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(54) Title: DEVICE FOR CLEANING TOILET BOWLS AND DISPOSABLE CLEANING ELEMENT THEREFORE

(57) Abstract: A device (1) is described for cleaning toilet bowls, comprising a tubular body (10) provided with a handle (11) which encloses a mechanism (6) that acts on an expanding coupling element (4) disposed in a distal position with respect to the handle (11) and adapted to couple and to release a cleaning element (2) of the disposable type. The mechanism (6) comprises an operating element (7) disposed near the handle (11) to be operated by the user and a connecting rod (8), which connects the operating element (7) to the expanding coupling element (4). The cleaning element (2) is made of a biodegradable, water-soluble plastic material.

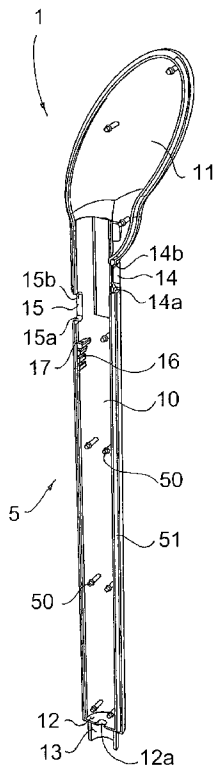

FIG. 3

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DEVICE FOR CLEANING TOILET BOWLS AND DISPOSABLE CLEANING ELEMENT THEREFORE

DESCRIPTION

The present invention refers to a device for cleaning toilet bowls.

Toilet brushes comprising a shaft ending in a cleaning head provided with protruding parts to scrape the inner walls of the toilet bowl are known on the market. It is obvious that these types of brushes are not hygienic, since the toilet dirt generally remains trapped in the gaps between the protruding parts of the cleaning head and is therefore difficult to remove.

The Italian patent application VI2006U000005U, in the name of the same applicant, describes a toilet cleaning device provided with a head consisting of a disposable cleaning element, made of a biodegradable paper material, possibly impregnated with detergent and disinfectant products.

The cleaning element is mounted removably at the end of the shaft and a coupling and release mechanism, provided with a spring-operated button, allows the cleaning element to be coupled and to be expelled. By operating the button on the handle of the shaft, the user can cause the removal of the cleaning element. In this manner, after each use of the cleaning device, the cleaning element is allowed to fall into the toilet trap, preventing build-up of dirt thereon.

However, such a type of device presents some drawbacks, due to the paper material of the cleaning head. In fact said paper material soaks up water and does not fulfil its cleaning function perfectly. Furthermore, the cleaning head is not very stiff; consequently, it must be structured with a round shape and anchoring thereof to the end of the shaft proves difficult. The coupling and release system also proves quite complex and unreliable because of the provision of the spring-loaded button.

Object of the present invention is to overcome the drawbacks of the prior art by providing a disposable cleaning element and a device for cleaning toilet bowls that is efficient, versatile, practical and simple to make.

This object is achieved in accordance with the invention with the characteristics set forth in appended independent claims 1 and 12.

Advantageous embodiments of the invention are apparent from the dependent claims.

The device for cleaning toilet bowls according to the invention comprises a tubular body provided with a handle which encloses a mechanism that acts on an expanding coupling element disposed in a distal position with respect to the handle and adapted to couple and to release the disposable cleaning element. The mechanism comprises an operating element disposed near the handle to be operated by the user and a connecting rod, which connects the operating element to the expanding coupling element.

Such a mechanism proves simple, cheap and reliable.

The cleaning element is made of a biodegradable, water-soluble plastic material. In this manner the cleaning element can be structured with a suitable shape to perform its cleaning function.

Further characteristics of the invention will be made clearer by the detailed description that follows, referring to a purely exemplifying and therefore non limiting embodiment thereof, illustrated in the appended drawings, in which:

- Figure 1 is a perspective view of the cleaning device according to the invention;
- Figure 2 is an exploded perspective view illustrating the container for the cleaning elements of the device of Figure 1;
- Figure 3 is an exploded perspective view illustrating the various parts that make up the cleaning device of Figure 1;
- Figure 4 is an exploded axial sectional view, illustrating the coupling and release mechanism of the cleaning device of Figure 1;
- Figure 5 is an axial sectional view, partially broken off, of the device of Figure 1 assembled, during a first stage of the coupling of the cleaning element; and
- Figure 6 is an axial sectional view like Figure 5, in which the cleaning element is firmly coupled to the coupling element.

