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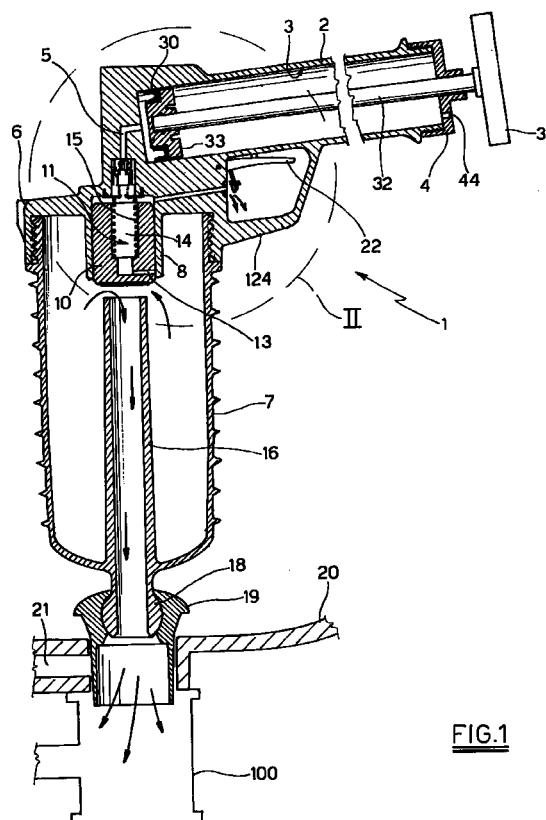
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(54) **Portable device for unblocking pipes, typically the waste pipes of sinks and the like**

(57) The device comprises an air receiver (7) having its inlet connected to a manually operated pumping unit (3, 33) for its filling with compressed atmospheric air, between said pumping unit and said receiver (7) there being interposed a valve unit comprising a non-return valve (77) positioned to intercept the delivery conduit of said pumping unit; a valving element (10) slidably housed air-tight inside a passage chamber (12) into which said delivery conduit opens, and arranged to close the outlet of the receiver (7); a vent valve (24), controlled by a trigger operable from the outside, to intercept a channel (25) which connects said passage chamber (12) to the outside; and a duct (11) which passes through said valving element (10) and has one end constantly connected to said passage chamber (12) and its other end opening into the outer cylindrical surface of the valving element (10); said valving element (10) is provided with elastic means (15) arranged to maintain the valving element (10) constantly urged towards its closure position, the thrust of said elastic means (15) being overcome by the thrust produced by the pressure downstream of the valving element (10) when the passage chamber (12) is connected to discharge.



**FIG.1**

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## Description

[0001] This invention relates to a device for unblocking pipes in general, a typical but not exclusive application of which is in unblocking waste systems of sinks and the like at least partly obstructed by deposits. 5

[0002] An object of this invention is to provide an efficient functional portable sink unblocking device able to unblock even relatively very clogged pipes without the need to use acid products and/or products requiring external energy sources. 10

[0003] Another object of the invention is to provide a portable sink unblocking device which is practical, manageable, reliable, small in size and lightweight.

[0004] A further object is to provide a portable sink unblocking device which can also be used by non-expert persons and is hence suitable for example for domestic use. 15

[0005] A further object is to provide a portable sink unblocking device which is constructionally simple while being of safe and reliable operation. 20

[0006] These and still further objects are attained by a portable sink unblocking device having the characteristics defined in the claims.

[0007] Specifically, the sink unblocking device of the invention consists of a device in which the unblocking action is provided by a compressed air mass which is released instantaneously, to be fed into the pipe to be unblocked in the manner of a shot, such as to create an impact wave which strikes the matter obstructing the pipe. 25

[0008] The device comprises an air receiver having its inlet connected to a manually operated pumping unit for its filling with compressed atmospheric air, and its outlet comprising a delivery spout to be sealedly engaged with the mouth of a pipe to be unblocked, between said pumping unit and said receiver there being interposed a valve unit able to assume an operative first configuration, or filling configuration, in which it enables the pumped air to accumulate within the receiver, and a second configuration, or emptying configuration, in which it enables the compressed air present in the receiver to discharge instantaneously through said spout. 35

[0009] Said valve unit, which is described in detail hereinafter, assumes said filling configuration automatically, whereas said emptying configuration is set by the user when a pressure considered sufficient has been attained. 40

[0010] All components are housed in a profiled casing substantially in shape of a gun, the handgrip of said gun shape being equipped with said pumping unit, and its barrel forming said receiver. 45

[0011] The characteristics and the constructional merits of the invention, together with its method of operation, will be apparent from the detailed description given hereinafter with reference to the figures of the accompanying drawings, on which: 50

Figure 1 is an interrupted sectional side elevation of the invention in the configuration in which the compressed air previously accumulated in the air receiver is discharged into the waste hole of a sink.

