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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
28 October 2010 (28.10.2010)

PCT

(10) International Publication Number
WO 2010/122558 A1

(51) International Patent Classification:
B05C 17/01 (2006.01)

(21) International Application Number:
PCT/IL2010/000323

(22) International Filing Date:
22 April 2010 (22.04.2010)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/171,502 22 April 2009 (22.04.2009) US

(72) Inventor; and
(71) Applicant : **ZAHR, Wadeeh** [IL/IL]; 73 5th St., 30090 Osafiya (IL).

(74) Agent: **GOLD-PATENTS & FINANCIAL SERVICES**; 15 Yohanan Ha'Sandlar, 31251 Haifa (IL).

(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, CL, 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, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, 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, LR, 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, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

[Continued on next page]

(54) Title: MATERIAL DISPENSING SYSTEM

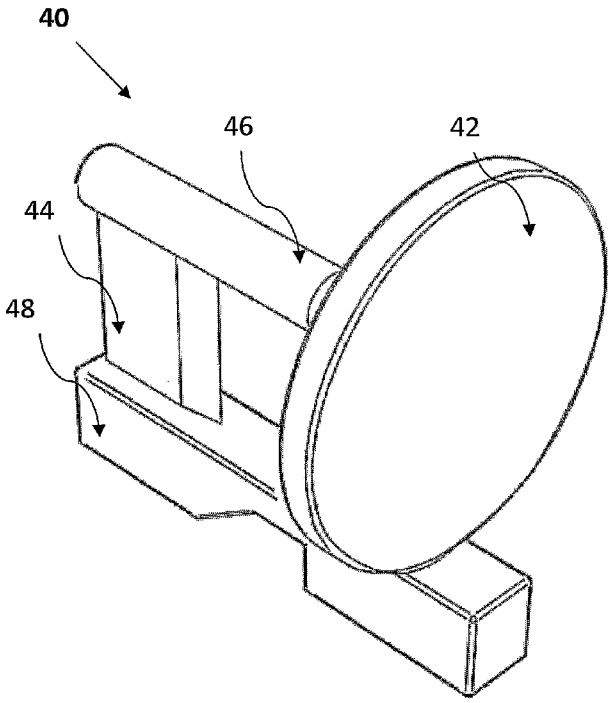

Figure 2A

(57) Abstract: A cutting-pushing element (40) and dispensers including the element are disclosed, and associated method for applying pressure onto a movable cap (14) within a container (10) such that viscous material it is dispensed through a nozzle (11). The element comprises a cutting-pushing base (48), a push plate (42) capable of applying pressure upon the movable cap, and at least one blade (44) positioned behind the push plate. The blade is capable of cutting the container. The blade and push plate are mounted on the cutting-pushing base.

WO 2010/122558 A1

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

MATERIAL DISPENSING SYSTEM

FIELD OF THE INVENTION

The present invention relates to construction utensils. In particular, the invention relates to hand-held material dispensing devices.

BACKGROUND

Viscous substances such as silicone glue are often used in construction for sealing crevasses or adhering surfaces to each other. These substances are typically applied through utensils such as a caulk gun, which enable pushing the substance out of the container in which it is stored in order to apply it onto a surface or to fill in crevasses.

Conventional hand-held material dispensing devices rely on the action of a piston to push paste-like materials out of a tube's nozzle. The movement of the piston may be induced by employing mechanical means such as a trigger or a spring; Typically, a rod is used to push forward the moveable cap of standard containers. The rod needs to be as long as the longest commercially available container, and positioned behind the container's cap.

Using a rod makes conventional caulk guns long and heavy. Use of such devices is cumbersome, particularly in tight places that can be reached only with compact instruments.

Several improvements have been made to the operation mechanism of such material dispensing devices. US Patent Number 5,887,765 titled "Caulk Gun" to Dripless Inc. adds a biasing mechanism to relieve the back pressure inside the caulk tube while maintaining the position of the piston during a given trigger stroke even after the trigger has been released. This mechanism, however, does not contribute to the reduction of size of such a caulk gun.

Similarly, US Patent number 4,386,717 titled "Dispenser Having Hose-Like Expandable Member" to Freidrich Koob describes a device for measured discharge of viscous substance which appears to be relatively compact. This device, however, requires that the container incorporates an expandable hose-like member configured to couple with a propellant or expanding medium which forces the substance through an outlet, and is not compatible with standard containers.

US Patent number 6,935,541 titled "Caulk Gun Pressurizing System" to Black & Decker Inc. describes a relatively compact caulk gun having an extruding mechanism designed to control the dispensing pressure within the caulk gun. The control involves releasing high-pressure gas into a gas enclosure. This mechanism is complex, and necessitates use and supply of compressed gas.

The need remains, therefore, for a compact, simple, hand-held viscous material dispensing device that can be used in small confined locations and can be coupled with standard viscous material containers. Embodiments described hereinbelow address this need.

SUMMARY OF THE INVENTION

A cutting-pushing element is disclosed, for applying pressure onto a movable cap within a container comprising viscous material, a nozzle and a moveable cap, the cutting-pushing element comprising a cutting-pushing base, a push plate capable of applying pressure upon the movable cap, and at least one blade capable of cutting the container and positioned behind the push plate, wherein the blade and the push plate are mounted on the cutting-pushing base.