A cleaning device for toilet bowls, indicated as a whole with the reference numeral 1, is described with the aid of the figures. With reference for now to Figures 1 and 2, the

cleaning device 1 comprises a containing body 10 with a substantially tubular shape. The containing body 10 has at its proximal end a handle 11 adapted to be gripped by a user. A coupling element 4 adapted to couple removably a disposable cleaning element or refill 2 is provided at the distal end of the tubular body 10.

The cleaning element 2 comprises a disc-shaped flange 20 provided with a plurality of protruding parts 21 which protrude from the bottom surface thereof, to be able to scrape the inner surface of the toilet bowl.

A cylindrical tang 22 is connected, by means of a curved joining element 23, to the central part of the upper surface of the disc-shaped flange 20. As shown in Figures 3 and 4, the tang 22 of the cleaning element is hollow on the inside and has a cylindrical hole 24 adapted to receive the coupling element 4 of the cleaning device 1.

The plane of the disc-shaped flange 20 is inclined by about 45° with respect to the axis of the tang 24. In this manner the cleaning element 2 is disposed with a suitable inclination to be able to scrape the inner surface of the toilet bowl easily.

The cleaning element 2 is made of a biodegradable, water-soluble plastic material. In order to be disposed in the toilet flush without polluting, said plastic material must preferably be soluble in cold water, must not contain heavy or toxic elements and must guarantee a minimum acute toxicity level (LD_{50}).

To meet the above mentioned requirements, a polyvinyl alcohol (PVA) based polymer is used. The product used advantageously consists of about 70-80% of polyvinyl alcohol and the remainder (20-30%) is made up of polyol plasticizers with the addition of a small amount of organic or inorganic additives.

The polyvinyl alcohol is of the type with a medium molecular weight and a medium hydrolysis fat (86-88%). The plasticizers are high boiling aliphatic polyols chosen among the group of the natural or synthetic alcohols or alcohol-esters containing at least three atoms of carbon per molecule and not less than two primary and secondary alcohol functional groups.

The above mentioned plastic material is supplied in the form of granules and can be used for injection moulding. The cleaning element 2 can thus be made in a single piece, by

injection moulding.

The cleaning device 1 is combined with a container 3 adapted to contain the refills for the cleaning elements 2. The container 3 has a substantially cylindrical shape, which defines a containing chamber 30 open at the top. The container 3 can hold about fourteen cleaning elements 2 stacked on top of each other. For this purpose, in the central part of the bottom surface of the flange 20 of the cleaning element a recessed hole is formed, within which the tang 22 of the cleaning element underneath is disposed.

The container 3 has a longitudinal opening 31 to allow the user to see the number of cleaning elements 2 contained therein. Furthermore, the container 3 has a rectangular slot 32 adapted to receive a rectangular protuberance 18, which protrudes outward from the tubular shaft 10 of the cleaning device 1. In this manner the cleaning device 1 can be disposed vertically, alongside the container 3.

At the base of the container 3 is disposed a flange 33 which protrudes radially therefrom to receive a drip catching receptacle 34. In this manner, when the cleaning device 1 is anchored to the container 3, the end thereof in which the coupling element 4 is situated is disposed inside the receptacle 34, preventing the dripping of the coupling element 4.

As shown in Figure 3, the outer body of the cleaning device 1 comprises two substantially symmetrical half shells 5, 5' that can be coupled to each other in a snap coupling relationship. For this purpose, the first half shell 5 has pins 50 which snap couple inside respective holes 50' formed in the second half shell 5'. To centre the two half shells 5, 5' perfectly, a rib 51', adapted to engage in a groove 51 formed on the peripheral edge of the first half shell 5, is formed on the peripheral edge of the second half shell 5'.

Each half shell comprises a semi-cylindrical shaft 10 and a handle 11 shaped as a semi-ellipsoid of revolution. The shaft 10 ends in a transverse semi-circular wall 12, provided with a central hole 12a. Beneath the wall 12 there extends a semi-cylindrical tang 13 with a slightly smaller diameter than the shaft 10.

Again in each half shell, on an edge near the handle 11, a first slot 14 defined by two abutment surfaces 14a and 14b is formed. Slightly beneath the first slot 14, in a diametrically opposite position, a second slot 15 defined by two abutment surfaces 15a

and 15b is formed. Slightly beneath the second slot 15 a protuberance 16 that protrudes radially inwards towards the inside of each half shell is formed, so as to define an upper abutment surface 17.