Figure 2 is a greatly enlarged view of the circled part indicated by II in Figure 1, the valve unit being shown in the position occupied during the return stage (air draw-in from the atmosphere) of the pumping unit.

Figure 3 is a view similar to the preceding, showing the position occupied by the valve unit during the outward stage (compression of atmospheric air into the receiver) of said pumping unit. 15

[0012] From said figures, and in particular Figure 1, it can be seen that the sink unblocking device of the invention is in the form of a hollow profiled plastic casing having a shape similar to a gun.

[0013] The butt of said gun houses a manually operated pumping unit, described hereinafter, the barrel of the gun forming a receiver for accumulating a compressed air mass drawn from the surrounding atmosphere by said pumping unit (Figure 2), which then feeds it into the receiver (Figure 3) via a suitable valve unit.

[0014] The handgrip 2 of said hollow casing comprises a cylindrical operating chamber 3 having its free end fitted with a centrally holed threaded cap 4, and its opposite end provided with an elbow-shaped duct 5. 25

[0015] A pumping piston 33 is slidably mounted in the operating chamber 3 such that its rod 32 emerges from said cap 4 where it comprises an operating member 31.

[0016] The piston 33 is housed in the chamber 3 with a degree of circumferential slack, and is provided with an annular lip gasket 30 arranged to deform inwards during the return strokes of the piston 33, and to seal against the facing cylindrical surface of the chamber 3 during the outward strokes of the piston 33. 35

[0017] The connection between the chamber 3 and the external atmosphere is made by a sized hole 44 provided in the cap 4.

[0018] At said opposite end, said handgrip 2 is provided with an internally threaded cap-shaped flange 6 which is tightly screwed into the top of the receiver 7, this being of cup shape.

[0019] Said elbow-shaped duct 5 opens at the centre of the base wall of said flange 6, from said base wall there branching a downwardly extending central sleeve 8 of cylindrical shape. 40

[0020] As can be seen, the downstream end of the duct 5, ie that shown at the bottom in the figures, has a greater diameter than its upstream end, the terminal port of said downstream end being surrounded by an annular incision.

[0021] A metal valve seat 55 is inserted as a forced fit into said terminal port, a flanged metal ring 66 being 55

inserted as a forced fit into said annular incision.

**[0022]** A metal valving element 77 provided with a seal gasket 88 is slidably housed in said valve seat 66, a compressed spring 99 being provided between said valving element 77 and said ring 66.

**[0023]** The purpose of this compressed spring is to facilitate the return of said valving element 77 into its closed position when the piston 33 is stationary or is undergoing a return stroke.

**[0024]** The arrangement formed by said valving element 77 is basically a non-return valve.

**[0025]** A valving element 10 is also slidably mounted in said downwardly extending central sleeve 8 as a precise fit so that it slides freely under sealed conditions, for the filling and emptying operations as described hereinafter.

**[0026]** Said valving element 10 is in the form of a cylindrical block provided with an angular duct 11 having an upper longitudinal portion 14 which opens into the overlying passage chamber 12 provided between the valving element 10 and the flange 6, and a lower radial portion 13 which opens into the lateral cylindrical surface of said cylindrical block forming the valving element.

**[0027]** The upper part of said longitudinal portion 14 of the duct 11 has a widening to house a compressed spring 15 positioned between the shoulder formed by said widening and said flanged ring 66.

**[0028]** The purpose of said spring 15 is to ensure correct positioning of said valving element 10 at the end of its advancement stroke, where the outer mouth of the radial portion of the angular duct 11 is uncovered, ie lies beyond the free lower end of the sleeve 8.

**[0029]** As can be seen in Figure 1, said end-of-stroke position is defined by the upper end of a tube 16 positioned coaxial to the receiver 7, when in said end-of-stroke position the valving element 10 lying against the upper opening of the tube 16 via a seal element 17, in particular consisting of an embedded frontal gasket fixed thereat by vulcanization.

**[0030]** Said tube 16 passes beyond the base of the receiver 7, where it comprises a hemispherical head 18 on which an interchangeable spout 19 of elastomeric material is articulated.

**[0031]** The spout 19, of mushroom shape, is traversed by a longitudinal discharge channel, this latter being upperly provided with a matching seat for engaging said head 18.