Optionally, the cutting-pushing element further comprises a handle configured to allow inserting the push plate of the cutting-pushing element into the container, pushing material stored within the container out of the container's nozzle and cutting a slit in the container, the cutting enabling further insertion of the push plate into the container.

Optionally, the cutting-pushing element further comprises teeth.

A device for dispensing viscous material out of a container provided with viscous material is disclosed, the device comprising a housing configured to accommodate the container, the cutting-pushing element, and a force transmitting element configured to allow applying force onto the cutting-pushing element, wherein the force transmitting element enables relative movement of the cutting-pushing element and the container in opposite directions towards each other, and wherein the device is configured to allow inserting the push plate of the cutting-pushing element into the container, pushing material stored within the container out of the container's nozzle and cutting a slit in the container, the cutting enabling further insertion of the push plate into the container.

Optionally, the force transmitting element is a handle.

Optionally, the housing is configured to accommodate a tubular container. Optionally, the housing comprises a support configured to immobilize the container within the housing.

Optionally, the cutting-pushing element is configured to be movable forward, the forward movement pushing the moveable cap towards the container's nozzle. Alternatively or additionally, the container is configured to be moveable backward towards the cutting-pushing element.

Optionally, the force transmitting element comprises a hand operated trigger. Optionally, the force transmitting mechanism is configured to receive electrical power. Optionally, the device further comprises a power source configured to supply power to the force transmitting mechanism.

Optionally, the force transmitting mechanism is configured to couple with an external force generating device.

Optionally, the external force generating device is selected from a group comprising electrical drills, screwing machines, electric motors, and pneumatic motors.

Optionally, the device is configured to be operable with one hand.

Optionally, the viscous material is selected from a group consisting of gels, glues, sealants, paints, baking doughs, syrups, plasticine, modeling clay composite posts, adhesive composites, curing adhesives, impression compounds and pastes.

Embodiments further teach a method for dispensing viscous material out of a tubular container comprising viscous material, a front, tail, nozzle and a moveable cap. The method comprises inserting the container into a viscous material dispensing device comprising a cutting-pushing element, the cutting-pushing element comprising a push plate capable of applying pressure upon a movable cap of a container and at least one blade positioned behind the push plate, the blade capable of cutting the container and the inserting comprising contacting the push plate with the moveable cap; securing the container within the device; applying force that triggers relative movement of the cutting-pushing element and the container in opposite directions towards each other, thereby pushing material stored within the container out of the container's nozzle and cutting a slit in said container, the cutting enabling further

insertion of the cutting-pushing element into the container by repeatedly applying the force, thereby extending the slit.

Optionally, the relative movement is achieved by actions comprising pushing forward the cutting-pushing element of the dispensing device. Alternatively or additionally, the relative movement is achieved by actions comprising pushing the container backwards against the cutting-pushing element.

Optionally, the method further comprises removing at least part of an empty tail of the container, wherein the empty tail is located behind the moveable cap. Optionally, the relative movement takes place in small confined places.

Optionally, the applying force comprises ratcheting action on the container.

BRIEF DESCRIPTION OF THE FIGURES

For a better understanding of the invention and to show how it may be carried into effect, reference will now be made, purely by way of example, to the accompanying drawings.

With specific reference now to the drawing in detail, it is stressed that the particulars shown are by way of example and for purposes of illustrative discussion of embodiments only, and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the invention. In this regard, no attempt is made to show structural details of the invention in more detail than is necessary for a fundamental understanding of the invention; the description taken with the drawing making apparent to those skilled in the art how the several forms of the invention may be embodied in practice.

In the accompanying drawings:

Figure 1 illustrates a prior art tubular container for viscous materials such as silicone glue;

Figure 2A illustrates a perspective view of an embodiment of a cutting-pushing element employed within embodiments of compact material dispensing devices;

Figure 2B illustrates a perspective view of an embodiment of a cutting-pushing element which may be employed for material dispensing;

Figure 2C illustrates a side view of a cutting-pushing element coupled with a handle;

Figure 3A illustrates a side view of an embodiment of a manual compact material dispensing device comprising a cutting-pushing element;

Figure 3B illustrates a view of part of a cutting-pushing element within a cutout container housing of the compact material dispensing device of Figure 3A;

Figure 3C Shows rod retainers for the compact material dispensing device of Figure 3A;

Figure 4A illustrates a perspective view of another embodiment of a compact material dispensing device;

Figure 4B illustrates a perspective view of the embodiment shown in figure 4A ready for operation with a tubular container such as shown in figure 1;

Figure 4C shows a view of the embodiment shown in figure 4A ready for operation with a tubular container, from another perspective;

Figure 5A illustrates a perspective view of an embodiment of a compact material dispensing device configured to be coupled with a powered tool;

Figures 5B, 5C illustrate a perspective view of the embodiment of figure 5A coupled with an electric screwdriver;

Figure 6A illustrates a side view of a very short embodiment of a compact material dispensing device;

Figure 6B shows a rear view of the very short manual embodiment shown in Figure 6A;

Figure 6C shows a front view of the very short manual embodiment shown in Figure 6A containing a stopper element;

Figure 6D illustrates an embodiment of a stopper element employed within the embodiment shown in Figures 6A-C; and

Figure 7 is a flow chart of a method for dispensing material out of a standard viscous material container using an embodiment of the compact viscous material dispensing device.

