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closing a draining mouth, the plug further including an adjusting screw bearing on a driving mechanism controlled by an electric control device in turn controlled by a push-button or other remote control unit.



## Description

### BACKGROUND OF THE INVENTION

[0001] The present invention relates to a driving construction for driving draining systems of sanitary fixtures, such as washbasin, bidet, kitchen sink, bath tub, shower fixtures and the like.

[0002] As is known, washbasin, bidet, kitchen sink, bath tub, shower fixtures conventionally comprise a draining or outlet hole which must be frequently closed by a closure assembly usually comprising, in replacement of the ancient rubber plug, a closure assembly including a closing plug element having an adjusting screw which may be operated through an outer lever operating system which, however, has the drawback that it must be accurately calibrated and continuously adjusted since, because of corrosion and fouling phenomena, may not always provide a desired perfect closure.

[0003] In the last years have been moreover designed closure systems including a closure plug assembly having an inner spring mechanism which may be simply operated by pressing it by the fingers of a hand.

[0004] The above system, on the hand, has the drawback that, to open the draining assembly, a user must necessarily immerse his/or hand into water.

### SUMMARY OF THE INVENTION

[0005] The aim of the present invention is to provide a novel system for driving or operating the draining plug assembly of sanitary fittings by a remote control.

[0006] Within the scope of the above mentioned aim, a main object of the invention is to provide such a driving or operating device which may be driven by a driving electric motor, a monostable or bistable electromagnet or by pneumatic driving means.

[0007] Another object of the present invention is to provide such a driving construction which may also be applied to existing sanitary fixtures or fittings including conventional closure plug operating systems.

[0008] Another object of the present invention is to provide such a driving construction which, owing to its specifically designed structural features, is very reliable and safe in operation.

[0009] According to one aspect of the present invention, the above mentioned aim and objects, as well as yet other objects, which will become more apparent hereinafter, are achieved by a driving construction for driving washbasin, bidet, kitchen sink, bath tub, shower draining systems, characterized in that said driving construction comprises a closure device associated with the drain assembly of a sanitary fitting, and including a plug adapted to shut-off a drain outlet, said plug having a plug stem and an adjusting screw bearing on a driving mechanism in turn controlled by an electric controlling device, said electric controlling device being driven by a push-button or other remote driving assembly.

[0010] The electric device comprises a linear bistable solenoid assembly including a control or driving rod element affected by a return spring, said driving or control rod element having, at a free end portion thereof, a wedge or cone element forming the driving mechanism, thereby as said rod element is extended, it drives the wedge or conic element under the stem thereby causing the drain assembly to be raised and opened, whereas, as the control rod element is withdrawn, the wedge or cone element disengages from the stem to allow the adjusting screw to be lowered so as to close the drain assembly.

[0011] The driving mechanism may also comprise a cam system including a cam associated with a shaft element, which is rotatively driven by the electric device, said cam being arranged under an end portion of the plug adjusting screw for vertically driving said plug, a return spring operating on said shaft element to provide a proper and quick movement thereof, said electric device comprising linear bistable solenoid assembly the linear movement of which may be transformed into a rotary movement by a slanted-plane or conic mechanism.

### BRIEF DESCRIPTION OF THE DRAWINGS

[0012] Further characteristics and advantages of the present invention will become more apparent hereinafter from the following disclosure of a preferred, though not exclusive, embodiment of the invention, which is illustrated, by way of an indicative, but not limitative, example in the accompanying drawings, where:

Figure 1 is a longitudinally cross-section side elevation view showing the driving device of the outlet or drain system according to the present invention, being shown in an open-drain condition thereof;

Figure 2 is a view similar to figure 1, but showing the system in a closed drain condition thereof;

Figure 3 is a further cross-sectioned front elevation view of the draining system driving device according to a further aspect of the present invention, said driving device being shown in an open drain condition thereof;

Figure 4 is yet another side elevation view of the driving device of figure 3, being shown in an open-drain condition thereof;

Figure 5 is a front elevation view of the driving device of figure 4, being shown in a middle condition thereof in which an opening or closing drain operation is performed;

Figure 6 is a further side elevation view of the device of figure 5, being shown in the same drain opening and closing middle operating step;

Figure 7 is a further front elevation view of the driving device of figure 6, being shown in a closed-drain condition thereof ;

