(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
12 September 2008 (12.09.2008)

PCT

(10) International Publication Number
WO 2008/109130 A1

(51) International Patent Classification:
B05C 17/005 (2006.01) *B65D 81/32* (2006.01)

(21) International Application Number:
PCT/US2008/002996

(22) International Filing Date: 5 March 2008 (05.03.2008)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/904,867 5 March 2007 (05.03.2007) US

(71) Applicant and
(72) Inventor: **VIRNELSON, Robert, Craig** [US/US]; 8696 Ranch Drive, Chesterland, OH 44026 (US).

(74) Agent: **JOCKE, Ralph, E.**; 231 South Broadway, Medina, OH 44256 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*
— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

(54) **Title:** DUAL COMPONENT DISPENSER

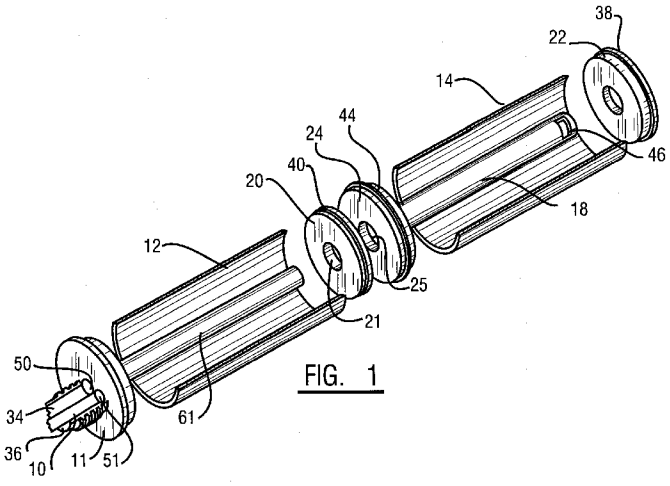

FIG. 1

(57) **Abstract:** A dual component dispenser for simultaneous delivery of two fluid products at a preset ratio, comprising a cylindrical container having in series a front (28) and a back chamber (30) in axial alignment, each of said chambers (28, 30) having an interior volume being defined by a fixed front wall (11, 24), side walls (12, 14), and a plunger (20, 22). The plungers (20, 22) are formed such that they are slidably movable inside the side walls (12, 14) of their respective chambers, wherein movement of the back plunger (22) effects synchronous movement of the front plunger (20). The dispenser further comprising a nozzle (10) attached to the front wall (11) of the front chamber (28) and a conduit (26) within the container for conveying the content of the back chamber (30) directly to the nozzle (10). The conduit (26) is a cylindrical telescopic tube consisting of a front inner tube (16) and a back inner tube (18).

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DUAL COMPONENT DISPENSER

The present invention relates to a dual component dispenser according to the preamble of claim 1.

There are many types of dispensers that are available for dispensing a plurality of components. These fluid components include chemically reactive resins, resins and hardener, various sealants, caulks, and even toothpaste, etc. This is currently accomplished by a variety of means including concentric tubes and side-by-side tubes, both requiring a special dispensing "gun". What is desirable is a system which requires only the same gun as for a single component tube.

U.S. Patent 5,954,236 describes a segmented tube in which only the connected plungers move to discharge the fluid products. U.S. Patent 5,310,091 describes a tube within a tube where the sidewall of the moveable back tube pushes the front plunger. U.S. Patent 4,220,261 is nearly identical in mechanical action except the two tubes telescope as the fluid product is discharged.

U.S. Patent 4,220,261 has not been commercially used because telescoping action presented storage issues. One design (U.S. Pat. 5,310,091) has attained commercial use but suffers from high friction and low volume as well as the inability to deliver different ratios of the fluid products. Another such solution (U.S. Patent 5,954,2326) has overcome those restrictions, but has not been accepted in the market because of potential difficulties in creating tight seals and the distribution of internal hydrostatic forces. Each of the aforementioned solutions suffers from difficulties in moulding the dispenser parts which also makes them expensive to manufacture. Various others have attempted to use flexible internal dispenser parts, but discharge ratios are not consistent.

It is therefore an object of the invention to provide a dual component dispenser that allows a first fluid product contained in the first chamber to be maintained separate from a second fluid contained within a second chamber and dispensed simultaneously together with a single discharge nozzle.

It is another object of the invention to provide a dual product dispenser that discharges two products in a preset ratio through the nozzle.

It is another object of the invention to provide a dual product dispenser that allows one force to be applied at the rearward chamber to synchronously dispense both products from their respective chambers by use of a standard dispensing gun as used e.g. for single component dispensers.

It is another object of the invention to provide a dual product dispenser that allows filling the void between the tube separator and the front plunger when discharging the fluid products.