DETAILED DESCRIPTION

CONTAINER

Figure 1 illustrates a standard tubular container 10 which can be mounted onto paste dispensing devices such as glue guns, dispensing guns for sealants or the like. Standard containers typically have a nozzle 11 with an aperture 12 at the front 13 from which the material 16 is dispensed and a rear side 15 having a moveable cap 14. When the container is full, the moveable cap 14 is located at the back end 17 of the container 10. Force exerted upon the container's movable cap 14 causes the cap to move forward within the container 10, compressing and squeezing the material 16 towards the nozzle 11. Material 16 stored within the container 10 is pushed out of the container through the nozzle aperture 12. The rear side of the container emptied of material 16 will be referred to as the empty tail 15 of the container 10. The empty tail 15 can grow in length as more material is dispensed out of the container 10, and can become shorter if cut off.

CUTTING-PUSHING ELEMENT

Embodiments of a cutting-pushing element comprise a push plate and a blade where the blade is positioned behind the push plate and is configured to follow the push-plate as the cutting-pushing element is moved. Means for coupling the push plate and the blade together may vary.

Reference is now made to Figure 2A illustrating a perspective view of an embodiment of a cutting-pushing element 40 comprising a push plate 42, a blade 44 positioned behind the push plate, and a connector element 46 assembled on a cutting-pushing base 48. The push plate 42 may be of various shapes and sizes, enabling it to be inserted into containers whose cross sections are of different shapes. Push plate 42 is coupled to the blade 44, through a connector element 46. The blade is positioned to follow the push plate.

In various embodiments, the cutting-pushing element may further comprise a handle 47 as shown in Figure 2B. The handle may be used to manually apply force on the cutting-pushing element, pushing it forward towards a nozzle of a container, creating during the pushing a slit along the container. Embodiments of the cutting-pushing element which comprise a handle may be used to dispense viscous material out of a container even if not coupled with a compact dispensing device.

Alternatively, the cutting pushing element may not comprise a handle, but be configured to couple with an external handle 34 optionally through a dedicated recess 99 in the base 48 such as shown in Figure 2C.

In various embodiments of a cutting-pushing element, there may be more than one blade.

MANUAL EMBODIMENTS

Reference is now made to Figure 3A showing a view of a compact viscous material dispensing device 200, in accordance with one embodiment. Figure 3B shows a view of part of a cutting-pushing element 240 of device 200 within a container housing 260.

The device 200 comprises a housing 260, a nozzle support 265 mounted on a rod 268, a housing base 220, a force transmitting mechanism 230 and a cutting-pushing element 240 (only shown in Figure 3B) that serves as a piston and is located within the container housing 260.

The container 10 is placed within the housing 260 such that the front side 13 of container closer to the nozzle 11 is supported by the container's nozzle support 265, and the body of the container 10 is secured within the housing 260 such that the moveable cap of the container 10 is lined against the cutting-pushing element 240 within the container housing 260.

The embodiment shown in Figures 3A and 3B is provided with a force transmitting mechanism 230 comprising a retracting trigger 232 and a handle 234 for pushing backwards container 10 toward cutting-pushing element 240, wherein the cutting-pushing element 240 is configured to enable generating pressure on a moveable cap in the container 10. Force exerted upon the moveable cap pressures the material within the container 10 and pushes it outwardly through the nozzle 11.

In the embodiment shown in figures 3A and 3B, the retracting trigger 232 is configured to push backwards rod 268 with nozzle support 265 towards push plate 242 of cutting-pushing element 240: A spring 272 in the force transmitting mechanism is compressed when the trigger 232 is squeezed, and released to a resting position when the trigger 232 is released. The device 200 may further include plates 274, which are shown in Figure 3C, that are placed between a spring 272 and the trigger 232. The holes of the plates 274 are sized and shaped such that when the trigger 232 is squeezed, the plates 274 engage the rod 268 and pull it 268 back.

When the trigger 232 is released, the plates 274 disengage the rod 268 and thus the force transmitting mechanism 230 may act like a ratchet. The displacement of the spring determines the extent to which the rod 268 with the nozzle support 265 can travel back with each squeeze of the trigger 232.

As the rod 268 is moved backwards, a blade (not shown) located behind the push plate 242 cuts a slit in the back of the container 10 where material has been squeezed out, enabling the container 10 to be further pushed backwards towards the push plate 242. The empty tail (not shown) of the container 10 emerges from the container housing 260 as the nozzle support 265 and the rod 268 are pushed back. The empty tail of the container located behind the moveable cap can be cut, further shortening the device with the mounted container.

To remove the container, plate 276 may be pressed backwards and concomitantly rod 268 pushed forward. Spring 278 urges plate 276 forward to engage the rod 268, to prevent accidental movement of the rod 268 forwards.

In this embodiment of the compact dispensing device the cutting-pushing element is fixed and cannot be moved. In such embodiments, force from the retraction trigger is used to push the container backwards towards the fixed cutting-pushing element.