**[0032]** Specifically, said spout 19 comprises: at the top a spherical cap enabling the device of the invention to be orientated in the desired direction relative to it; in an intermediate position a frusto-conical portion to engage the mouth of a pipe to be unblocked, such as the waste hole of the sink indicated by 20 in Figure 1; and at the bottom a thin-walled downwardly extending sleeve the purpose of which is to close the mouth of the overflow channel 21 of said sink 20 when the air stored in the receiver 7 is discharged through its emptying

hole.

**[0033]** Basically, said sleeve acts as a back-flow preventer, to prevent undesired passage of deposits or debris from the U trap 100 of the sink 20 to its overflow channel 21.

**[0034]** With reference to the accompanying figures, the air is discharged by a trigger 22 pivoted at 23 to the flange 6, and protected by the bridge 124.

**[0035]** Said trigger 22 is provided with a small vent valve 24, shown as a soft rubber plug, which by means of a spring 122 acting on the trigger 22 is constantly urged elastically against the outer mouth of a channel 25 which connects the outer cylindrical surface of said flange 6 to the aforescribed passage chamber 12.

**[0036]** The described device operates in the following manner.

**[0037]** To pressurize the receiver 7 by means of the piston 33, the trigger 22 is maintained in the closed position shown in Figures 2 and 3, with the valving element 10 closing by means of its element 17 the discharge mouth of the tube 16. This latter closure is achieved initially by the thrust of the spring 15, which maintains the valving element 10 pressing against the upper mouth of the tube 16 to allow air to be fed under pressure into the chamber 12, and subsequently by the pressure of the air which has been fed into the chamber 12, to act on the upper face of the valving element 10. Consequently during pressurization of the receiver 7, the discharge tube 16 remains closed whereas the duct 11 remains open.

**[0038]** In this respect, as can be seen from Figure 2, during the return stroke of the piston 33 the non-return valve 77 is closed to prevent the compressed air present in the receiver 7 and in the passage chamber 12 from returning to the operating chamber of the piston 33 during its withdrawal.

**[0039]** During the outward or advancement stroke of the piston 33 (see Figure 3), the air thrust by this latter causes the non-return valve 77 to open against the thrust of the respective repositioning spring 99, and flows into the passage chamber 12 to then penetrate into the receiver 7 via the duct 11, which as stated is at that moment open.

**[0040]** When the required pressure (for example a few atmospheres) has been attained in the receiver 7, the spout 19 is engaged with the pipe to be unblocked (see Figure 1) and the trigger 22 is then operated.

**[0041]** This causes instantaneous discharge into the atmosphere of the compressed air present in the passage chamber 12, with the result that the pressure present downstream of the valving element 10 raises the valving element by easily overcoming the thrust of the respective spring 15. Consequently the portion 13 of the duct 11 is closed, and the compressed air accumulated in the receiver 7 is suddenly discharged through the tube 16 and spout 19, so unblocking the sink.

## Claims

1. A portable device for unblocking pipes, typically the waste pipes of sinks and the like, characterised by comprising an air receiver (7) having its inlet connected to a manually operated pumping unit (3, 33) for its filling with compressed atmospheric air, between said pumping unit and said receiver (7) there being interposed a valve unit comprising a non-return valve (77) positioned to intercept the delivery conduit of said pumping unit; a valving element (10) slidably housed air-tight inside a passage chamber (12) into which said delivery conduit opens, and arranged to close the outlet of the receiver (7); a vent valve (24), controlled by a trigger operable from the outside, to intercept a channel (25) which connects said passage chamber (12) to the outside; and a duct (11) which passes through said valving element (10) and has one end constantly connected to said passage chamber (12) and its other end opening into the outer cylindrical surface of the valving element (10) in such a manner as to be open when the valving element (10) closes the outlet of the receiver (7) but be closed when the valving element (10) is spaced from this latter; said valving element (10) being provided with elastic means (15) arranged to maintain the valving element (10) constantly urged towards its closure position, the thrust of said elastic means (15) being overcome by the thrust produced by the pressure downstream of the valving element (10) when the passage chamber (12) is connected to discharge.
2. A device as claimed in claim 1, characterised in that said elastic means (15) consist of a compressed spring acting against that end of the valving element (10) distant from said seal element (17), this latter consisting of a frontal gasket positioned at the lower end of the valving element (10).
3. A device as claimed in claim 2, characterised in that said compressed spring (15) is partly housed within that part of the valving element duct (11) which opens into said passage chamber (12).
4. A device as claimed in claim 1, characterised in that said air receiver (7), said pumping unit and said valve unit are housed within a profiled casing shaped as a gun, the butt of which houses the pumping unit and the barrel of which forms the receiver.
5. A device as claimed in claim 1, characterised in that said pumping unit comprises a piston (33) housed in an operating chamber which at one end is connected to said valve unit and at the other end is connected to atmosphere, said piston (33) having a rod (32) which emerges from said chamber where it comprises an operating member (31).
6. A device as claimed in claim 1, characterised in that inside the receiver (7) there is provided an air passage tube (16) which at its upper end both defines the outlet of the receiver (7) and forms the seal seat for a seal element (17) carried by the valving element (10), and at its other end passes beyond the wall of the receiver (7) to be joined to the spout (19).
7. A device as claimed in claim 1, characterised in that said spout (19) is removably connected to said inner pipe (16) of the receiver (7) by a ball joint system.