The coupling and release mechanism of the cleaning element 2, designated as a whole with the reference numeral 6, is described hereunder with reference also to Figure 4.

The coupling and release mechanism 6 comprises an operating element 7 that can be operated by the user and a connecting rod 8 which connects the operating element 7 to the coupling element 4 adapted to couple the cleaning element 2.

In the present embodiment, the coupling element 4 is an expanding element formed by means of a cylindrical block of a compressible elastic material such as, for example, rubber. However, the coupling element 4 can be formed by any equivalent element that performs the same function such as, for example, an expansion screw or even a hook or an articulated arm.

The rubber block 4 has an axial hole 42 adapted to be passed through by the lower end of the rod 8. The rod 8 has at its lower end a retaining disc 80, which abuts against the bottom end of the coupling element 4 to retain it. For this purpose the retaining disc 80 can have a threaded hole 81 (Figure 4) to screw to the end of the rod 8.

The coupling element 4 comprises a smaller diameter tang 40 and a larger diameter tang 41. The smaller diameter tang 40 is adapted to be inserted inside the bottom tang 13 of the shaft of the cleaning device. The diameter of the larger diameter tang 41 is slightly smaller than the diameter of the hole 24 formed in the tang 22 of the cleaning element, so as to give rise to a loose coupling between the coupling element 4 and the cleaning element 2.

A substantially U-shaped configuration which gives rise to two elastic tongues 82 is provided at the upper end of the rod 8. Each tongue 82 has an outwardly tapered surface 83, which gives rise to an abutment and retaining surface 84. The rod 8 has a flattened portion 85 beneath its upper end.

The operating element 7 consists of a substantially cylindrical body 70 having a transverse wall 71 in which a rectangular through hole 72 adapted to be passed through

by the tongues 82 of the rod 8 is formed. In this manner the tapered surface 83 of the tongues 82 slides on the edges of the hole 72 and the tongues 82 bend elastically inward until they pass beyond the hole 72; the tongues 82 then return elastically to their original position and their abutment surface 84 abuts against the wall 71 retaining the connecting rod 8.

A lever 73, which comes out from the first slot 14 of the half shells so that it can be operated by the user, protrudes radially outward from the cylindrical block 70. From the transverse wall 71 there protrudes downward a longitudinal elastic tongue 74 ending in a protruding end 75 which defines a lower abutment surface 76 adapted to abut against the upper abutment surface 17 of the protrusion 16 of the shells. In a central portion of the longitudinal tongue 74 is formed a button 77, which protrudes radially outward, in a diametrically opposite direction with respect to the lever 73, to come out from the second slot 15 of the two half shells.

Operation of the cleaning device 1 according to the invention is described hereunder with reference to Figures 5 and 6.

Initially, with reference to Figure 5, the coupling element 4 is in its original resting configuration. The lever 73 and the button 77 of the operating element 7 are thus in abutment against the lower abutment surfaces 14a and 15a of the respective slots 14 and 15 of the half shells. In this situation, the user inserts the tang 41 of the coupling element inside the tang 22 of the cleaning element.

Subsequently the user pushes the lever 73 of the operating element upward, in the direction of the arrow F1. The rod 8 thus moves upward and the retaining disc 80 compresses the elastic coupling element 4 against the wall 12 of the half shells. As a result, as shown in Figure 6, the coupling element 4 expands radially pressing on the walls of the hole 24 of the cleaning element so as to anchor itself firmly to the cleaning element 2.

At the same time, the longitudinal tongue 74 of the operating element 7 moves upward, until its protruding part 75 goes past the protruding part 16 of the shells. The longitudinal tongue 74 then returns elastically to its original position and its lower abutment surface 76 abuts against the upper abutment surface 17 of the protrusion 16 of the half shells, preventing the axial movement of the coupling mechanism 6. In this manner the coupling

mechanism 6 remains in this position against the elastic force of the elastic element 4, which is deformed.

After having cleaned the toilet bowl, the user presses the button 77 of the operating element, so as to disengage the protrusion 75 of the longitudinal tongue 74 from the abutment surface 17 of the protruding part of the shells. As a result, the elastic element 4 returns to its original configuration, contracting radially and releasing the cleaning element 2, which falls into the toilet trap. At the same time, the rod 8 is pulled downward, bringing the coupling mechanism 6 back to the original configuration illustrated in Figure 5.

Numerous changes and modifications of detail within the reach of a person skilled in the art can be made to the present embodiment of the invention without thereby departing from the scope of the invention as set forth in the appended claims.