In some embodiments, the blade may further contain teeth (not shown) that further allow ratcheting action of the device. The teeth may assist the cutting-pushing element in gripping the container alongside the slit created by the movement of the front of the container and cutting-pushing element towards each other. The teeth typically face backwards. In other embodiments, another part of the cutting-pushing element may have teeth fulfilling the same purpose.

In yet other embodiments, the container housing may have teeth to help provide ratcheting functionality to the device.

The container housing 260 may be designed to fit cylindrically shaped barrels, or may be any other shape, to fit available or standard containers of different shapes and sizes, for example and without limitation sealant containers commonly used to store and apply sealing material upon surfaces and crevasses.

In various embodiments, a force transmitting element enables relative movement of the cutting-pushing element and the container in opposite directions towards each other.

The cutting-pushing element may be immobilized, as in the device 200 described above, and the device is configured to push the container backwards towards the cutting pushing element.

Alternatively, as described below, the device may be configured to immobilize the container and push the cutting-pushing element forward.

SHORT MANUAL EMBODIMENT

Reference is now made to Figure 4A showing a view of a compact viscous material dispensing device 300, in accordance with another embodiment and Figures 3B, 3C showing a rear view and a front view respectively of the embodiment ready for operation, loaded with a standard container 10. The device 300 comprises a housing 360, a housing base 320 comprising a groove 322, a force transmitting mechanism 330 with a retracting trigger 332 and a handle 334, a cutting-pushing element 340 that serves as a piston comprising a push-plate 342 and a blade 344, and stopper element 362.

A cutting element configured for the device 300 also includes a cutting-pushing base, not shown in the figure but shown in Figure 2A as base 48, that can move along the groove 322. The retracting trigger 332 is configured to push cutting-pushing element 340, causing the push plate 342 to move forward along the groove 322 of the housing base 320. A spring (not shown) in the force transmitting mechanism 330 is compressed when the trigger 332 is squeezed, which determines the extent to which the cutting-pushing element 340 with the push plate 342 can travel within the groove 322 of the housing base 320. Stopper 362 is configured to clasp the tube and secure it within the container housing 360 during at least some of the time the trigger 332 is squeezed. In some other embodiments, the container may be secured by hand.

As the cutting-pushing element moves forward, the push plate 342 pushes the moveable cap of the container towards the container nozzle 11, and the blade 344 cuts a slit in the empty tail 15 of the container 10 where material has been squeezed out.

The slit 19 created in the container 10 enables further forward insertion of the push plate 342 into the container 10, thus extruding material out of the container 10.

With this design, a rod typically used in prior art dispensing devices for pushing the moveable cap of the container forward is unnecessary, and the dispensing device can be made lighter and more compact. The housing for holding the container does not include a nozzle support and may be shorter than the original length of the container. Upon initial use, the container is placed such that the moveable cap is placed against the push plate of the cutting-pushing element within the housing and the front of the container may stick out of the container's housing without further support.

As in the formerly described embodiment 200, the cutting-pushing element may comprise teeth to assist in engaging the container 10, i.e. the applying force comprises ratcheting action on the container.

POWER ASSISTED EMBODIMENT

Reference is now made to Figure 5A illustrating a perspective view of an embodiment of a power-assisted compact material dispensing device 500. In this embodiment, a powered tool such as but not limited to an electric drill is harnessed as a force transmitting mechanism. The device may be as short as the length of the powered tool in use with this device. Electrical embodiments typically comprise a container housing 560 and a nozzle support 520 for holding the container. Figure 5A further shows push plate 542.

Power assisted embodiments of a compact viscous material dispensing device may be configured to couple with external force-generating devices as shown in figure 5B and 5C. Alternatively, a force-generating element may be incorporated within the compact material dispensing device.

Power assisted embodiments may be configured to couple with external power sources, for example and without limitation via an electric cable. Alternatively, a power source may be incorporated within the compact material dispensing device, for example and without limitation a battery for electricity storage.

Power assisted embodiments are typically amenable to manipulation with one hand. An electrical drill 700 may be connected to the compact material dispensing device by attachment means 550. Attachment means may assist in operating the device with one hand. Power assisted embodiments employed with a heavy force transmitting mechanism may be heavier than embodiments which do not require use of a powered mechanism.

Figures 4B, 4C present other perspective views of the device shown in Figure 5A mounted on an electrical drill 700. Optionally, other electrical devices such as an electrical screw driver can be used. The torque generated by the drill may be transmitted to the cutting-pushing element 540 via a screw rod positioned in the container housing 560. The electrical drill's rotational motion is transformed to a linear movement of a cutting-pushing element 540 of Figure 5B further comprising a cutting-pushing element with push-plate 542.

It should be noted that other force transmission mechanisms can be employed within the device in order to transform the rotational force created by the torque of the electrical drill to a linear movement of the cutting pushing element. A reversible drill capable of reverse rotation may be provided for employing the device. The reverse rotation allows returning the cutting-pushing element to the starting position.

Electric motors, pneumatic motors or the like, optionally provided with variable force transmission levels and speeds, may also be used as force transmission mechanisms for power-assisted embodiments.