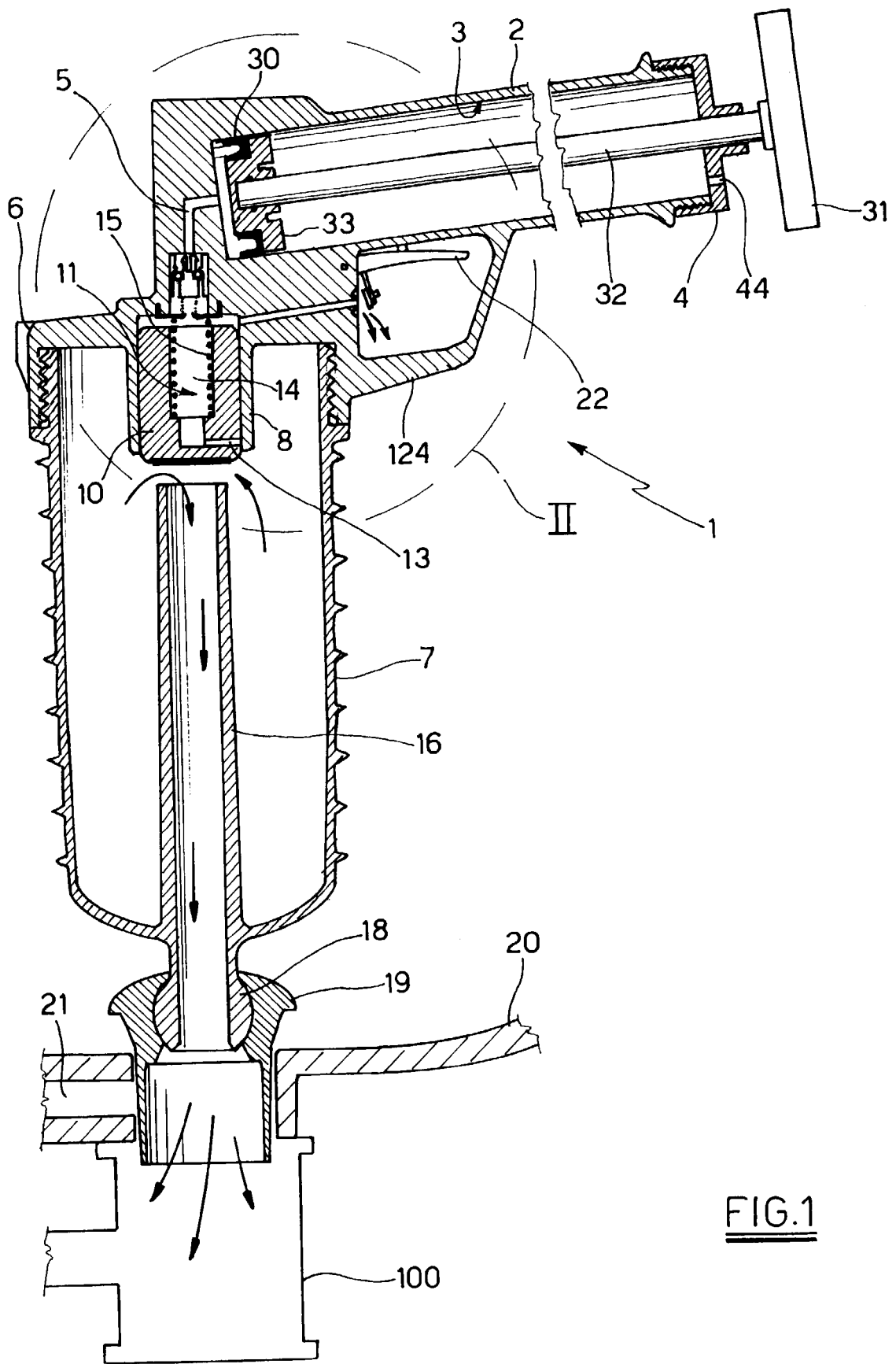


FIG.1