Aforementioned objectives are solved by a dual component dispenser having the features of claim 1. Preferred embodiments of the inventive dispenser are disclosed in the dependent claims.

The inventive dispenser may be filled with two separate fluid components or products and allows them to be discharged synchronously in a preset ratio and be mixed within a nozzle of the dispenser while discharging them.

A dual component dispenser according to the invention is for simultaneous delivery of two fluid products at a preset ratio. The dispenser comprises a cylindrical container having in series a front and a back chamber in axial alignment. Each of said chambers has an interior volume being defined by a fixed front wall, side walls and a movable rear wall. The fixed front wall of the front chamber may be constructed in one piece with the nozzle. The side walls preferably are formed by cylindrical tubes, in particular by two tubes in series, so called front and back tubes. The movable rear walls preferably are plungers and are formed such that they are slidably movable inside the side walls or tubes of their respective chambers. The movement of the rear wall of the back chamber effects synchronous movement of the rear wall of the front chamber. A nozzle is attached to the front wall of the front chamber. The nozzle surrounds at least one port in the front wall of the front chamber. The dispenser further comprises a conduit within the container for conveying the content of the back chamber directly to the nozzle.

The conduit is a cylindrical telescopic tube consisting of a front inner tube and a back inner tube. The dispenser also comprises a flow connection to allow discharge of the content of the back chamber into the back inner tube. The front inner tube is placed between the fixed front walls of the front and back chambers. The fixed front wall of the back chamber is also designated as tube separator. The tube separator advantageously is placed or formed half length of the container. The back inner tube is rigidly fixed between the movable rear walls or plungers, whereby the tube separator has an aperture, the so called separator hole, to slidably engage the back inner tube. The front plunger also has an aperture, the so called front plunger hole, constructed to slidably engage the front inner tube for movement thereon.

In a preferred embodiment the nozzle surrounds two ports, one for discharging the content of the front chamber and one for discharging the content of the back chamber. The nozzle may also surround only one port, where the conduit ends in this port and where the cross-sectional area of the port is larger than that of the conduit thus allowing the content of the front chamber to be discharged through the opening between the conduit and the inner surface of the one port.

In a preferred embodiment the flow connection consists of at least one aperture in the backside of the back inner tube. This aperture may have any cross-sectional shape, in particular may be an opening or hole having a circular or polygonal cross-section, or may be a slit. In particular, the flow connection may consist of an aperture in the cylindrical shell of the back inner tube. The flow connection may also comprise connection channels within the movable rear wall of the back chamber which are formed such that the content of the back chamber can be discharged through the connection channels to the back inside of the back inner tube. In another preferred embodiment the flow connection may comprise flow channels in the back plunger and additionally also at least one aperture in the cylindrical shell of the back inner tube.

Preferaly, the front and back inner tubes are placed coaxially, and the inner tubes are formed such that the back inner tube is slidably and sealingly movable over the front inner tube.

The front inner tube preferably is positioned in axial alignment with the nozzle. In particular, the front inner tube may pass through the at least one port in the front wall of the front chamber.

In a preferred embodiment, at least some of the dispenser parts movable to each other are provided with sealing means between their corresponding sliding surfaces.

Preferably, the front inner tube forms a stationary part of the conduit and is rigidly coupled to the nozzle, or is formed in one piece with the nozzle. The forming in one piece may be effected by moulding technique.

In a further preferred embodiment, the side walls of the container include an aperture, a so called breather hole, located between the rear wall of the front chamber and the front wall of the second chamber for allowing air to flow therebetween upon filling or discharging the components, i.e. the breather hole allows to fill or discharge air into or from the void created between the front plunger and the tube separator during filling or discharging the content of the chambers.

The container preferably is in the form of a circular hollow cylinder where the cylinder shell forms the side walls of the front and back chambers. The front and back chambers may have an approximately equal cross-sectional area. In another embodiment, the front and back chambers may have different cross-sectional areas to allow a specific ratio of the contents of the front and back chambers to be discharged.

Preferably, the nozzle is located in axial alignment with the central axis of the container. The nozzle may be a static mixer nozzle. The nozzle may also be a needle, in particular for medical applications.

The front and back inner tubes preferably each having a circular cross-section.

The front wall of the back chamber, i.e. the tube separator, preferably is rigidly attached to the side walls at half-length of the container. In another preferred embodiment, the tube separator may also be formed in one piece with the side walls, in particular with the side walls of the back chamber.

Preferably, the front and rear walls, the side walls, the nozzle and the front and back inner tubes are formed from a material selected from the group consisting of glass, plastic, fluoroplastic material, polymer, metal, and metallic alloys.

