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FLUSHING DEVICE

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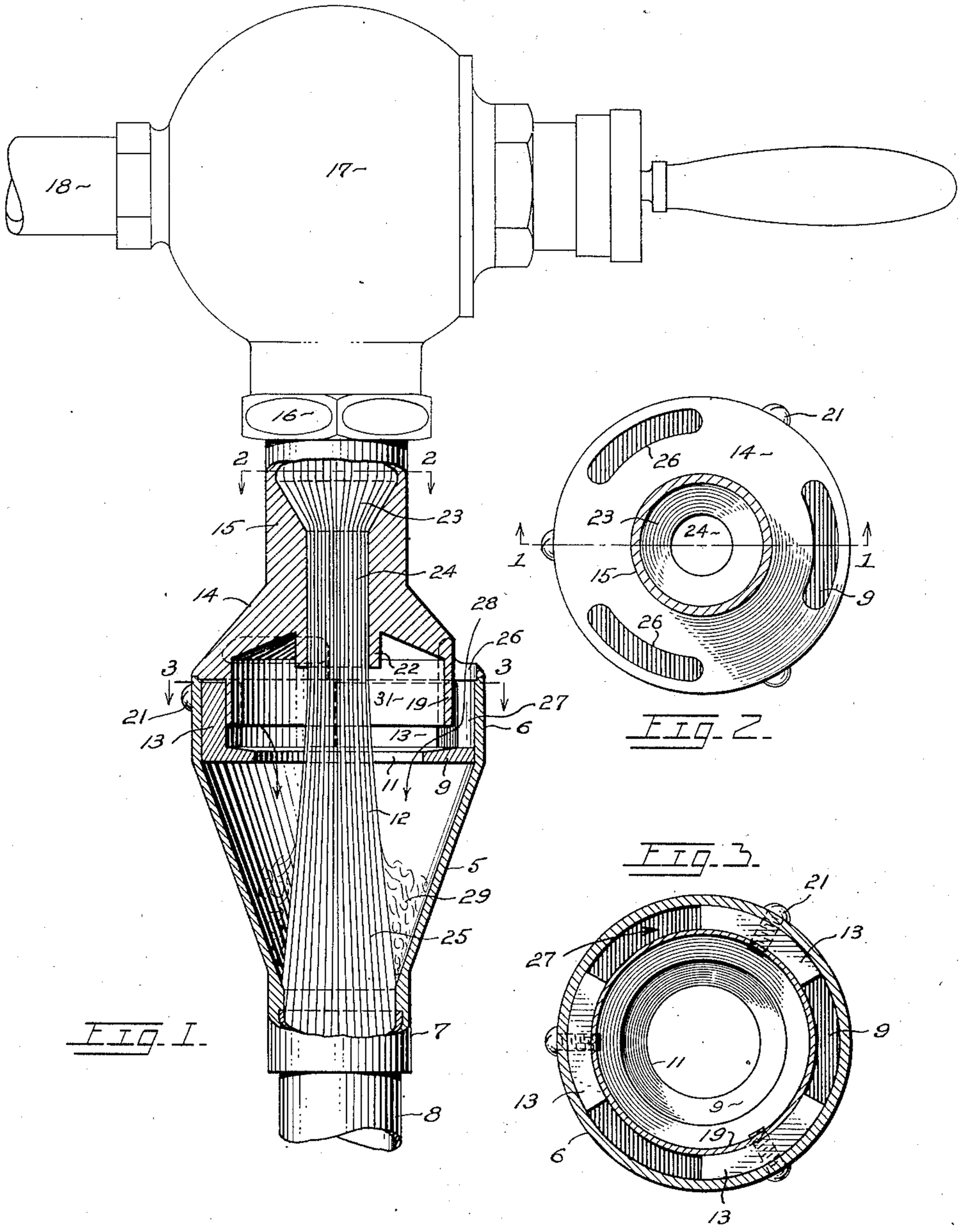

Fig. 1.

Fig. 2.

Fig. 3.

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FLUSHING DEVICE

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7 Claims. (Cl. 4—70)

My invention relates to improvements in devices for flushing such fixtures as water-closet bowls and urinals. Among its salient objects are; first, to supply a device of this nature that will absolutely prevent any reverse flow through it into the water supply system, as by reason of the creation of a partial vacuum in the latter; second, to furnish a device that will absolutely prevent the draining of the water seal from closet bowls and the like; third, to provide a flushing device that is adapted to effect a material saving in the amount of water required for flushing; and, fourth, to accomplish the aforesaid objects by means of very simple and relatively inexpensive construction, that is suitable for installation under ordinary conditions.