Figure 8 is a further side elevation view of the drain device of figure 7, being shown in a closed-drain condition thereof; and

Figures 9 and 10 are further partially cross-sectioned side elevation view showing the driving device according to the present invention in an embodiment thereof in which its control or drive rod element operates or drives a conic element coupled to a closure plug supporting stem.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0013] With reference to the number references of the above mentioned figures, the driving construction according to the present invention, which has been generally indicated by the reference number 1, comprises a closure device 2, associated with a sanitary fitting or fixture drain assembly, said sanitary fitting or fixture comprising a washbasin, a bidet, a kitchen sink, a bath tub, a shower draining system or the like.

[0014] The closure device comprises a closure plug 4, designed to shut-off the outlet mouth 5 and including a stem element 20 having an adjusting screw 6 bearing on a driving mechanism 7, in turn controlled by an electric device 8.

[0015] The electric device 8 is in turn driven or controlled by a control push-button, not shown in the figures, which may be applied on a surface of the sanitary fitting or at any other suitable position for easily driving the drain assembly.

[0016] Said electric device 8 may also be controlled by a remote control unit.

[0017] According to a first aspect of the present invention, the electric device 8 comprises a linear bistable solenoid assembly including a control rod element 9.

[0018] Said electric device further comprises a plastics bush element 10 including flexible wings or legs, designed for tightly abutting on the drain assembly body.

[0019] The control rod element 9 comprises, at the free end portion thereof, a wedge element 11 constituting the driving mechanism 7.

[0020] Said wedge element 11 may be replaced by a conic element 11', shown in figures 9 and 10, operating on the stem 7.

[0021] Thus, as the control rod element 9 is operatively driven, it will displace the wedge 11 or conic 11' element under the adjusting screw 6, thereby causing the latter to be raised and opening the drain, as shown in figure 1.

[0022] Vice versa, as the control rod element 9 is withdrawn, the wedge 11 or cone 11' element will disengage thereby freeing the adjustment screw 6 and stem 20 to allow them to be lowered thereby closing the drain assembly, as shown in figure 2.

[0023] According to a further aspect of the present invention, the driving mechanism 7, shown in figures 3-8, comprises a cam system including a cam element 12 associated with a shaft 13 which is rotatively driven by the electric device 8.

[0024] The cam 12 is arranged under the stem 20 and the adjusting screw 6 end portion thereby vertically driv-

ing the latter in a manner similar to that of a tappet valve engine.

[0025] The electric device 8 may comprise a linear bistable solenoid assembly, as in the preceding embodiment, the linear movement of which is transformed into as rotary movement by a slanted or inclined plane mechanism 14.

[0026] The electric device 8 may also comprise a rotary solenoid, or a linear lever solenoid, or an electric motor including a rotary shaft and a geared unit, or being associated with a driving screw to transform the shaft rotary movement into a linear movement.

[0027] It has been found that the invention fully achieves the intended aim and objects.

In fact, the invention has providing a driving construction for driving the drain assembly of a sanitary fitting or fixture such as a driving construction for driving washbasin, bidet, kitchen sink, bath tub, shower draining systems or the like, which does not comprise driving rods or manually operated mechanism, but a fully automatic system which is remotely electronically controlled.

[0028] The driving construction according to the invention may be used in any desired sanitary fitting or fixture, both in domestic and public places.

[0029] Moreover, the inventive driving construction allows to open or close, by a push-button or telecontrol element, the drain assembly through an electric driving device.

[0030] A very important advantage of the driving construction of the invention is that it may be easily and quickly assembled also on existing drain or outlet systems, by merely replacing only their existing control or driving assembly.

[0031] In practicing the invention, the used materials, as well as the contingent size and shapes, can be any, according to requirements.