CLAIMS

1. A disposable cleaning element (2) for a toilet bowl cleaning device (1), characterised in that said cleaning element (2) is made of a biodegradable, water-soluble plastic material.

2. A cleaning element (2) according to claim 1, characterised in that it comprises a polyvinyl alcohol (PVA) based polymer.

3. A cleaning element (2) according to claim 2, characterised in that it comprises about 70 – 80% of polyvinyl alcohol and the remainder (20 – 30%) is made up of polyol plasticizers.

4. A cleaning element (2) according to claim 2 or 3, characterised in that it comprises a small amount of organic or inorganic additives.

5. A cleaning element (2) according to any one of the claims from 2 to 4, characterised in that said polyvinyl alcohol is of the type with a medium molecular weight and a medium hydrolysis fat (86-88%).

6. A cleaning element (2) according to any one of the claims from 3 to 5, characterised in that said plasticizers are high boiling aliphatic polyols chosen among the group of the natural or synthetic alcohols or alcohol-esters containing at least three atoms of carbon per molecule and not less that two primary or secondary alcohol functional groups.

7. A cleaning element (2) according to any one of the preceding claims, characterised in that it is made by injection moulding.

8. A cleaning element (2) according to any one of the preceding claims, characterised in that it comprises a disc-shaped flange (20) provided with a plurality of protruding parts (21) able to scrape the dirt from the toilet bowl.

9. A cleaning element (2) according to claim 8, characterised in that it comprises a cylindrical tang (22) adapted to engage with a coupling element (4) of the cleaning device (1).

10. A cleaning element (2) according to claim 9, characterised in that the plane of said disc-shaped flange (20) is inclined with respect to the axis of said tang (22).

11. A device (1) for cleaning toilet bowls, characterised in that it comprises a cleaning element (2) according to any one of the preceding claims.

12. A device (1) for cleaning toilet bowls comprising a tubular body (10) provided with a handle (11) which encloses a mechanism (6) that acts on an expanding coupling element (4) disposed in a distal position with respect to the handle (11) and adapted to couple and to release a cleaning element (2) of the disposable type, characterised in that said mechanism (6) comprises an operating element (7) disposed near the handle (11) to be operated by the user and a connecting rod (8) that connects said operating element (7) to said expanding coupling element (4).

13. A device (1) according to claim 12, characterised in that said expanding coupling element (4) is an elastic block that engages in a cylindrical tang (22) of said cleaning element.

14. A device (1) according to claim 12 or 13, characterised in that said operating element (7) comprises a body (70) from which protrudes radially a lever (73) which comes out of a slot (14) of the tubular body (10) of the cleaning device to be operated by the user.

15. A device (1) according to claim 14, characterised in that said operating element (7) comprises a longitudinal elastic tongue (74) that protrudes downward from the body (70) of the operating element, said longitudinal elastic tongue (74) being provided with a protruding part (75) which engages with a protruding part (16) that protrudes inward from the tubular body (10) of the cleaning device.

16. A device (1) according to claim 15, characterised in that it comprises a button (77) that protrudes radially from said longitudinal tongue (74) of the operating element (7), said button (77) coming out of a slot (15) in the tubular body (10) of the cleaning device to be able to be operated by the user, so as to release the protruding part (75) of the longitudinal tongue from the protruding part (16) of the tubular body (10) of the cleaning device.

17. A device (1) according to any one of the claims from 12 to 16, characterised in that

the containing body (10, 11) of said device comprises two half shells (5, 5') engageable with each other by means of snap means (50, 51, 50', 51').

18. A device (1) according to any one of the claims from 12 to 17, characterised in that it comprises a cleaning element (2) according to any one of the claims from 1 to 10.