In different embodiments of the material dispensing device, the device may be configured such that the cutting-pushing element is held still and the container housing with the container is moved backwardly towards the cutting-pushing element, as the embodiment shown in Figure 2A, 2B. In other embodiments, the device is configured to hold the container steady and the cutting-pushing element is configured to move forward within the container's housing groove toward the nozzle 11 of the container 10 as the embodiment shown in Figures 3A, 3B, 3C. Other embodiments may enable movement of both cutting-pushing element and container or container housing as desired.

VERY SHORT MANUAL EMBODIMENT

Reference is hereby made to Figure 6A showing a side view of a very short manual embodiment of a viscous material dispensing device 600. The embodiment includes a cutting-pushing element 640, housing 660 a neck 664, a release ring 630 and a force transmitting mechanism 630. The housing 660 is configured to accommodate a standard tubular viscous material container (10 in Figure 1). The internal part of the neck 664 comprises a thread for screwing a release ring 666 onto the housing 660. The force transmitting mechanism 630 may be used to manually apply force on the cutting-pushing element 640 within the housing 660. The mechanism 630 may be coupled to the cutting-pushing element 640 similar to the coupling shown in Figure 2C. In this embodiment, the mechanism 630 comprises a static part 632 and a moving part 634 coupled together via a coupling pin 653.

Reference is hereby made to Figure 6B showing a rear view of the very short manual embodiment of a viscous material dispensing device 600. The rear view shows the static part 632 and the coupling pin 653 of the mechanism 630. The rear view further shows the back of the cutting-pushing element 640 assembled within the housing 660, comprising a push plate 642, a blade 644, and a connector element 646 assembled on a cutting-pushing base 648.

Reference is now made to Figure 6C showing a front view of the very short manual embodiment of a viscous material dispensing device 600. The front view shows the front side of the push plate 642 and an embodiment of a stopper element 662 connected to the container housing 660. 670 is the space between the push plate 642 and the stopper element 662, where a tubular container (10 in Figure 1) can be inserted into the device 600.

Figure 6D illustrates the embodiment of the stopper element 662 shown in Figure 6C. This embodiment comprises a plurality of teeth 661 (661a and 661b are marked). In this embodiment, the teeth are flexible, such that they can bend towards the inside in the container housing (660 in Figure 6A, 6B and 6C). When a tubular container 10 is inserted into the container housing 660 from the front of the device 600, it is secured by the teeth 661. Attempting to pull the container from within the housing 660 will result in the teeth 661 getting pushed towards the front of the device and not enabling the extraction of the container, as well as preventing movement of the container forwards during employment of the force transmitting mechanism 630 while allowing the container to move backwards during release of the mechanism 630.

The extraction of a tubular container (10 in Figure 1) from this embodiment involves screwing in the release ring (666 in Figure 6A) onto the housing 660. The release ring 666 pushes the teeth 661 of the stopper element 662 towards the inside of the housing 660, thus creating a space (670 in Figure 6C) from which the container can be extracted.

METHOD

Reference is now made to Figure 7, illustrating a flow chart of a method 700 for dispensing material out of a standard viscous material container using an embodiment of the compact viscous material dispensing device described herein.

The method commences with step 710 of inserting a standard tubular container with a movable cap into a housing of a compact viscous material dispensing device such that the movable cap is placed in front of the push plate of the cutting-pushing element of the dispensing device. The procedure continues with step 720 of securing the container within the housing, and finally step 730 of applying force which causes the cutting-pushing element of the device to push forward the movable cap of the container.

Step 720 of securing the container within the housing can be done as described for a manual device 200. Alternatively, when the dispensing device does not contain a nozzle support as in Figure 3A, a user may press his hand against the front of the container. Optionally, a stopper element 362 may be used to secure the container within the housing.

The method may further include the step 740 of removing the empty tail of the container located behind the container's moveable cap after it has been emptied of its content. This can be done, for example and without limitation, by cutting the tail of the container with a knife.

It should be noted that a viscous material dispensing device can be used in a variety of fields, not limited to construction. For example, a small embodiment of the viscous material dispensing device may be used in dental procedures when material needs to be dispensed into a patient's mouth. The mouth is a confined space, and reduction of the size of the utensil used to apply viscous material into a patient's mouth may be very useful.

In embodiments used in medical and dental procedures, the size of the container may be very small. Embodiments of the compact viscous material dispensing device for medical and dental use may be used to replace other viscous material application utensils requiring a push piston such as syringes. In the medical and dental embodiments, the hand-operated trigger may be small and designed to be operable with a finger. Optionally, the force transmission mechanism could be powered and the trigger may be operable by a push of a button.

Medical and dental applications could also be for home use, for example and without limitation dispensing teeth-bleaching material out of a teeth-bleaching material container and into a teeth mold to be applied upon a subject's teeth overnight. Other applications may be used during medical surgery or cosmetic procedures, such as insertion of silicon or Botulinum toxin A to body cavities.

Other embodiments of the compact viscous material dispensing device may be used in cooking and baking, for example for insertion of material such as melted chocolate into dessert cups.

Assembling a cutting pushing element on a viscous material dispensing device relieves the need for using a rod to push the cap of a tubular container towards the container's nozzle, enabling a compact design of the dispensing device. The reduction in the dispensing device's size assists in making it lighter in weight and easier to operate in small, confined spaces. Embodiments may be used in various fields, such as but not limited to construction, manufacturing, cooking, baking, cosmetics, dental procedures and other medical uses.

