forming a passage 13 having its upper end opening into a passage 14 formed by wall structure 15 in integral connection with the upper marginal portion of the walls 1 and 2 of the bowl. This passage 14 may extend entirely around the upper end of the bowl and has numerous openings or slots 16 through which the water entering the passage 14 is discharged to the inside of the bowl in order to perform a flushing operation.

Wall structure 17 is formed in connection with the walls 1 and 2 of the bowl and provides a passage 18 that opens into a space 19. A passage 20 opens from the space 19 into the bottom of the basin 5 and this passage is preferably directed upwardly and rearwardly, so that a jet or stream of water injected or forced through said passage 20 will pass below the forward lower portion of the wall 6 and into the passage 9 and thus create and produce a driving force that will drive the contents of the bowl upwardly through the passage 9 and over the upper edge 4 of the wall 3 and into the passage 10 and also create a suction that will draw the contents of the bowl above the wall 6 downwardly into the passage 9 and through said passage 9 eject the contents of the bowl into the passage 10.

A pipe 21 has its lower end opening to the outside or other place of discharge. A partition 22 is fixed in the pipe 21 and the lower end of a tube 23 is attached to and opens through the partition 22. The pipe 21 is approximately vertical. A pipe 24 has one end opening into the pipe 21 and inclines upwardly therefrom and has its opposite end opening into the lower portion of the passage 13 (Fig. 4).

Another pipe 25 has one end opening into the

upper portion of the pipe 21 above the pipe 24 and its opposite end opening into the upper portion of the passage 13.

A valve 26 (Fig. 1) is mounted in an opening in the partition 22 and has its stem pivoted to the inner end of a lever 27. A spring 28, mounted on the stem of the valve 26, has its ends abutting against the partition 22 and the lever 27, respectively, and is effective to hold the valve 26 closed but will yield when the lever 27 is operated to permit the valve 26 to be opened by said lever.

A valve housing 29 is attached to the upper end of the pipe 21 and is equipped with a removable and replaceable end portion 30. A water supply pipe 31 opens into one side of the valve housing 29.

A hollow cylindrical body 32 is detachably connected with a valve 33 designed and adapted to engage a valve seat 34 formed in the housing 29 below the opening from the pipe 31 and thus close communication from the pipe 31 to the pipe 21.

A chamber 35 in the valve housing 29 surrounds the body 32 and the valve 33 above the valve seat 34 and is in communication with the pipe 31. A passage 36 through the body 32 communicates with a chamber 37 in the housing end member 30 above the upper end 38 of the body 32 through a passage 39 controlled by a valve 40. The passage 39 is closed by the valve 40 when said valve 40 is in its lower position (Fig. 5). A valve 41 is mounted in the lower end of the body 32 for oscillating movement to and from a valve seat 42 formed or mounted on the upper side of the body of the valve 33 and is capable of oscillation to raise any peripheral portion of said valve 41 from the seat 42 to permit water to flow from the inside of the body 32 through the opening 43 in the valve body 33 and thence into the pipe 21. A spring 44 has its lower end pressing against the valve 41 and its upper end against the wall of the passage 36 and is effective to hold the valve 41 normally closed but will yield to pressure properly applied to permit a marginal portion of said valve 41 to be raised from the seat 42 and thereby permit flow of water into the pipe 21.

The pipe 31 has no communication with the inside of the body 32 excepting through the passages 36, 39 and 45, the passages 45 forming communication from the space 37 to the inside of the body 32. Accordingly, when the valve 41 is tilted, water is free to flow from the space 37 through the passages 45 into the inside of the hollow cylindrical body 32 and thence through the opening 43 into the pipe 21. This will permit the water in the chamber 35, by pressing against the marginal device 46 in connection with the end 38 of the body 32, to move the body 32 and thereby the valve 33 upwardly because the pressure of the water in the chamber 35 against the device 46 exceeds the pressure of the water in the chamber 37. Thus, the valve 33 is opened to permit a flow of water from the pipe 31 to the pipe 21 and this flow of water will continue until water passing to the chamber 37 through the passages 36 and 39 creates a greater pressure against the upper end 38 of the body 32. This greater pressure of the water in the chamber 37 and against the upper side of the end 38 will close the valve 33 and stop the flow of water from the pipe 31 to the pipe 21.

The device 46 forms sealing contact with the inner surface of the wall of the end member 30, so that water cannot flow between the wall of the member 30 and said device 46.