## Claims

1. A driving construction for driving a washbasin, bidet, kitchen sink, bath tub, shower and the like draining system, **characterized in that** said driving construction comprises a closure device, associated with a sanitary fitting drain assembly, and including a plug for shutting off a draining mouth, said plug including a plug stem and an adjusting screw bearing on a driving mechanism controlled by an electric control device in turn controlled by a controlling push-button or other remote control unit.
2. A driving construction, according to claim 1, **characterized in that** said electric device comprises a linear bistable solenoid including a control rod element, said control rod element having, at a free end portion thereof, a wedge or cone element constituting the driving mechanism, an extension of said control rod element so driving said wedge or cone ele-

ment as to be arranged under the plug stem and adjusting screw thereby causing said adjusting screw to raise and opening the drain assembly, and, as said control rod element is withdrawn, said wedge or cone element disengaging said stem and adjusting screw, thereby allowing said adjusting screw to be lowered to close the drain assembly. 5

3. A driving construction, according to claim 1, **characterized in that** said driving mechanism comprises a cam system including a cam element associated with a shaft rotatively driven by said electric device, said cam element being arranged under an end portion of said plug adjusting screw to vertically drive said adjusting screw, a return spring operating on said shaft to quickly and properly displace said shaft latter, said electric device comprising a linear bistable solenoid a linear movement of which is transformed into a rotary movement by an inclined plane mechanism. 10 15 20
4. A driving construction, according to one or more of the preceding claims, **characterized in that** said electric device comprises a rotary solenoid. 25
5. A driving construction, according to one or more of the preceding claims, **characterized in that** said electric device comprises a linear lever solenoid.
6. A driving construction, according to one or more of the preceding claims, **characterized in that** said electric device comprises an electric motor including a rotary shaft and a geared unit therefor. 30
7. A driving construction, according to claim 1, **characterized in that** said driving construction comprises a plastics bush element including flexible wings tightly engaging a drain assembly body. 35
8. A driving construction, according to one or more of the preceding claims, **characterized in that** said electric device comprises an electric motor including a rotary shaft coupled to a control screw to transform a rotary of said shaft into a linear movement. 40 45

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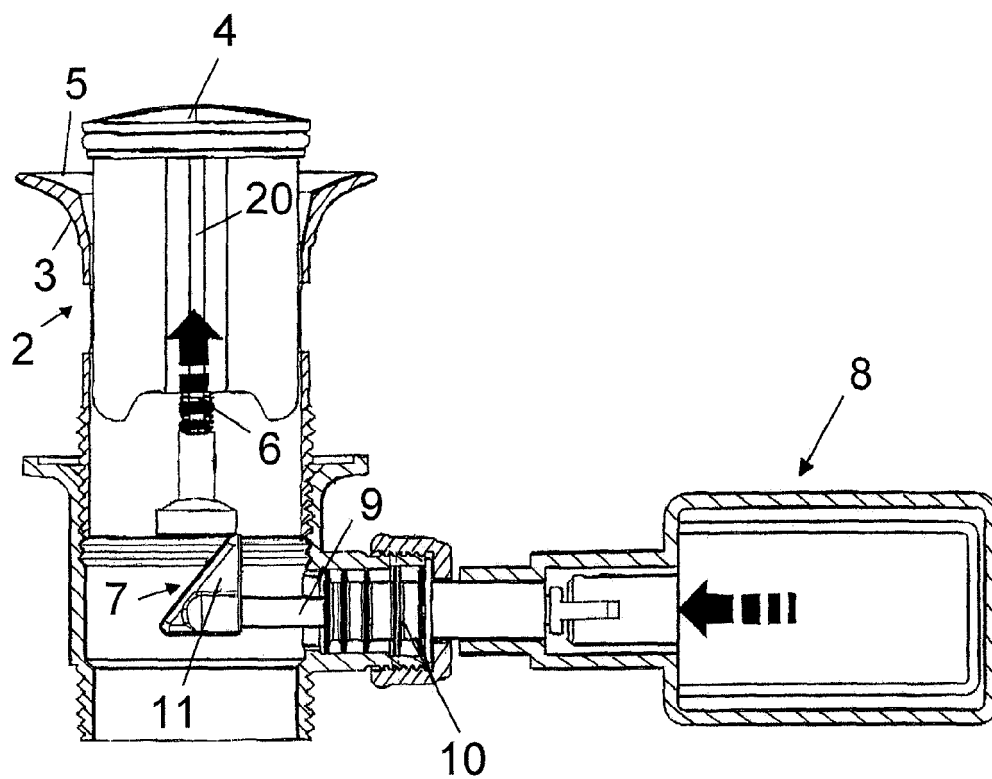