In a preferred embodiment the back inner tube and the rear wall of the back chamber are formed in one piece, e.g. by a moulding technique.

In a still another preferred embodiment the back inner tube and the rear wall of the front chamber are formed in one piece, e.g. by moulding technique.

In accordance with the present invention, there is provided a dual component dispenser that is simple in design and economical to manufacture. Preferably, the container of the dispenser would consist of a segmented tube with two separate chambers containing the two components. A conduit would allow fluid communication between the second chamber and a nozzle that also receives fluid from the first chamber. One part of the conduit, namely the back inner tube, also serves as the connecting member of the plungers which allows synchronous discharge of the two components. Additionally, the ratio of the components could be varied by changing the ration of the diameters of the first and second chambers.

Present invention is exemplified by reference to the accompanying drawings:

Figure 1 is an exploded view of an inventive dual product dispenser.

Figure 2 is a longitudinal section view through an inventive dual product dispenser in a full position.

Figure 3 is a longitudinal section view through an inventive dual product dispenser in a partially dispensed position.

Figure 4 is a longitudinal section view through an inventive dual product dispenser in an empty position.

Fig. 5 shows a partially exploded view of a preferred embodiment.

Figures 1 shows a dual product dispenser comprising two tubes 12, 14, where only one half shell of each tube is shown.

The dual product dispenser preferably comprises four moulded parts. The first part comprises a nozzle 10 having a back product port 34 and a front product port 36, a fixed front wall 11, a front tube 12 and a front inner tube 16. The fixed front wall 11 exhibits two through holes 50, 51 where through hole 50 encompasses the front inner tube 16, or the front inner tube 16 is sealingly attached to the inner circumference of the through hole 50, or the fixed front wall 11 and the front inner tube 16 are formed in one piece having a through hole 50 connecting the inner room of the front inner tube 16 with the back product port 34 of the nozzle 10.

The second part comprises a back tube 14 and a fixed front wall of the second chamber, called tube separator 24, having a through hole, the so called separator hole 25, and comprising an inner separator seal element 42 for sealing the movable back inner tube with the tube separator 24. The tube separator further having an outer tube separator seal element 44 for sealing with the two chambers, in particular for separating the contents of the back and front chambers 28, 30 during filling, storage and discharge of the components.

The third part is a plunger assembly consisting of a front plunger 20 and a back inner tube 18. The back inner tube 18 has at its back side

end an aperture 46. The front plunger 20 has a circumferential front plunger seal 40.

The fourth part is a back plunger 22 comprising a back plunger seal 38. The back plunger 22 further has a countersink for engagement of the back inner tube 18.

In an alternative embodiment the plunger assembly consists of a back plunger 22 and a back inner tube 18 in one piece, where the front plunger 20 forms a separate element.

The front chamber 28 consist of a nozzle 10, a fixed front wall 11, a front tube 12 and a front inner tube 16, and contains one of the two components or products to be dispensed at a discharge point 34, 36 for both products.

The back chamber 30 consists of the tube separator 24 and the back tube 14, and contains the second of the two components or products to be dispensed.

The plunger assembly consists of a front 20 and a back plunger 22 rigidly connected by the back inner tube 18. The back inner tube 18 provides a synchronous movement of the plungers and provides an even distribution of the applied forces.

The assembly of the nozzle 10 with the fixed front wall 11 forms the fixed end of the front chamber 28. The dispensed components or products from the front and back chambers are combined in the nozzle 10 as they exit.

The front tube 12 forms the outer wall of the front chamber 28, and the back tube 14 forms the outer wall of the back chamber 30. The front tube 12 is connected to the fixed front wall 11 of the front chamber 28, or the front tube 12 and the fixed front wall 11 are formed in one piece. The back tube 14 is connected to the tube separator 24, i.e. the fixed

front wall of the second chamber. The diameter of the front tube 12 may be different from that of the back tube 14 in order to vary the volume ratio of the two products to be dispensed.

The conduit 26 for conveying the content of the back chamber 30 through the back end aperture 46 of the back inner tube 18 to the nozzle 10 consists of the telescoping front and back inner tubes 16, 18. The front inner tube 16 forms the stationary half of the conduit 26. The back inner tube 18 forms the movable half of the conduit 26 for conveying the content of the back chamber 30 to the nozzle 10.

The front plunger 20 for pushing the content of the front chamber 28 through the nozzle 10 is rigidly connected to the back inner tube 18. The front plunger 20 comprises a front plunger seal 40 for sealing with the front tube 12. The front plunger 20 comprises a front plunger hole 21 constructed to slidably engage the front inner tube 16 for movement thereon.

The back plunger 22 is for pushing the content of the back chamber 30 through the inner tubes 16, 18 to the nozzle 10. The back plunger 22 comprises a back plunger seal 38 for sealing with the back tube 14.