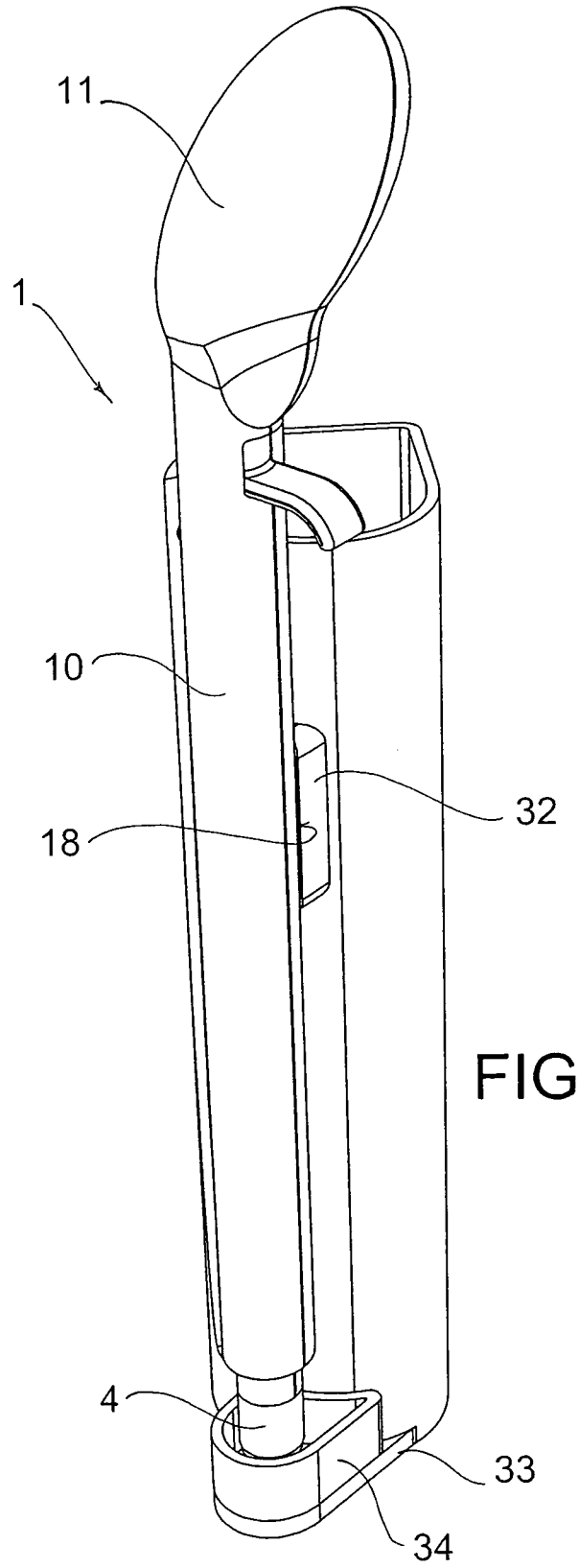

FIG. 1

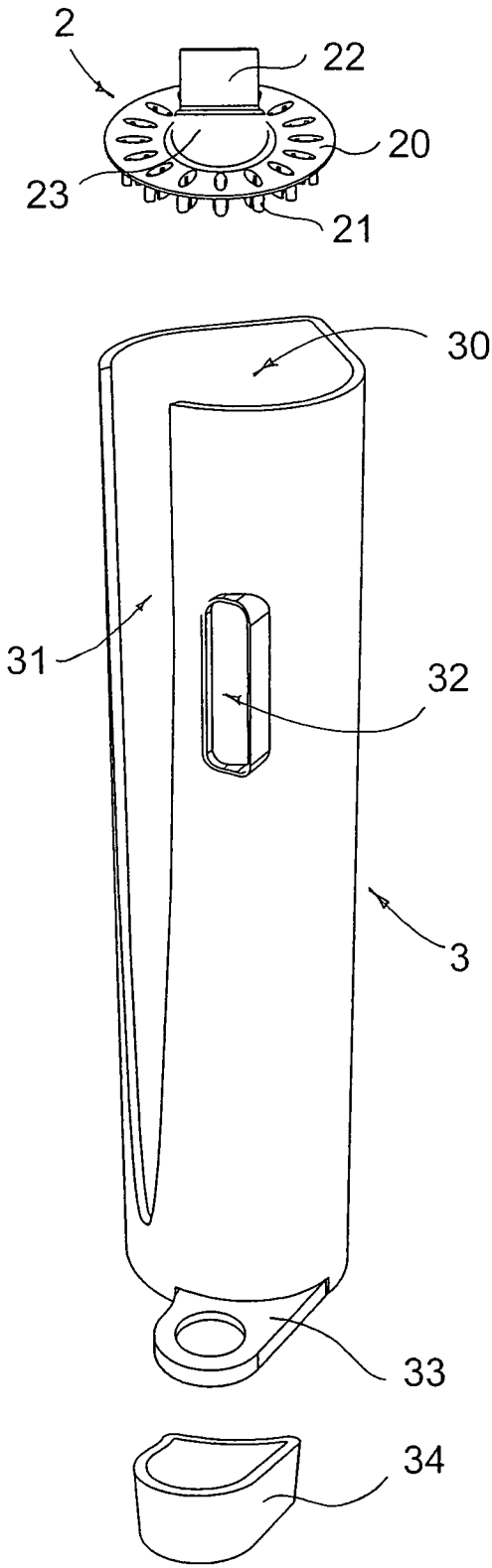

FIG. 2