A stem 47 is supported for vertical sliding movements by a tubular member 48 attached to the valve 41 and extends downwardly opposite the inner end of a valve stem 49 mounted for sliding movements in a support 50 in connection with the valve housing 29. An oscillating handle 51 is operative to move the valve stem 49 inwardly a distance sufficient to push the stem 47 laterally and thereby tilt, or raise one side of, the valve 41 to permit flow of water from the chamber 37 through the passages 45 and through the body 32 and the passage 43 into the pipe 21. As already explained, this initial or piloting flow of water from the chamber 37 permits the water in the chamber 35 to open the valve 33 and discharge a flushing flow of water from the pipe 31 into the pipe 21 and thence through the pipes 24 and 25 into the passage 13. From the passage 13, the water is injected through the passages 18 and 20 into the lower part of the bowl and through the passages 14 and 16 into the upper part of the bowl to produce a perfect flushing operation. When the valve handle 51 is released, a spring 52 will move the stem 49 outwardly and move the handle 51 to its initial unoperated position.

A stem 53 is mounted for vertical sliding movements in a guide 54 (Fig. 5) in the lower portion of the valve housing 29. A float 55 is mounted in the pipe 21 and attached to the stem 53 and has a tubular portion 56 mounted for sliding movements on the upper end of the tube 23. The upper end of the stem 53 has a part 57 in axial alinement with and adjacent to the lower end of the stem 47. Accordingly, it is clear that when the pipe 21 becomes filled with water and the float 55 is thereby raised, the stem 53 will be operated to move the stem 57 upwardly beyond and out of alinement with the inner end of the stem 49, so that said stem 49 cannot operate the stem 47 even though said stem may be operated by the handle 51. Thus, if the waste outlet 11 or the passages 9 or 10 become choked to prevent proper flushing of the bowl, water will rise in the bowl above a predetermined height and will fill the pipe 21 and operate the float 55. This will operate the stem 53 and cause said stem to raise and support the stem 47 above and out of position to be operated by the stem 49. Accordingly, it is impossible to cause an overflow of the bowl since the valve devices cannot be opened when the bowl contains water above a predetermined level.

Moreover, a second operation of the valve device cannot be performed immediately following one operation thereof. This is because a greater volume of water flows into the pipe 21 than can pass through the pipes 24 and 25, so that said pipe 21 becomes filled with water and the float 55 is operated to raise the valve stem 47, and support said valve stem 47 above the end of the stem 49 until enough water has passed from the pipe 21 through the pipes 24 and 25 to permit the float 55 to move downwardly approximately to its starting position.

The lower end of the stem 53 is engaged by the upper end of a stem 53a which supports a cross head 58 (Figs. 1 and 4). A roller 59, supported by one end of a lever 60, operates against the underside of the cross head 58. The lever 60 is attached to a rock-shaft 61 supported by walls 62 forming a passage 63. A plate 64 is attached to the shaft 61 and is operative to turn said shaft in

opposite directions. The passage 63 has one end opening toward the front and the other end opening toward the rear of the coach or vehicle in which the device is mounted, so that, irrespective of the direction in which the vehicle is traveling and irrespective of which end of the vehicle is in front, a strong current or draft of air will pass through the passage 63 and will operate or move the plate 64 to a rearwardly and downwardly inclined position and will support said plate 64 in such position. This movement of the plate 64 turns the shaft 61 and moves the lever 60 to an inclined position. When the coach or vehicle is stationary, or is moving at such a low rate of speed that the current or draft of air will not support the plate 64, said plate 64 moves to a vertical or approximately vertical position. Thus, the plate 64 constitutes an actuator for turning the shaft 61 to extend the lever 60 upwardly and operate the roller 59 against the underside of the cross head 58 and thus move the stems 53[a] and 53 upwardly and support said stems in their raised positions. This upward movement of the stems 53[a] and 53 moves the stem 47 upwardly above and out of line with the stem 49, so that said stem 47 will not be operated by said stem 49 when the handle 51 is manipulated. Accordingly, when the coach or vehicle is stationary or is moving at a low rate of speed, it is impossible to operate the flushing apparatus or to discharge water into the flushing apparatus from the pipe 21.

However, the lever 27 may be operated to open the valve 26 and thereby drain the bowl, the water flowing through the passages 20 and 18 and the pipe 24 into the pipe 21 and thence through the opening controlled by the valve 26 and out through the discharge end of the pipe 21.

It should now be clear that my invention is designed and adapted for embodiment in a traveling vehicle having a floor or support 65 and includes a bowl to be flushed equipped with mechanism operative by the handle 51 to admit water to said bowl to flush the same, connections comprising the stems 53 and 47 operative to condition said mechanism to prevent effective operation of said mechanism and thereby prevent admission of water to the bowl. Further, my invention includes means operated by the air during travel of the vehicle comprising the stem 53[a], the plate 64 and the connections operated by said plate 64 to operate said stem 53[a] and thereby the stem 53 to condition such mechanism, so that it cannot be operated and to hold said connections in position to prevent flushing operation of said mechanism. Additionally, my invention comprises means including the valve 26 for withdrawing water from the bowl while said mechanism remains unoperated. These embodiments may be defined as mechanism operative to admit water to said bowl to flush the same, connections for preventing effective operation of said mechanism and thereby preventing admission of water to said bowl, means operated by an excess amount of water in the bowl to control said connections and prevent effective operation of said mechanism, and means operated by the air during travel of the vehicle for holding said connections in position to permit operation of the mechanism to flush the bowl, and for holding said connections in position to prevent effective operation of said mechanism to flush said bowl when the vehicle is stationary.