The front tube 12 comprises a breather hole 32 located between the tube separator 24 and the front plunger 20. The breather hole is located close to the separator 24 and allows air to escape or to enter the void formed between the front plunger 20 and the tube separator 24 during dispensing or filling the chambers 28, 30 of the dispenser.

The nozzle 10 is attached to the fixed front wall 11 of the front chamber 28 or is formed in one piece with this front wall 11. The nozzle 10 surrounds two ports 50, 51 in the front wall 11 of the front chamber 28. Port 50 is for discharging the content of the back chamber 30, and port 51 is for discharging the content of the front chamber 28. The nozzle 10 comprises a back product port 34 connected to port 50 for discharging the content of the back chamber

30. The nozzle 10 also comprises a front product port 36 connected to port 51 for discharging the content of the front chamber 28.

The back plunger 22 comprises a back plunger seal 38 for preventing product leakage from the back chamber 30 out of the dispenser during filling, storage and discharge of the content of the back chamber 30.

The tube separator 24 forms the fixed front wall of the back chamber 30. The tube separator 24 comprises a tube separator seal 44 for preventing leakage of the content of the front and back chambers 28, 30 during filling, storage and discharge of the products. The tube separator 24 has a separator hole 25 to slidably engage the back inner tube 18. In order to seal this engagement, the tube separator also has a inner separator seal element 42.

The seal elements, in particular the back plunger seal 38, the front plunger seal 40, the tube separator seal 44 and the inner separator seal element 42 preferably are ring-shaped elements attached to the peripheral surface of the corresponding elements.

Figure 2 shows a longitudinal section view trough an inventive dispenser in a full position. Hereby, the back plunger 22 is located at the rear end of the back tube 14, and the front plunger 20 is located close to the tube separator 24. the front tube 12 exhibits a breather hole 32 between front plunger 20 and tube separator 24. The front and back chambers 28, 30 have the same diameter and are attached to each other by the tube separator 24. The central axis of the front inner tube 16 and the back inner tube 18 coincide with the central axis of the container and are in axial alignment with port 50 engaging the front inner tube 16.

Figure 3 shows a longitudinal section view trough an inventive dispenser in a partially dispensed position. During the movement of the plungers 20 and 22 from the position shown in figure 2 to the position

shown in figure 3 a part of the content of the back chamber 30 has been discharged through the aperture 46 of the back inner tube 18 and the conduit 26, i.e. the telescopic inner tubes 16 and 18, to port 50 of the front wall 11 of the front chamber 28. Simultaneously, a part of the content of the front chamber 28 has been discharged through port 51 formed in the front wall 11 of front chamber 28. Figure 3 also shows the void 27 formed between front plunger 20 and tube separator 24 which may be filled with air that may be supplied through breather hole 32.

Figure 4 shows a longitudinal section view trough an inventive dispenser in an empty position. The back plunger 22 contacts tube separator 24, and front plunger 20 contacts front wall 11 of the front chamber 28. In this position, the front plunger 20 closes ports 50, 51 on the rear side of the front wall 11.

Figure 5 shows a partially exploded view of a preferred dual component dispenser embodiment. The front and back tubes 12, 14 are only shown as half shells. The dispenser shown in figure 5 consists of two parts. The first part contains a front tube 12, a front wall 11 of the front chamber 28, a nozzle 10 and a front inner tube 16 engaged within port 50. The front wall 11 further exhibits a second port 51 for discharging the content of front chamber 28. The second part consists of a back tube 14, a tube separator 24 having a separator hole 25 slidably engaging a back inner tube 18, and front and back plungers 20, 22 rigidly connected to the back inner tube 18. The back inner tube 18 has an aperture 46 for discharging the content of back chamber 30 through back and front inner tubes 16, 18 to port 50. An assembled dispenser may be formed by bringing together the first and second parts, i.e. by affixing the front tube 12 to the tube separator 24 and by passing the front inner tube 16 through front plunger hole 21 into back inner tube 18.