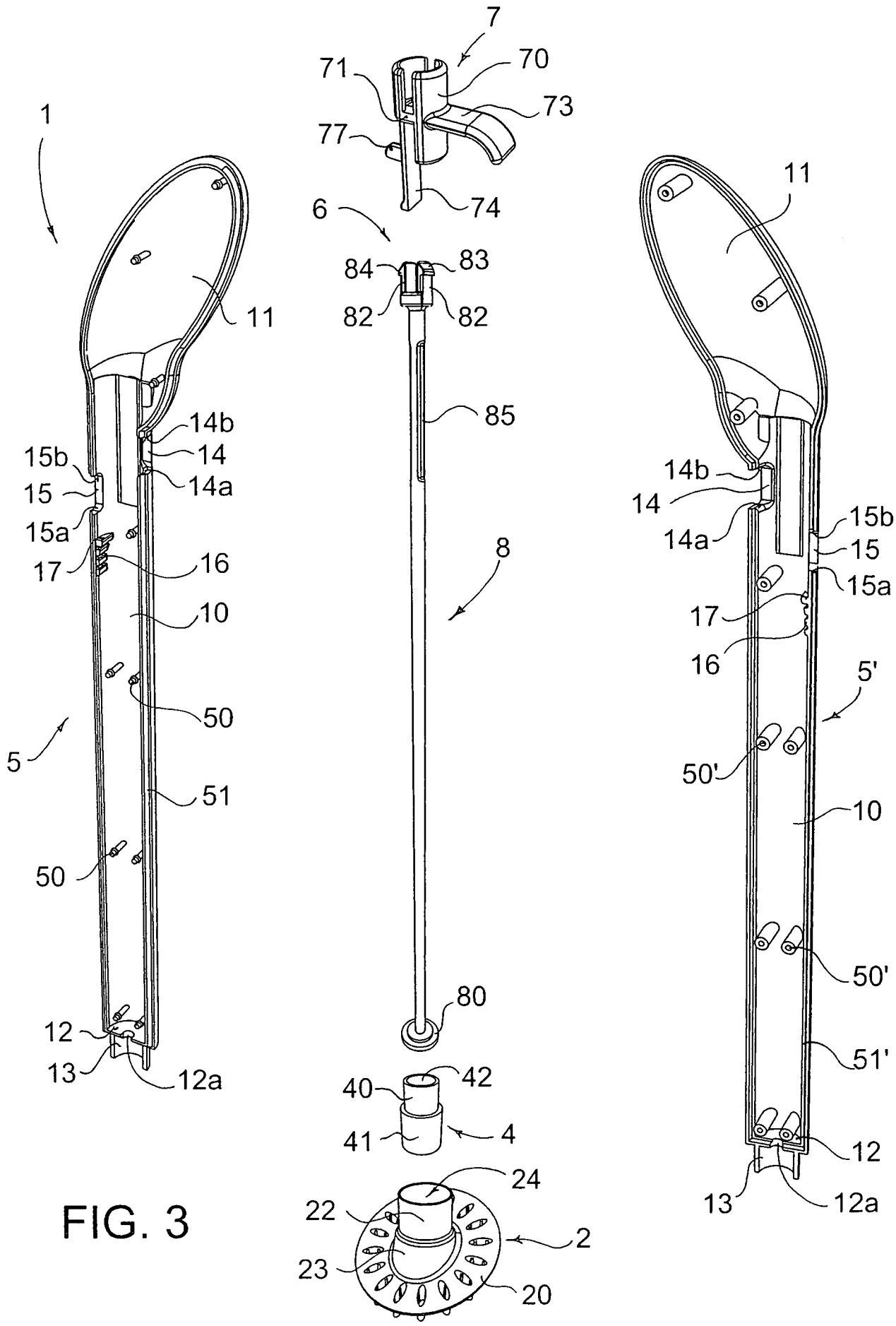
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FIG. 3