The scope of the present invention is defined by the appended claims and includes both combinations and sub combinations of the various features described hereinabove as well as variations and modifications thereof, which would occur to persons skilled in the art upon reading the foregoing description.

In the claims, the word "comprise", and variations thereof such as "comprises", "comprising" and the like indicate that the components listed are included, but not generally to the exclusion of other components.

CLAIMS

1. A cutting-pushing element for applying pressure onto a movable cap within a container comprising viscous material, a nozzle and a moveable cap, the element comprising:

   a cutting-pushing base;

   a push plate capable of applying pressure upon the movable cap; and

   at least one blade positioned behind said push plate, said at least one blade capable of cutting the container;

   wherein said at least one blade and said push plate are mounted on said cutting-pushing base.

2. The cutting-pushing element of claim 1 further comprising a handle configured to allow inserting said push plate of said cutting-pushing element into said container, pushing material stored within said container out of said container's nozzle and cutting a slit in said container, the cutting enabling further insertion of said push plate into said container.

3. The cutting-pushing element of claim 1, further comprising teeth.

4. A device for dispensing viscous material out of a container provided with viscous material comprising:

   a housing configured to accommodate the container;

   the cutting-pushing element of claim 1; and

   a force transmitting element configured to allow applying force onto said cutting-pushing element;

   wherein the force transmitting element enables relative movement of said cutting-pushing element and the container in opposite directions towards each other, and

   wherein said device is configured to allow inserting said push plate of said cutting-pushing element into said container, pushing material stored within said container out of said container's nozzle and cutting a slit in said container, the cutting enabling further insertion of said push plate into said container.

5. The device of claim 4 wherein said force transmitting element is a handle.

6. The device of claim 4 wherein said housing is configured to accommodate a tubular container.

7. The device of claim 4 wherein said housing comprises a support configured to immobilize said container within said housing.

8. The device of claim 4 wherein said cutting-pushing element is configured to be movable forward, the forward movement pushing said moveable cap towards said container's nozzle.

9. The device of claim 4 wherein said container is configured to be moveable backward towards said cutting-pushing element.

10. The device of claim 4 wherein said force transmitting element comprises a hand operated trigger.

11. The device of claim 4 wherein said force transmitting mechanism is configured to receive electrical power.

12. The device of claim 11 further comprising a power source configured to supply power to said force transmitting mechanism.

13. The device of claim 4 wherein said force transmitting mechanism is configured to couple with an external force generating device.

14. The device of claim 13 wherein said external force generating device is selected from a group comprising electrical drills, screwing machines, electric motors, and pneumatic motors.

15. The device of any one of claims 6 to 14 configured to be operable with one hand.

16. The device of claim 4 wherein said viscous material is selected from a group consisting of: gels, glues, sealants, paints, baking doughs, syrups, plasticine, modeling clay composite posts, adhesive composites, curing adhesives, impression compounds and pastes.

17. A method for dispensing viscous material out of a tubular container comprising viscous material, a front, tail, nozzle and a moveable cap, the method comprising:

inserting the container into a viscous material dispensing device comprising a cutting-pushing element, said cutting-pushing element comprising a push plate capable of applying pressure upon a movable

cap of a container and at least one blade positioned behind said push plate, said at least one blade capable of cutting the container;

the inserting comprising contacting the push plate with the moveable cap;

securing the container within said device;

applying force that triggers relative movement of said cutting-pushing element and said container in opposite directions towards each other, thereby pushing material stored within said container out of said container's nozzle and cutting a slit in said container, said cutting enabling further insertion of said cutting-pushing element into said container by repeatedly applying said force, thereby extending said slit.

18. The method of claim 17 wherein said relative movement is achieved by actions comprising pushing forward said cutting-pushing element of said dispensing device.

19. The method of claim 17 wherein said relative movement is achieved by actions comprising pushing said container backwards against said cutting-pushing element.

20. The method of claim 17 further comprising removing at least part of an empty tail of said container, wherein said empty tail is located behind said moveable cap.