My objects are attained in the manner illustrated in the accompanying drawing in which—

Figure 1 is an elevation of a preferred embodiment of my invention, in central longitudinal section;

Figure 2 is a cross-section of the aforesaid construction, taken on the plane 2—2 of Fig. 1; and

Figure 3 is a similar cross-section, taken on the plane 3—3 of Fig. 1.

Similar reference numerals refer to similar parts throughout the several views.

My invention embodies the principles of the Venturi tube, and also those of well known types of inspirators. By utilizing these principles, it is possible to create a relatively high velocity in the water stream used for flushing, and to cause it to draw in a certain amount of air that will mix with the water, and thus increase its effective volume without interfering with the functions of the flushing stream as such. In this manner a considerable saving may be had in the amount of water required for flushing. The passages for drawing in air from the atmosphere for producing the above result, are always open in my device; and, therefore, it is impossible for any partial vacuum in the water supply system to cause a reverse flow. Up to the present time such a reverse flow is always possible in the case of certain types of commonly used plumbing fixtures. This matter will be more fully explained below.

Passing to a detailed description of my invention in the form that has been selected for illustration, the main body portion of my improved device is in the form of an inverted hollow cone, as shown at 5. This part has a cylindrical portion 6 at the top, and a nozzle portion 7 at the bottom. A pipe 8 is tightly fitted into this nozzle, as by screw-threading or otherwise, and leads to the device to be flushed.

Within the upper cylindrical portion 6 of the body, is a castellated orifice diaphragm 9. Orifice 11 of this diaphragm is considerably larger in diameter than the flushing stream, indicated at 12, that passes downwardly therethrough. The castellated feature of the diaphragm comprises three upstanding arcuate portions 13. These serve to define air inlet passages between them, as well as to provide convenient means for positioning and assembling the several parts of the device.

A cap or head 14 is fitted to the upper cylindrical portion 6 of the main body, and serves as a closure therefor. This cap has an upwardly extending neck 15, adapted at the top for being engaged by the union-nut 16 of any suitable type of flushing valve, such as that indicated by reference numeral 17. This valve forms no part of my present invention. It is connected in any usual and convenient manner to the water supply system, as by means of the pipe 18.

Head 14 has a downwardly extending circular flange 19, adapted to fit snugly within arcuate portions 13 of the castellated diaphragm; and the three described parts of the device, after being positioned in the manner shown in Fig. 1, are held together by screws 21 which pass through portions 6, 13, and 19 respectively.

Head 14 has a downwardly extending nozzle portion 22, and an axial bore shaped like the entrance portion of a Venturi tube. This provides an inverted conical flow passage 23 at the top, and a throat passage 24 of considerably less diameter, the latter emerging at the mouth of nozzle 22.

The incoming flushing stream has a relatively low velocity initially, and this is greatly increased by means of the conical pasasge 23. The stream therefore passes through throat 24 at a relatively high velocity. After emerging from nozzle 22, the flushing stream will tend to expand gradually, as illustrated at 25, its velocity becoming reduced in proportion to the increase in its diameter. At the bottom, this stream will completely fill pipe 8, at a relatively low velocity, and pass thence into the device to be flushed.

During the passage of the flushing stream through body portion 5, wherein its diameter is expanded and its velocity is reduced, it will tend to draw air from the atmosphere into the body, by reason of its inspiratory effect. The incoming air enters through arcuate orifices 26 in the head, and passages 27 between the upstanding castellated portions 13. The course that this incoming air current will take, is shown by arrow

28. This air stream, by reason of its frictional contact with flushing stream 25, will cause a certain amount of turbulence and admixture of air and water, particularly in the lower part of cone 5 where indicated by reference numeral 29. Thus the outgoing flushing stream, passing through pipe 8, will be a mixture of air and water. For flushing purposes, this mixture is quite as effective as a corresponding volume of water alone, and a material saving of water may be accomplished in this way.