FIG. 1

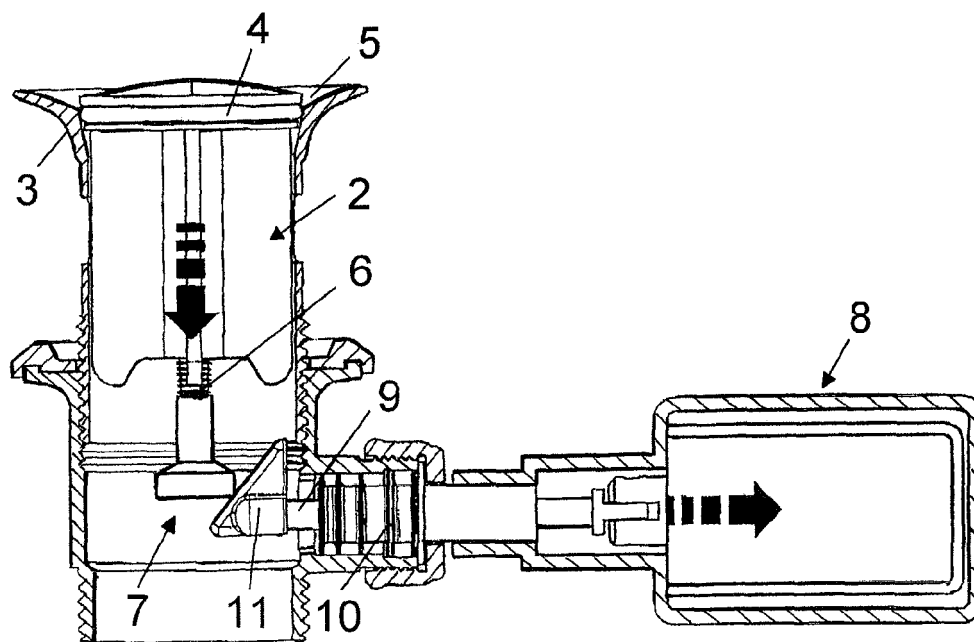


FIG. 2

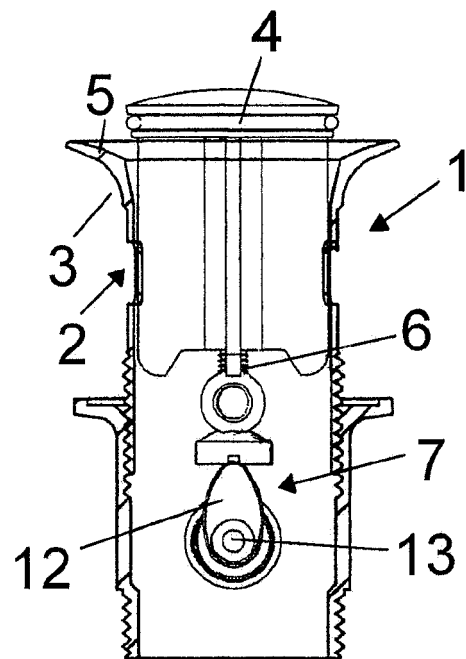


FIG. 3

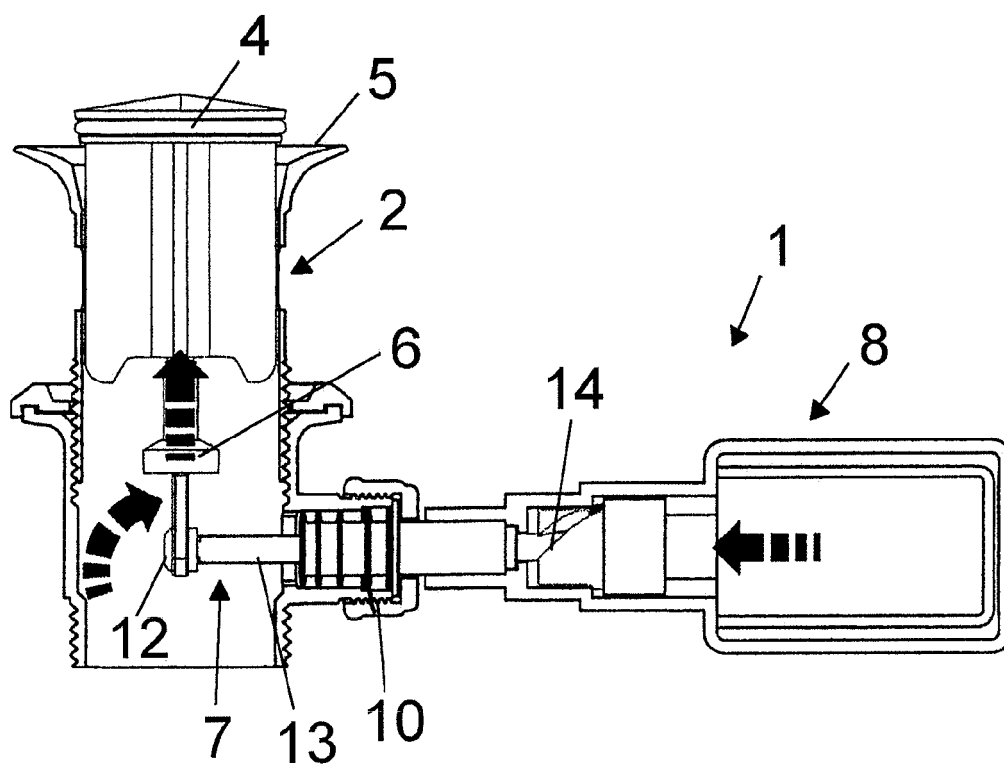


FIG. 4

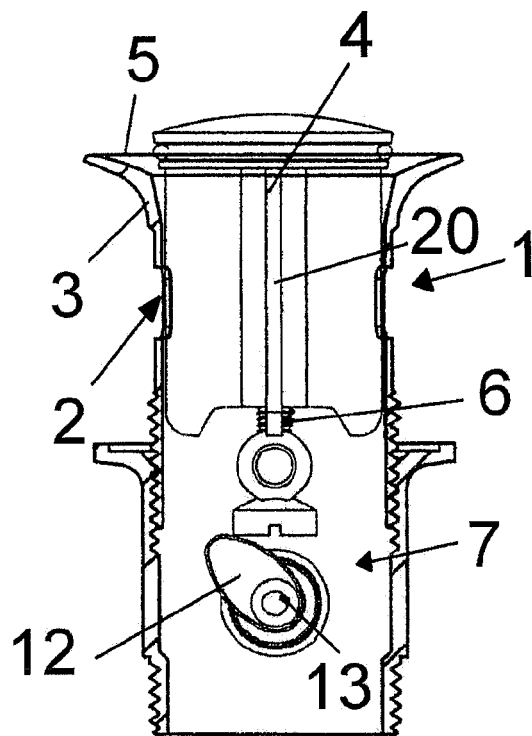


FIG. 5

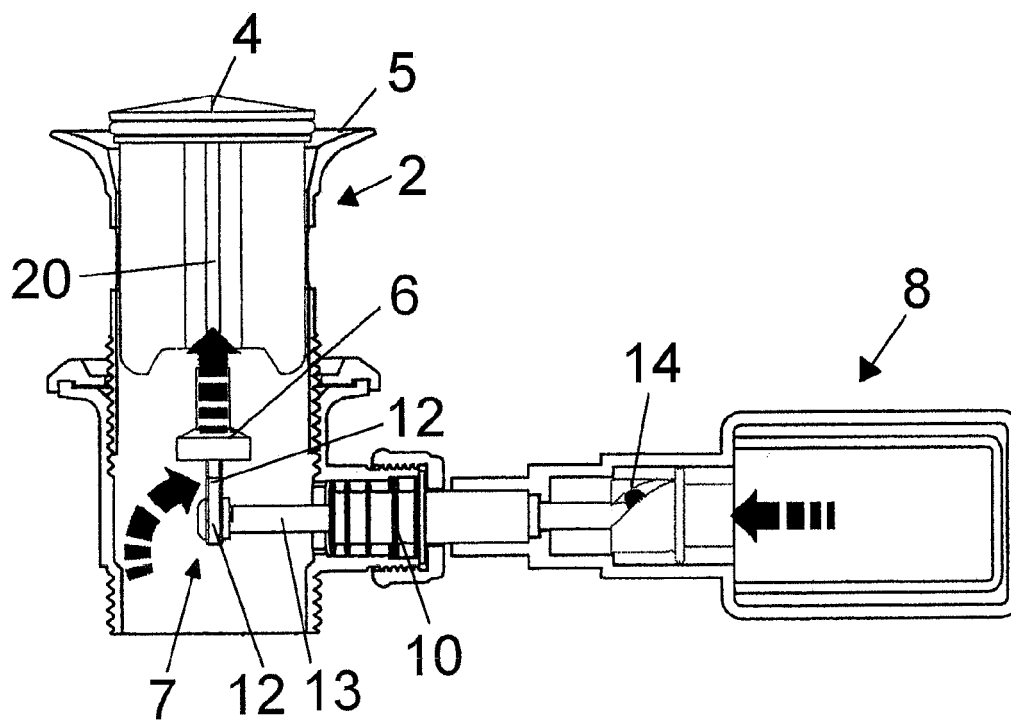


FIG. 6

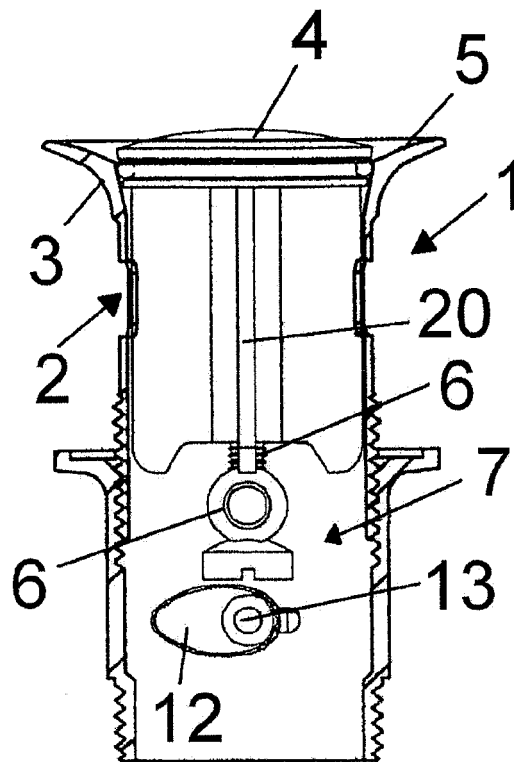


FIG. 7

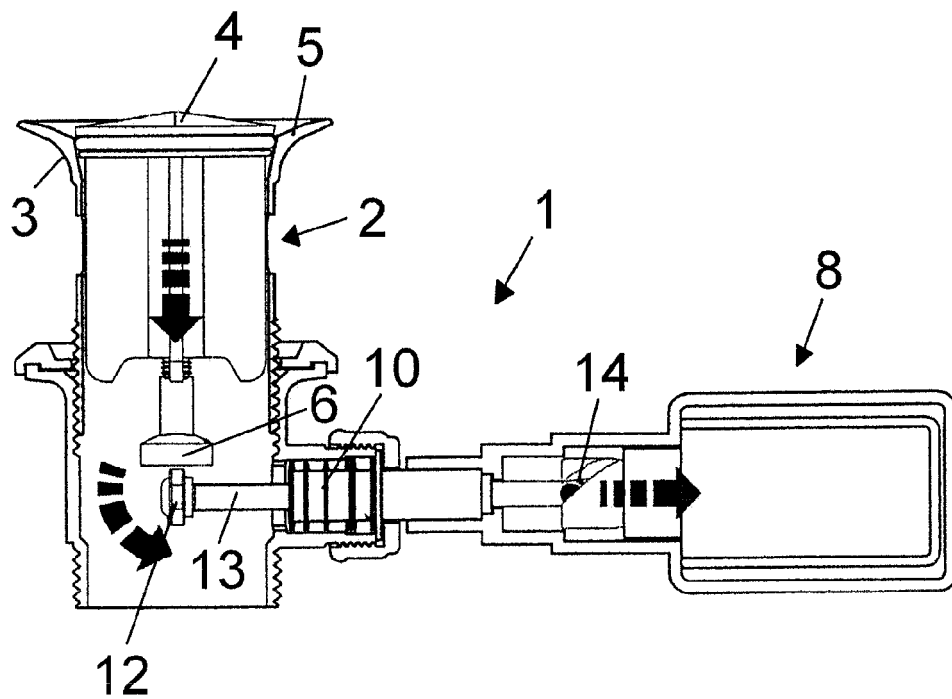