Claims

1. A dual component dispenser for simultaneous delivery of two fluid components at a preset ratio, comprising:

a cylindrical container having in series a front (28) and a back chamber (30) in axial alignment, each of said chambers (28, 30) having an interior volume being defined by a fixed front wall (11, 24), side walls (12, 14), and a movable rear wall (20, 22); the rear walls or plungers (20, 22) are formed such that they are slidably movable inside the side walls or tubes (12, 14) of their respective chambers, wherein movement of the rear wall (22) of the back chamber (30) effects synchronous movement of the rear wall (20) of the front chamber (28),

a nozzle (10) attached to the front wall (11) of the front chamber (28), the nozzle (10) surrounding at least one port (50, 51) in the front wall (11) of the front chamber (28), and

a conduit (26) within the container for conveying the content of the back chamber (30) directly to the nozzle (10),

characterized in that

the conduit (26) is a cylindrical telescopic tube consisting of a front inner tube (16) and a back inner tube (18),

the dispenser further comprising a flow connection (46) to allow discharge of the content of the back chamber (30) into the back inner tube (18),

the front inner tube (16) is placed between the fixed front walls (11, 24) of the front and back chambers (28, 30); the back inner tube (18) is rigidly fixed between the movable rear walls (20, 22) of the front and back chambers (28, 30), whereby the fixed front wall of the back chamber (24) has an aperture (25) to slidably engage the back inner tube (18), and

the rear wall (20) of the front chamber (28) having an aperture (21) constructed to slidably engage the front inner tube (16) for movement thereon.

2. A dual component dispenser according to claim 1, wherein the flow connection (46) comprises an opening or aperture in the backside of the back inner tube (18).

3. A dual component dispenser according to claim 1 or 2, wherein the flow connection (46) consists of an aperture in the cylindrical shell of the back inner tube (18).

4. A dual component dispenser according to one of claims 1 to 3, wherein the flow connection (46) comprising connection channels within the movable rear wall (22) of the back chamber (30) which are formed such that the content of the back chamber (30) can be discharged through the connection channels to the back inside of the back inner tube (18).

5. A dual component dispenser according to one of claims 1 to 4, wherein the front and back inner tubes (16, 18) are placed coaxially, and the inner tubes (16, 18) are formed such that the back inner tube (18) is slidably movable over the front inner tube (16).

6. A dual component dispenser according to one of claims 1 to 5, wherein the front inner tube (16) being positioned in axial alignment with the nozzle (10), and the front inner tube (16) passing through the port (50) in the front wall (11) of the front chamber (28).

7. A dual component dispenser according to one of claims 1 to 6, wherein the cross-sectional area of the port (50) in the front wall (11) of the front chamber (28) being larger than the cross-sectional area of the front inner tube (16) for allowing discharge of the content of the front chamber (28) through the port (50) into the nozzle (10).

8. A dual component dispenser according to one of claims 1 to 7, wherein at least some of the dispenser parts (20, 16, 18, 24, 22, 18) movable to each

other are provided with sealing means (38, 40) between their corresponding sliding surfaces.

9. A dual component dispenser according to one of claims 1 to 8, wherein the front inner tube (16) forms a stationary part of the conduit (26) that is rigidly coupled to the nozzle (10), or is formed in one piece with the nozzle (10).

10. A dual component dispenser according to one of claims 1 or 9, wherein the side walls (12, 14) of the container include an aperture (32) located between the rear wall (20) of the front chamber (28) and the front wall (24) of the second chamber (30) for allowing air to flow therebetween upon filling or discharging the components.

11. A dual component dispenser according to one of claim 1 to 10, wherein the container is in the form of a circular hollow cylinder and the cylinder shell forms the side walls (12, 14) of the front and back chambers (28, 30).

12. A dual component dispenser according to one of claims 1 to 11, wherein the front and back chambers (28, 30) have an approximately equal cross-sectional area.

13. A dual component dispenser according to one of claims 1 to 12, wherein the front and back chambers (28, 30) have different cross-sectional areas.

14. A dual component dispenser according to one of claims 1 to 13, wherein the nozzle (10) is located in axial alignment with the central axis of the container.

15. A dual component dispenser according to one of claims 1 to 14, wherein the front and back inner tubes (16, 18) each having a circular cross-section.

16. A dual component dispenser according to one of claims 1 to 15, wherein the nozzle (10) is a static mixer nozzle.

17. A dual component dispenser according to one of claims 1 to 16, wherein the front wall (24) of the back chamber (30) is rigidly attached to the side walls (14) at half-length of the container.

18. A dual component dispenser according to one of claims 1 to 16, wherein the front wall (24) of the back chamber (30) is formed in one piece with the side walls (14) of the back chamber (30).

19. A dual component dispenser according to one of claims 1 to 18, wherein the container, the front and rear walls (11, 20, 24, 22), the side walls (12, 14), the nozzle (10) and the front and back inner tubes (16, 18) are formed from a material selected from the group consisting of glass, plastic, fluoroplastic material, polymer, metal, and metallic alloys.

20. A dual component dispenser according to one of claims 1 to 19, wherein the back inner tube (18) and the rear wall (22) of the back chamber (30) are formed in one piece.

21. A dual component dispenser according to one of claims 1 to 20, wherein the back inner tube (18) and the rear wall (20) of the front chamber (28) are formed in one piece.