In case there ever should be a partial vacuum created in pipe 18, as by reason of shutting off a valve in the supply line or from a heavy draught of water at a lower level, it would be impossible for any reverse flow to take place through my device. This is for the reason that the air inlet passages always are open. Thus the pressure within conical portion 5 must remain substantially the same as that of the atmosphere. No partial vacuum in pipe 18 could possibly cause a reverse flow of the flushing stream, since the incoming air current would instantly cause the stream to break.

The radial flange of diaphragm 9 acts as a baffle, and effectively prevents any splash from passing upwardly through the passages indicated by arrow 28. Moreover, there is a hollowed chamber within the head, shown at 31. This is adapted to catch any splash that may pass through orifice 11, and allow it to fall back through said orifice into hollow cone 5.

I have already mentioned the practical advantages in the operation of my device which consist in reducing of the amount of water required for flushing, and making it impossible for a reverse flow to occur. Thus greater economy is secured, and there is a certainty that the supply system can never become contaminated by reason of a reverse flow.

Having thus fully described my invention in a manner that will be readily understood by those familiar with the art involved, I claim;

1. A device of the character described, comprising; a confined vertical passage for a fluid stream; and a housing below said passage adapted to completely enclose a stream issuing from the passage; the upper interior portion of the housing being in communication with the outside atmosphere; the upper portions of the lateral wall of the housing being spaced from the path of the stream; and the wall of the housing being so shaped that air drawn into the housing by the inspiratory action of the stream, will strongly tend to commingle with the stream.

2. A device of the character described, comprising; a housing in the form of an inverted hollow truncated cone, adapted to completely enclose an unconfined coaxial fluid stream passing downwardly therethrough; the upper portion of the interior of the housing being in communication with the outside atmosphere; and the diameter of the inverted base of said cone being materially greater than that of the path of said stream.

3. A device of the character described, comprising; a vertical passage adapted to impart a Venturi effect to a fluid stream passing downwardly therethrough; and a coaxial housing below said passage, adapted to completely encolse a stream issuing therefrom; the upper portion of the interior of the housing being in communication with the outside atmosphere; and the upper portion of the lateral wall of the housing being spaced from the path of said stream.

4. A device of the character described, comprising; a vertical passage adapted to impart a Venturi effect to a fluid stream passing downwardly therethrough; a coaxial housing below said passage adapted to completely enclose a stream issuing therefrom; and a coaxial annular spray-baffle within the upper part of the housing, spaced from said passage and from the path of said stream; the upper portion of the interior of the housing being in communication with the outside atmosphere; the upper portion of the lateral wall of the housing being spaced from the path of said stream; and the wall of the housing being so shaped that air drawn into the housing by the inspiratory action of said stream, will be caused to commingle therewith at the bottom of the housing.

5. A device of the character described, comprising; a converging passage leading into the upper end of a vertical cylindrical throat passage, whereby a portion of the pressure head of a fluid stream may be converted into an additional velocity head in said throat; and a coaxial housing below said throat, adapted to completely enclose a stream issuing therefrom; the upper portion of the interior of the housing being in communication with the outside atmosphere; the upper portion of the lateral wall of the housing being spaced from the path of said stream; and the wall of the housing being so shaped that air drawn into the housing by the inspiratory action of said stream, will be caused to commingle therewith at the bottom of the housing.

6. A device of the character described, comprising; a housing in the form of an inverted truncated hollow cone; a coaxial annular spray-baffle within the housing adjacent its upper end; and a coaxial cap closing the top of the housing; said cap having an axial passage therethrough, for directing a fluid stream downwardly into said housing; said baffle being spaced from said passage and from the path of a stream issuing therefrom; the interior of the upper part of said housing being in communication with the outside atmosphere; and the upper portion of the wall of said housing being spaced from the path of said stream.

7. A device of the character described, comprising; a housing in the form of an inverted truncated hollow cone; a coaxial annular spray-baffle within the housing adjacent its upper end; and a coaxial cap closing the top of the housing; said cap having an axial passage therethrough, for directing a fluid stream downwardly into said housing, and a downwardly directed coaxial annular flange; said baffle being spaced from said passage and from the path of a stream issuing therefrom, and having spaced upstanding lugs intermediate said flange and the upper wall of the housing for positioning and assembling said parts; the interior of the upper part of said housing being in communication with the outside atmosphere through passages between said lugs; the upper portion of the conical wall of the housing being spaced from the path of said stream; and the lower portion of said conical wall being contiguous to said path.

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