To use this flushing apparatus, when the plate 64 is in either of its operated positions indicated by dotted lines in Fig. 1, the handle 51 is operated to open the pilot valve 41 and drain the water from the chamber 37. Pressure of water from the pipe 31 into the chamber 35 moves the member 32 upwardly, thereby opening the valve 33 and permitting a flow of water from the pipe 31 into the pipe 21 and thence through the pipes 24 and 25 to flush the bowl. This flow of water continuous in a sufficient amount and for a sufficient time to flush the bowl satisfactorily. When the lever 51 is released, the stem 49 is retracted by the spring 52. Thereupon the valve 41 is closed by operation of the spring 54. Water continues to flow through the passages 36 and 39 into the chamber 37, thereby applying sufficient pressure against the upper side of the end 38, which is of greater area than the lower area of the device 46 to move the body 32 downwardly and thereby force the valve 33 onto the valve seat 34. This stops the flow of water into the pipe 21.

In other aspects of the invention, it is unimportant whether the actuator 61—60 be operated by pneumatic means or not. The invention comprising mechanical means in addition to the hydraulic means 55, or whether said hydraulic means is present or not, is a complete successful embodiment. It is clear that the mechanical means 53—53[a] may be operated in many ways and that for a complete successful embodiment of the invention the pneumatic device 64 is not required. For instance, the mechanical means 53—53[a] may easily be operated by a moving part of the vehicle or coach, such, for instance, as the axle equipped with known or other types of actuators (not shown) for imparting movement to some part or device when the axle is moving. I contemplate use of other devices in operating the parts 53—53[a] and do not limit myself to the use of pneumatic devices for that purpose.

The remaining operations of the device should now be clear and it is also apparent that the construction and arrangement of the elements of this invention may be varied widely within the scope of equivalent limits without departure from the nature and principle thereof. I do not restrict myself unessentially but what I desire to secure by Letters Patent is:

1. A safety flushing apparatus comprising a bowl to be flushed, means forming a passage for discharging water into the bowl, a valve controlling the flow of water through said passage, a device for causing said valve to open to discharge water into said passage and movable into and out of position for operation, means operative by an excess of water in said passage to move said device out of position for operation, and means for moving said device out of position for operation irrespective of the amount of water in said passage.

2. A safety flushing apparatus comprising a bowl to be flushed, a device controlling flow of water into said bowl to flush the same, a device for operating said first device to position to admit water into said bowl, means operated when an excess amount of water is contained in said bowl, to prevent operation of said first device by said second device, and means operated other than when an excess amount of water is contained in said bowl to prevent operation of said first device by said second device.

3. A safety flushing apparatus comprising a bowl to be flushed, means forming a passage for conducting water toward said bowl to flush the same, a valve controlling the flow of water through said passage, a device for causing water

at the influent side of said valve to open said valve to permit said water to flow through said passage toward said bowl, means at the effluent side of said valve for operating said device effectively to cause water at the influent side of said valve to open said valve, and means controlled by an excess amount of water in said passage making it impossible for said means to operate said device.

4. A safety flushing apparatus comprising a bowl to be flushed, means forming a passage for conducting water toward said bowl to flush the same, a valve controlling the flow of water through said passage, a device for causing water at the influent side of said valve to open said valve to permit said water to flow through said passage toward said bowl, means for operating said device effectively to cause water at the influent side of said valve to open said valve, means controlled by an excess amount of water in said passage making it impossible for said means to operate said device, and a mechanical actuator for operating said means irrespective of the amount of water contained in said bowl.

5. In a traveling coach or vehicle, a bowl to be flushed, mechanism controlling flow of water into said bowl to flush the same, a device for operating said mechanism to permit flow of water into said bowl to flush the same, an element for breaking cooperative relation of said device with respect to said mechanism to make it impossible to operate said mechanism by said device, and means operative by the air during travel of the vehicle for holding said element in position to permit operation of said mechanism by said device.

6. In a traveling vehicle, a bowl to be flushed, mechanism operative to admit water to said bowl to flush the same, connections for preventing effective operation of said mechanism and thereby preventing admission of water to said bowl, and means operated by the air during travel of the vehicle for holding said connections in position to permit operation of said mechanism to flush said bowl.