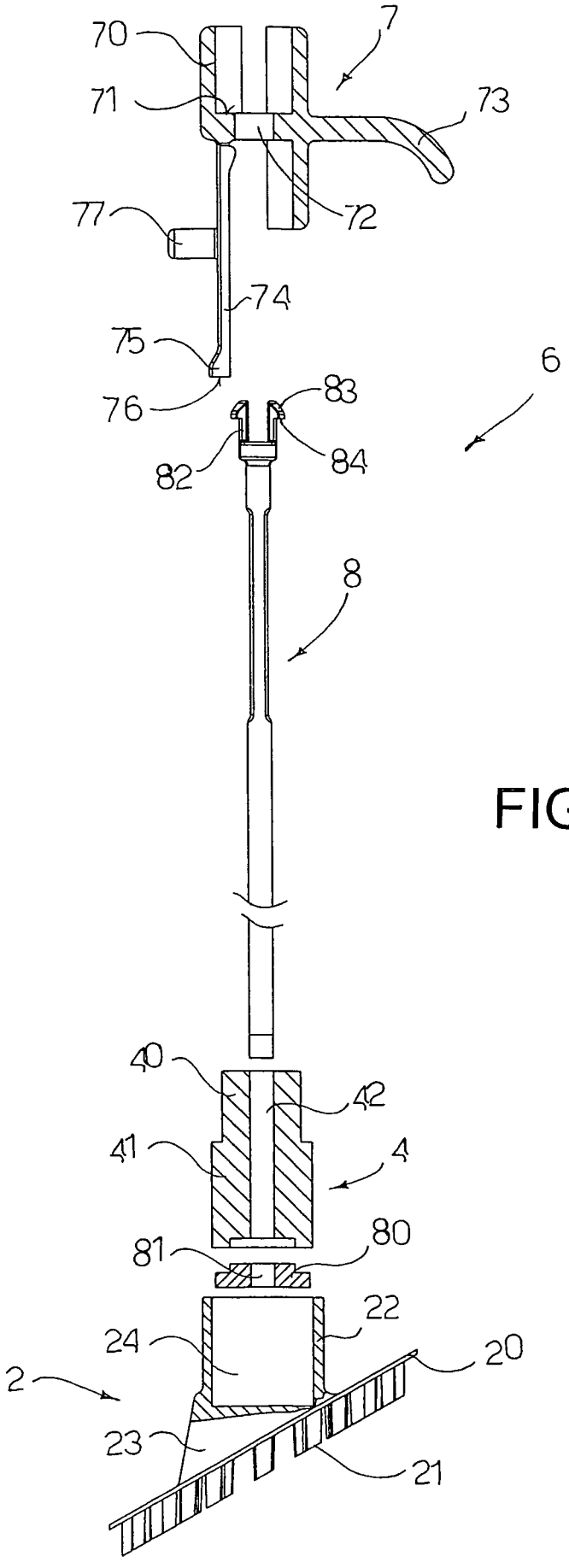

FIG. 4

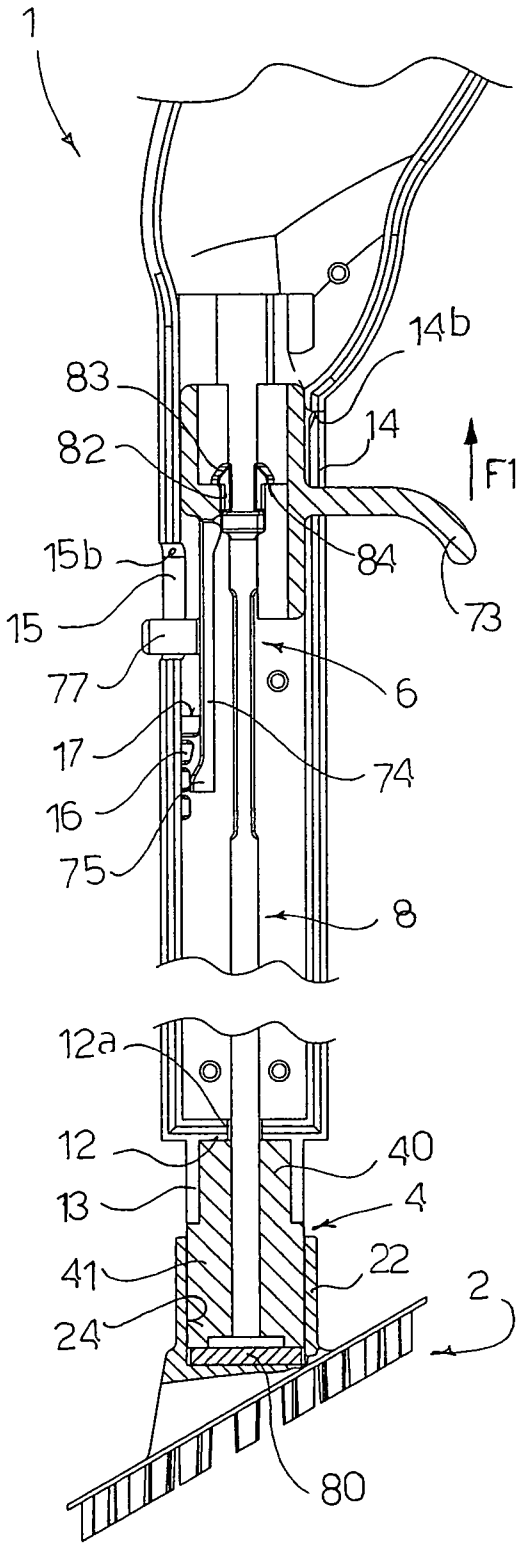
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FIG. 5