FIG. 8



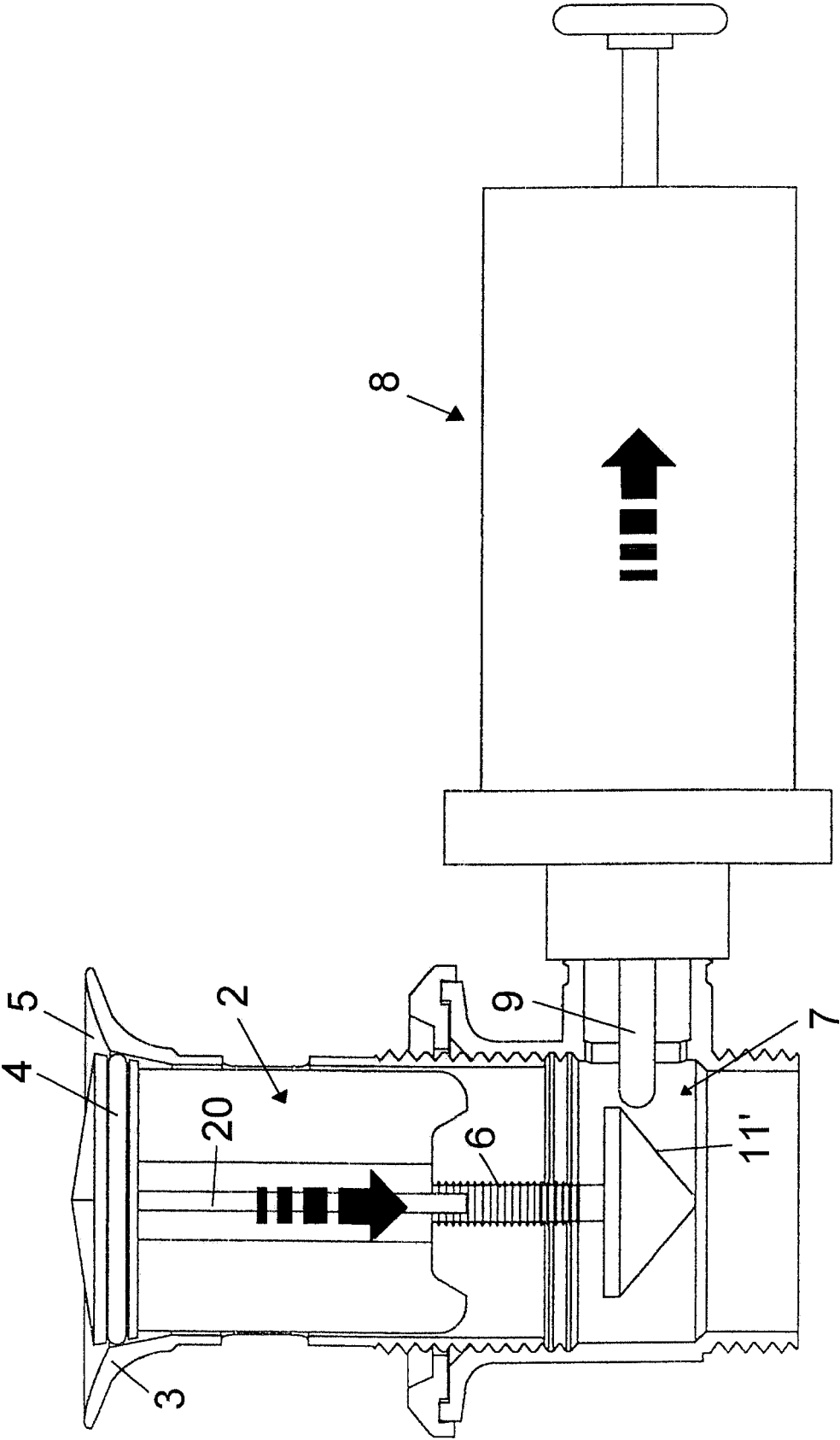


FIG. 9

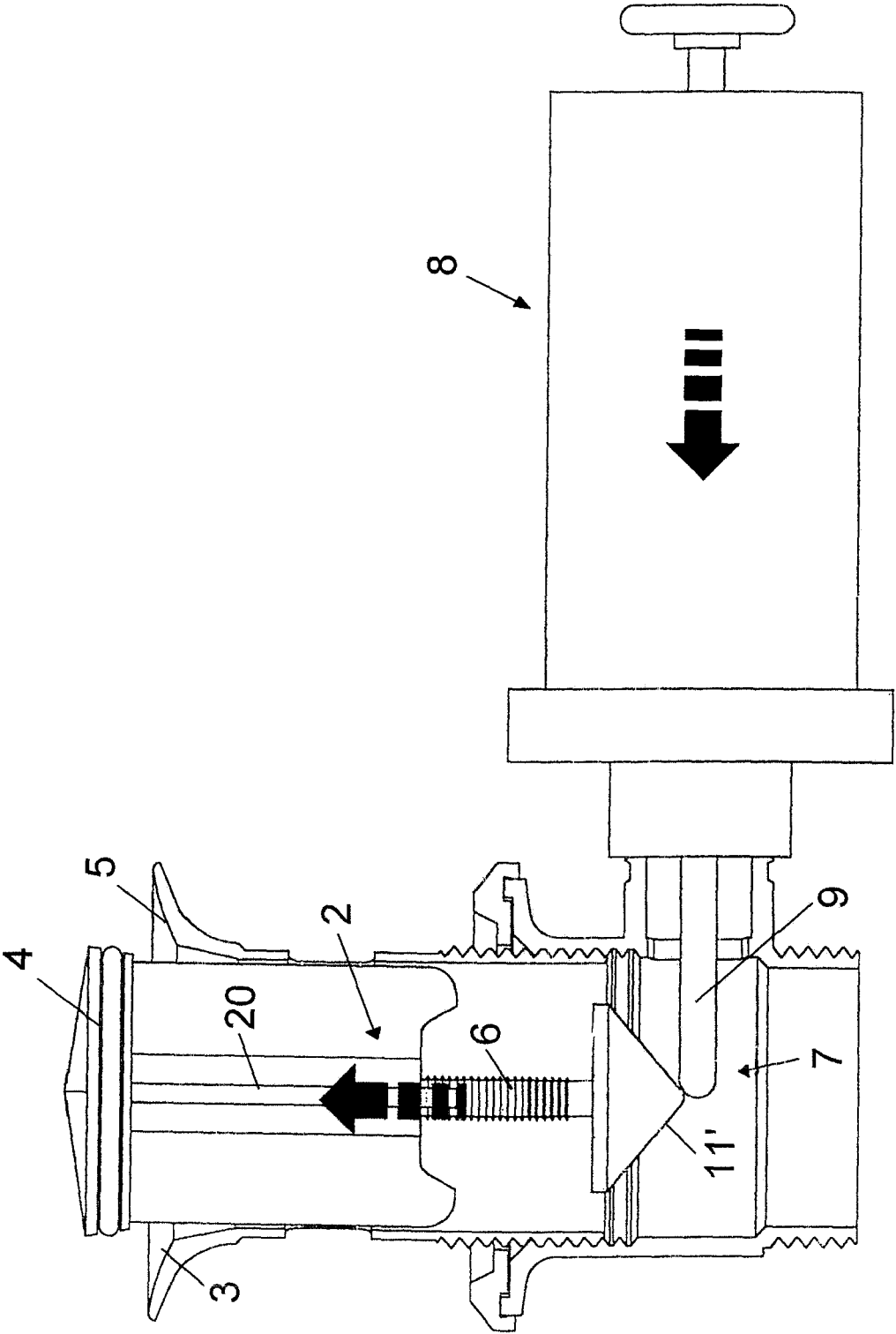


FIG. 10



## EUROPEAN SEARCH REPORT

Application Number  
EP 10 16 3968

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                   |                                  |                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-----------------------------------------|
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Citation of document with indication, where appropriate, of relevant passages                                                     | Relevant to claim                | CLASSIFICATION OF THE APPLICATION (IPC) |
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| Place of search                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                   | Date of completion of the search | Examiner                                |
| The Hague                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                   | 23 June 2010                     | De Coene, Petrus                        |
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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
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EP 10 16 3968

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
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