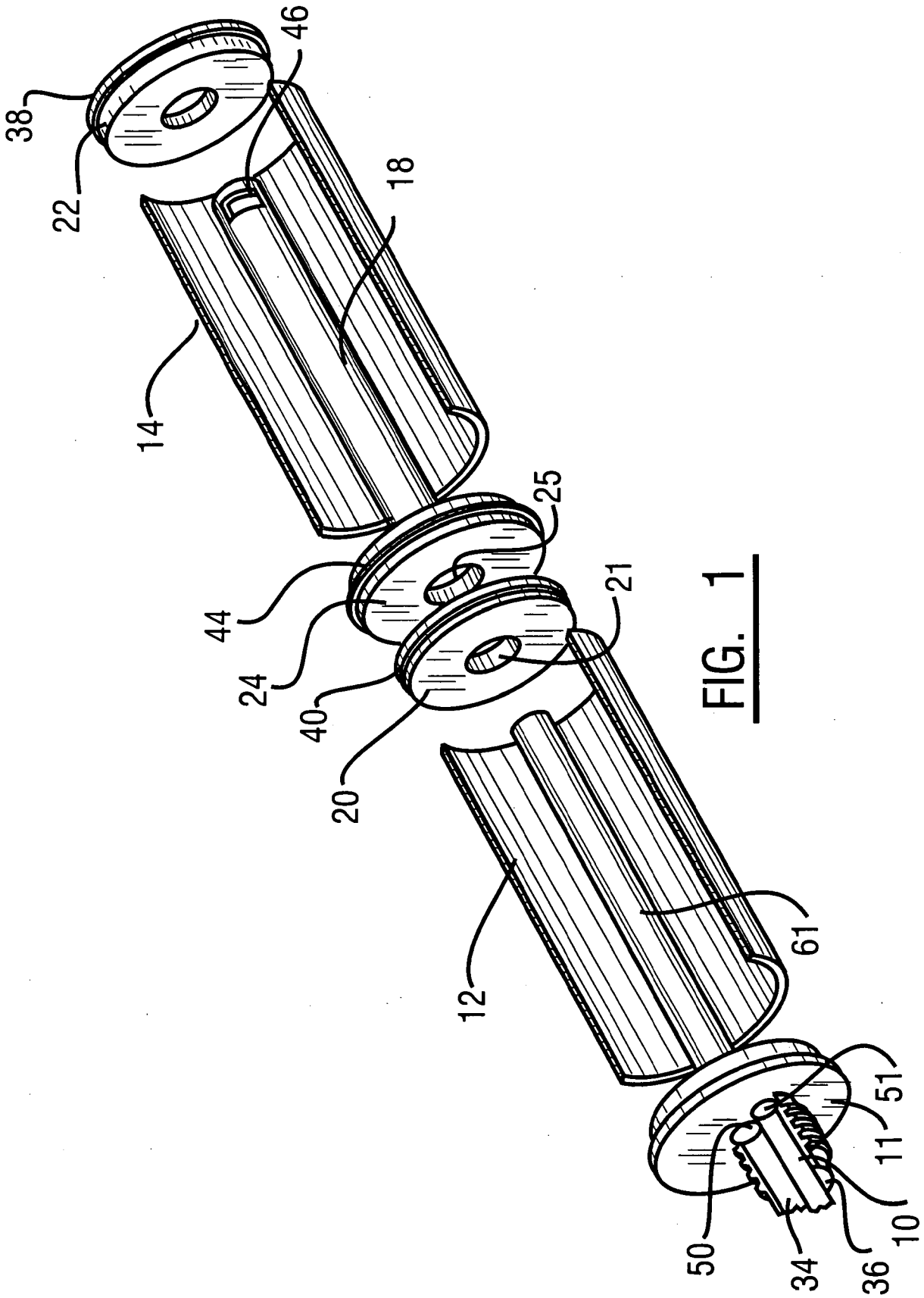

FIG. 1

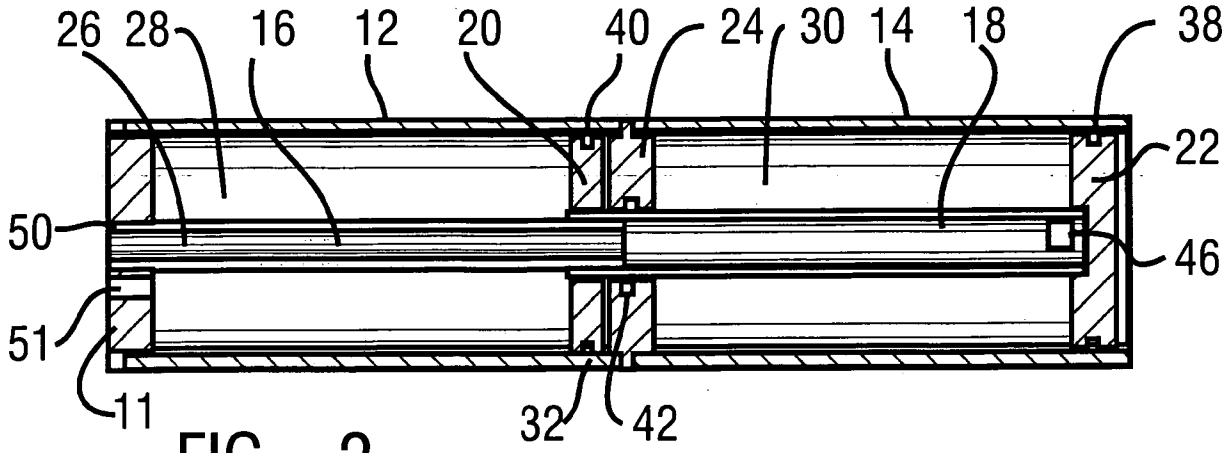

FIG. 2

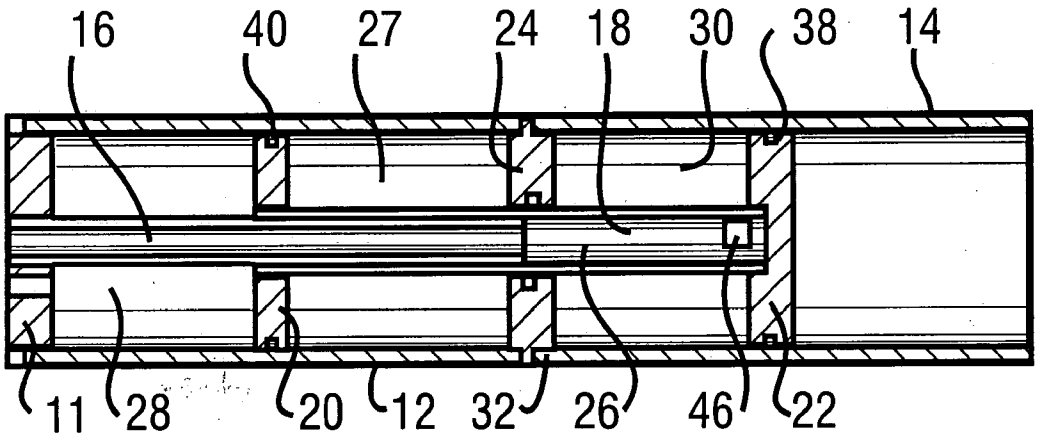

FIG. 3

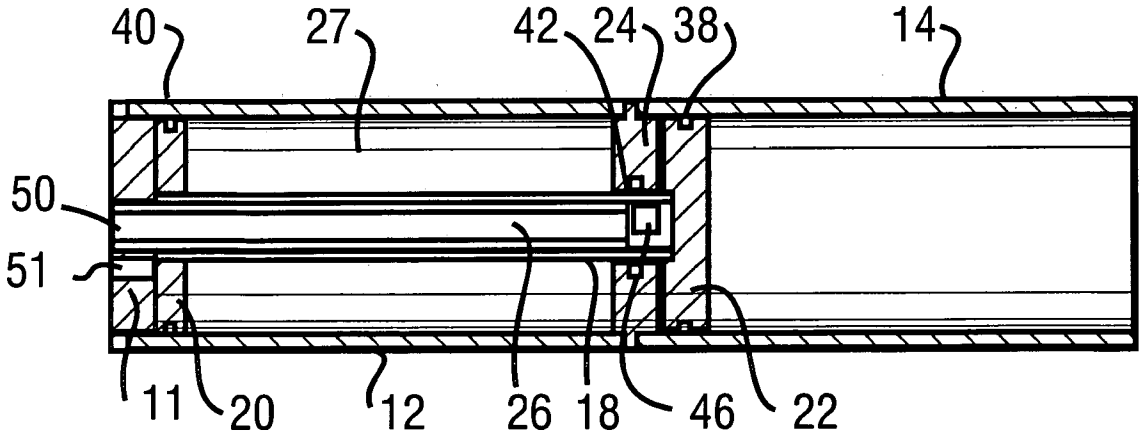

FIG. 4

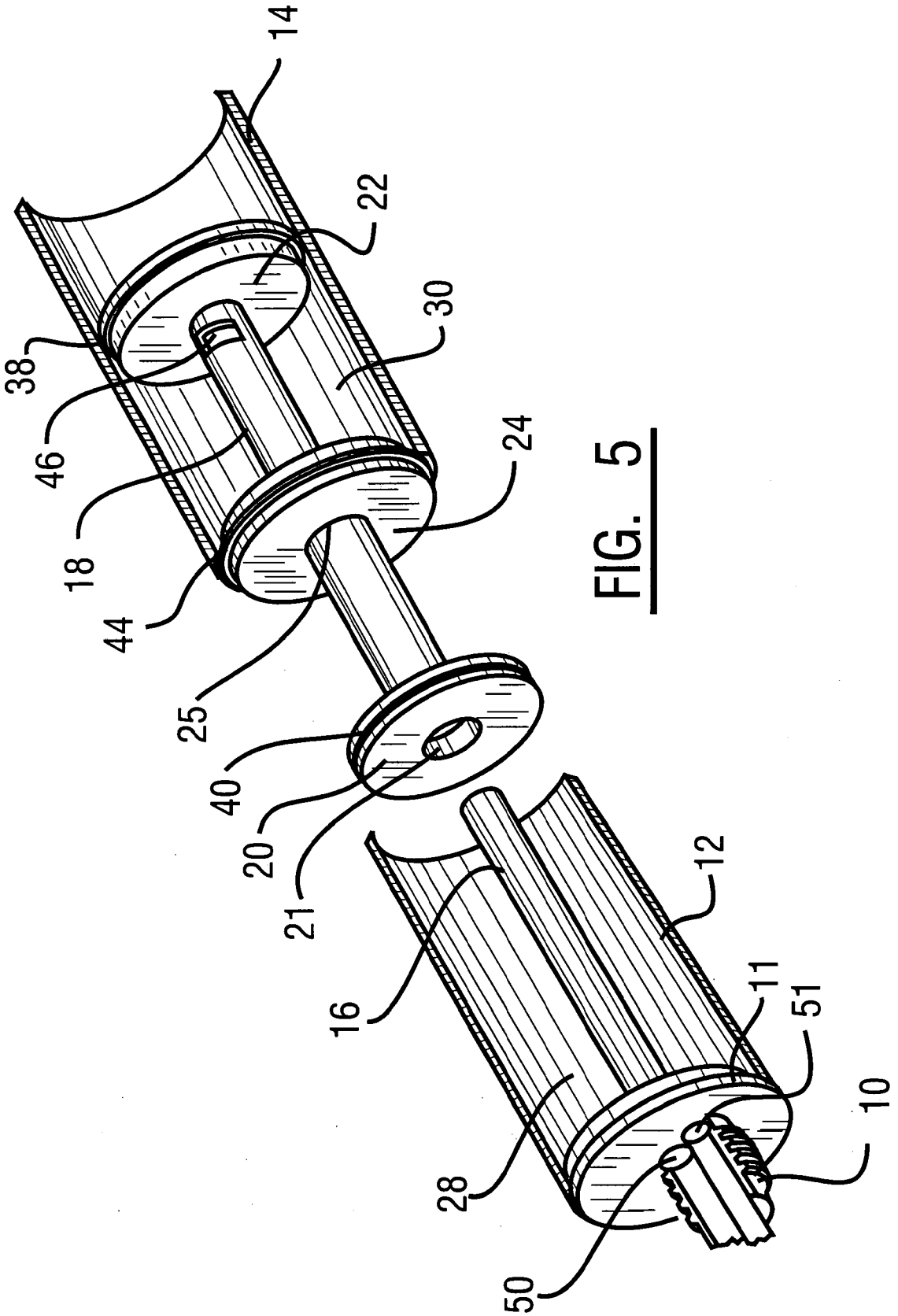

FIG. 5

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2008/002996

A. CLASSIFICATION OF SUBJECT MATTER
INV. B05C17/005 B65D81/32

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)
B05C B65D

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.
X	DE 101 32 417 A1 (WELLA AG [DE]) 16 January 2003 (2003-01-16) columns 1,2; figures 1,2	1-5,8,9, 11-13, 15-21
X	DE 197 44 746 A1 (HENKEL TEROSON GMBH [DE]) 15 April 1999 (1999-04-15) columns 4-6; figures 1-7	1-6,8,9, 11-20
X	US 4 220 261 A (WHITE DOUGLAS J [US]) 2 September 1980 (1980-09-02) cited in the application figures 1,2 columns 6-9	1-3, 5-15,19, 21
X	US 4 050 612 A (STONE THOMAS) 27 September 1977 (1977-09-27) columns 2-4; figures 4,5	1-3, 5-15,19, 21

☐ Further documents are listed in the continuation of Box C.

☒ 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
4 July 2008	14/07/2008

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Roldán Abalos, Jaime

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2008/002996

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