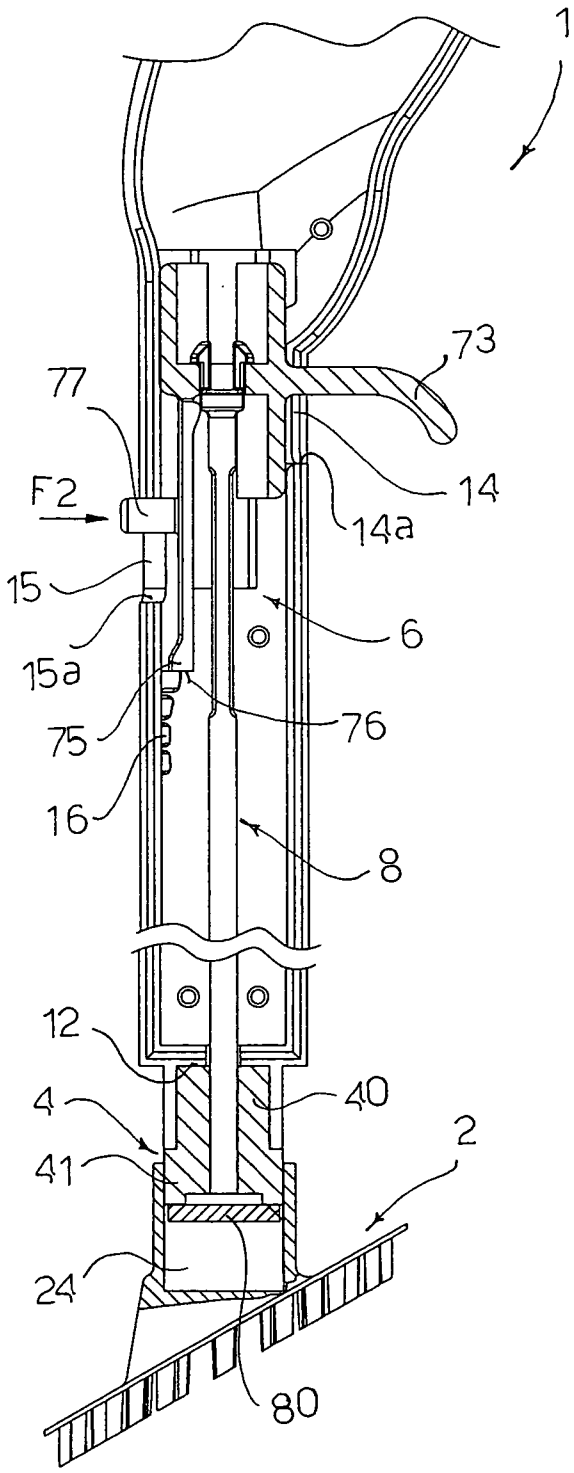
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FIG. 6

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2008/004827

A. CLASSIFICATION OF SUBJECT MATTER
INV. A47K11/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A47K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	US 4 329 755 A (ALISSANDRATOS TACKO D) 18 May 1982 (1982-05-18) column 1, line 39 - column 2, line 23; figures	8-10
X	FR 2 712 794 A (TOUTIN PIERRE [FR]) 2 June 1995 (1995-06-02)	12
Y	the whole document	14-16,18
	-/--	

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
27 April 2009	08/05/2009

Name and mailing address of the ISA/	Authorized officer
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X	US 2004/255418 A1 (MINKLER DOUGLAS J [US] ET AL) 23 December 2004 (2004-12-23) paragraph [0024] - paragraph [0066]; figures	12,17

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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