7. In a traveling vehicle, a bowl to be flushed, mechanism operative to admit water to said bowl to flush the same, connections for preventing effective operation of said mechanism and thereby preventing admission of water to said bowl, and means operated by the air during travel of the vehicle for holding said connections in position to permit operation of said mechanism to flush said bowl and holding said connections in position to prevent effective operation of said mechanism to flush said bowl when the vehicle is stationary.

8. In a traveling vehicle, a bowl to be flushed, mechanism operative to admit water to said bowl to flush the same, connections for preventing effective operation of said mechanism and thereby preventing admission of water to said bowl, means operated by the air during travel of the vehicle for holding said connections in position to permit operation of said mechanism to flush said bowl, and means for withdrawing water from said bowl while said mechanism remains unoperated.

9. In a traveling vehicle, a bowl to be flushed, mechanism operative to admit water to said bowl to flush the same, and an actuator operating to prevent effective operation of said mechanism when the vehicle is stationary.

10. In a traveling vehicle, a bowl to be flushed, mechanism operative to admit water to said bowl to flush the same, an actuator operating to prevent effective operation of said mechanism when the vehicle is stationary, and means for causing a draft or current of air to operate said actuator when the vehicle is traveling at or beyond a predetermined rate of speed.

11. In a traveling vehicle, a bowl to be flushed, mechanism operative to admit water to said bowl to flush the same, and an actuator supported in position to prevent operation of said mechanism when the vehicle is stationary and there is no draft or current of air against said actuator.

12. In a traveling vehicle, a bowl to be flushed, mechanism operative to admit water to said bowl to flush the same, an actuator supported in position to prevent operation of said mechanism when the vehicle is stationary and there is no draft or current of air against said actuator, and means for draining water from said bowl while said mechanism remains unoperated.

13. In a traveling vehicle, a bowl to be flushed and having a discharge passage, mechanism operative to admit water to said bowl through said discharge passage, means forming another discharge passage from said bowl, a valve controlling discharge of water from said bowl through said first-mentioned discharge passage, and means for operating said valve to discharge water from said bowl while said mechanism remains unoperated.

14. In a traveling vehicle, a bowl to be flushed, mechanism operative to admit water to said bowl to flush the same, plural discharge passages for conducting water from said bowl, a valve controlling one of said passages, and means for operating said valve to drain water from said bowl while said mechanism remains unoperated.

15. In a traveling vehicle, a bowl to be flushed, mechanism operative to admit water to said bowl to flush the same, plural discharge passages for conducting water from said bowl, a valve controlling one of said passages, means for operating said valve to drain water from said bowl while said mechanism remains unoperated, and means for maintaining said mechanism in an unoperative condition while the vehicle is stationary.

16. In a traveling vehicle, a bowl to be flushed, mechanism operative to admit water to said bowl to flush the same, plural discharge passages for conducting water from said bowl, a valve controlling one of said passages, means for operating said valve to drain water from said bowl while said mechanism remains unoperated, means for maintaining said mechanism in an unoperative condition while the vehicle is stationary, and an actuator operated by the air during travel of the vehicle for holding said means in position to permit operation of said mechanism when the vehicle is traveling at a predetermined rate of speed.

17. In a traveling vehicle, a bowl having a waste outlet passage, means forming two passages for discharging water into said bowl effectively to eject the contents of said bowl through said waste outlet passage, and a valve device controlling one of said two passages and controlling withdrawal of water from said bowl while said mechanism remains unoperated.

18. In a traveling vehicle, a bowl having a waste outlet passage, means forming two passage for discharging water into said bowl effectively to eject the contents of said bowl through said waste outlet passage, a valve device controlling one of said two passages and controlling withdrawal of water from said bowl while said mechanism remains unoperated, and a device operated pneumatically during travel of the vehicle to maintain said mechanism operative and operated by gravity

when the vehicle is stationary to maintain said mechanism inoperative.

19. A bowl of the character described comprising a wall forming a basin having a waste discharge outlet, and wall structure in connection with said wall forming an upwardly and downwardly extending passage communicating at its upper and lower ends with said bowl and basin respectively, said wall structure having openings one spaced below the other for admitting water into and conducting water from said passage respectively.

20. A bowl of the character described comprising a wall forming a basin having a waste discharge passage and having water inlet passages opening into the upper portion of the bowl above said basin and opening into the lower portion of the basin respectively, and wall structure in connection with said wall forming an upwardly and downwardly extending passage having its upper end opening into said first passage and its lower end opening into said second passage, and said wall structure having openings one spaced below the other for admitting water into and conducting water from said passage formed by said wall structure respectively.

MICHAEL J. TRACY.