21. The method of claim 17 wherein said relative movement takes place in small confined places.

22. The method of claim 17, wherein the applying force comprises ratcheting action on the container.

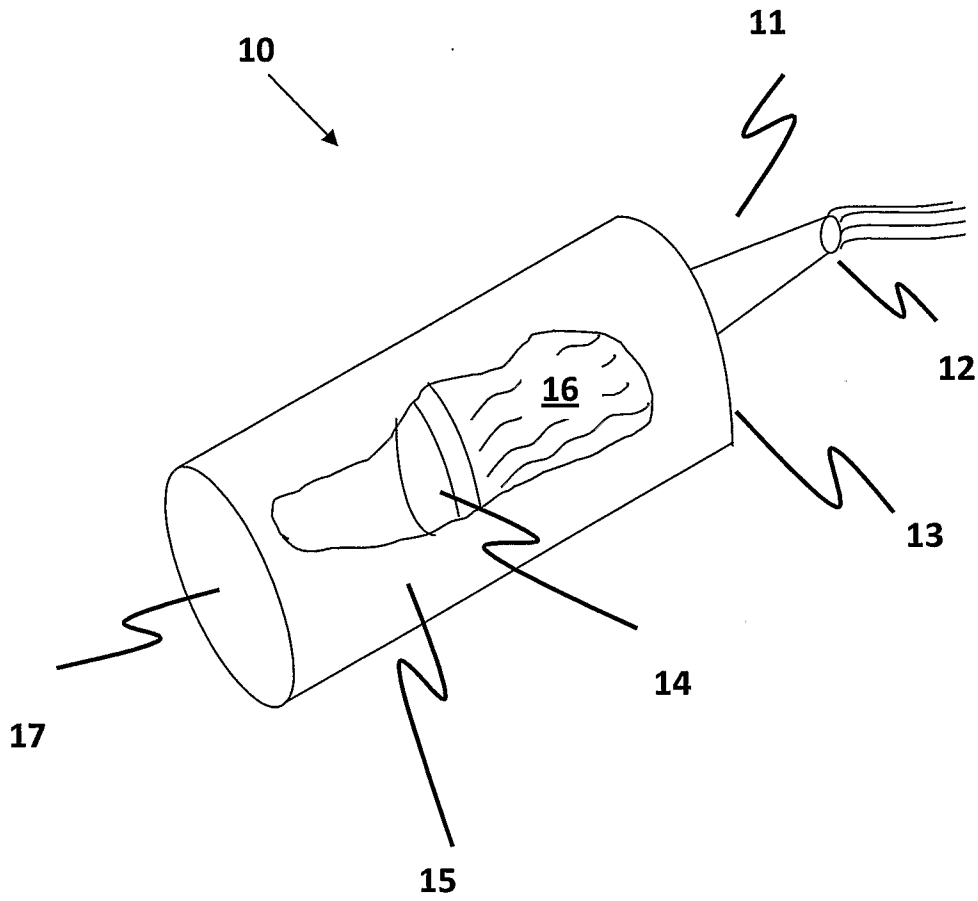

Figure 1

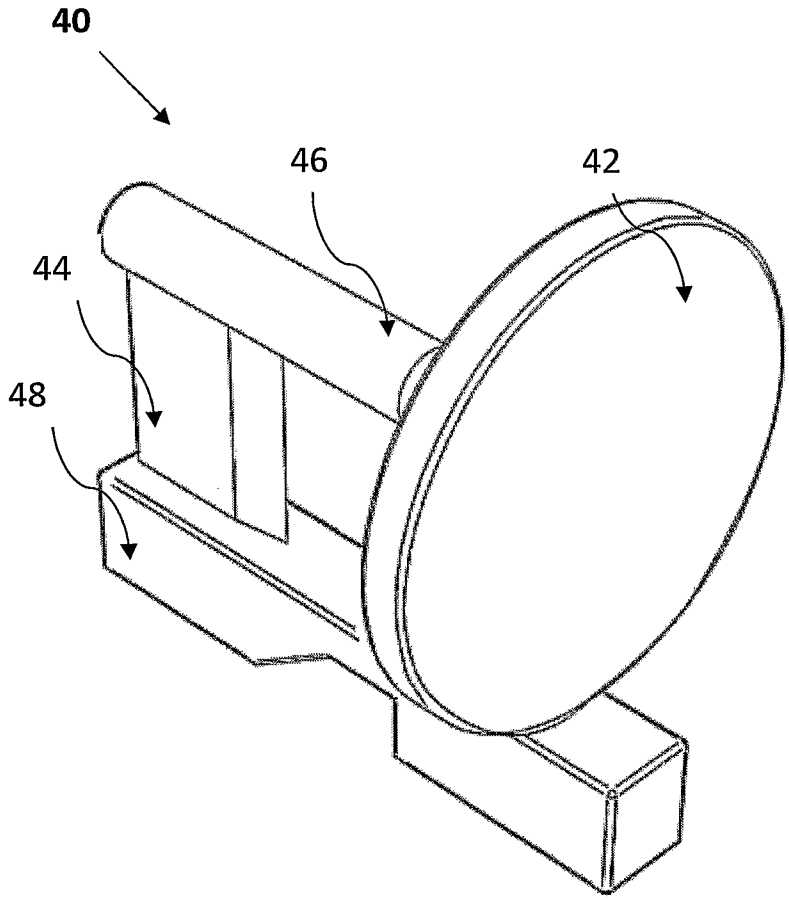

Figure 2A

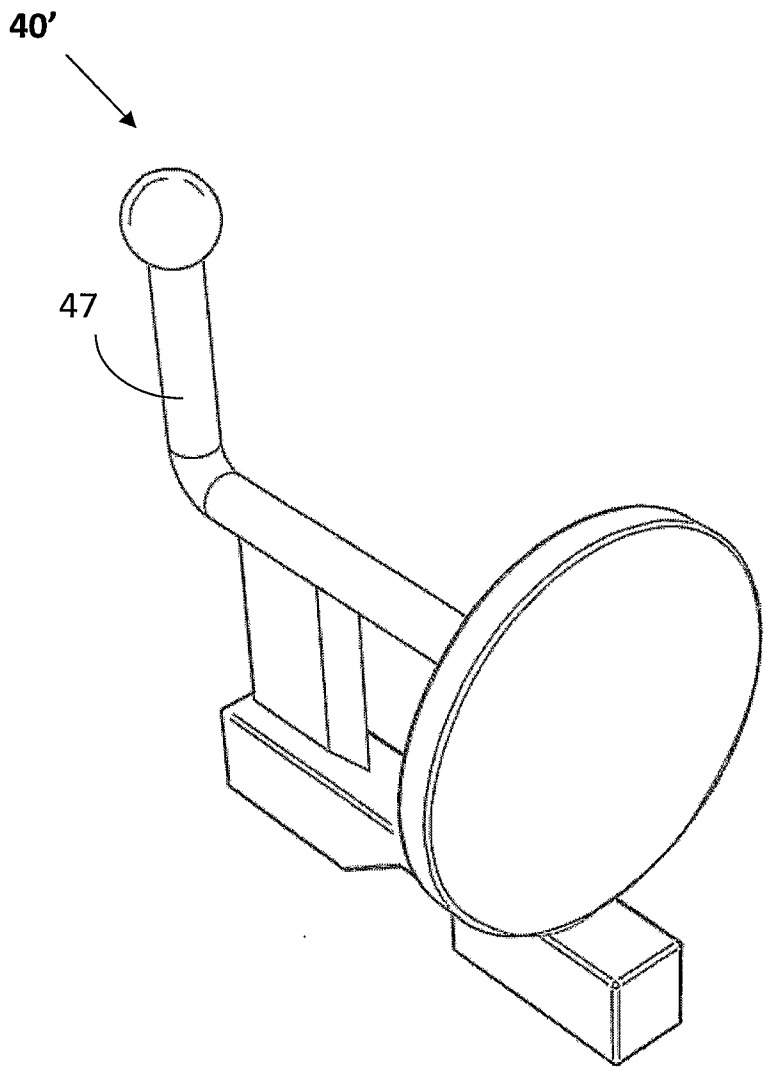

Figure 2B

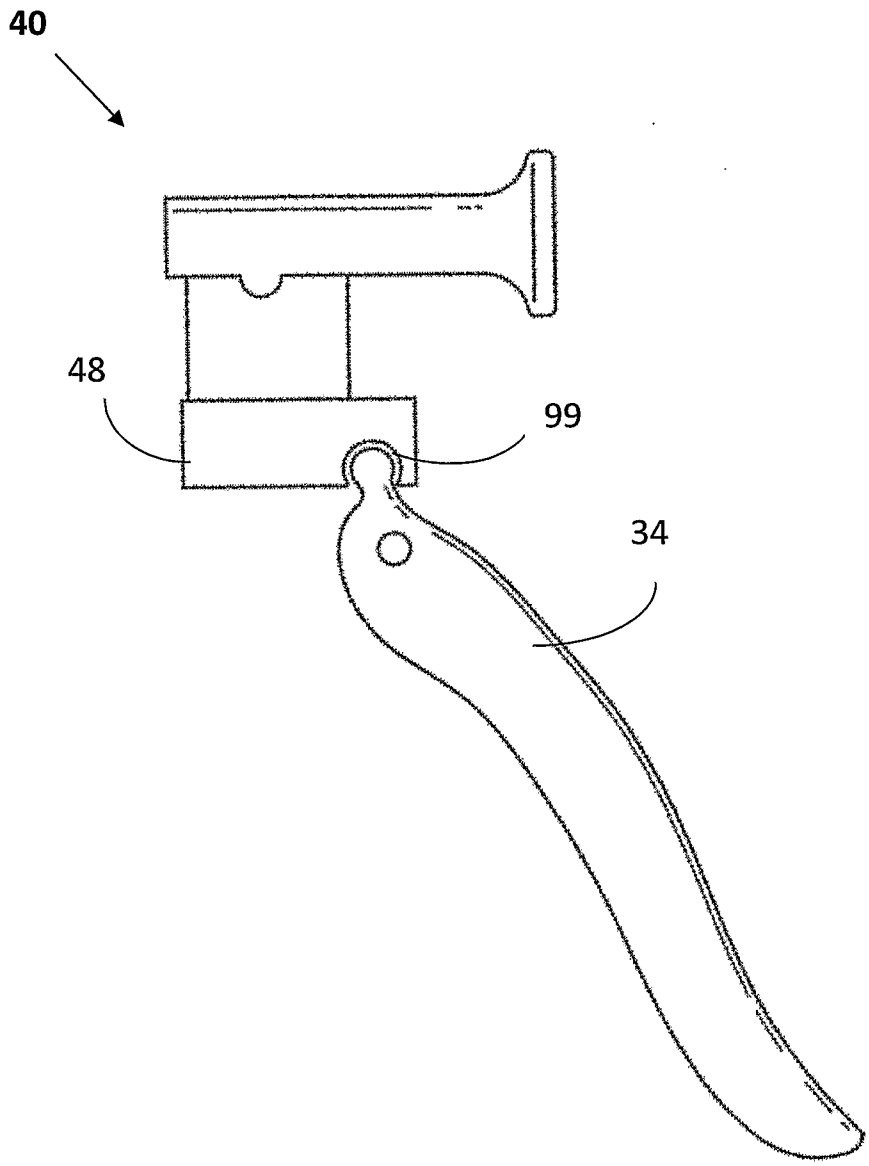

Figure 2C

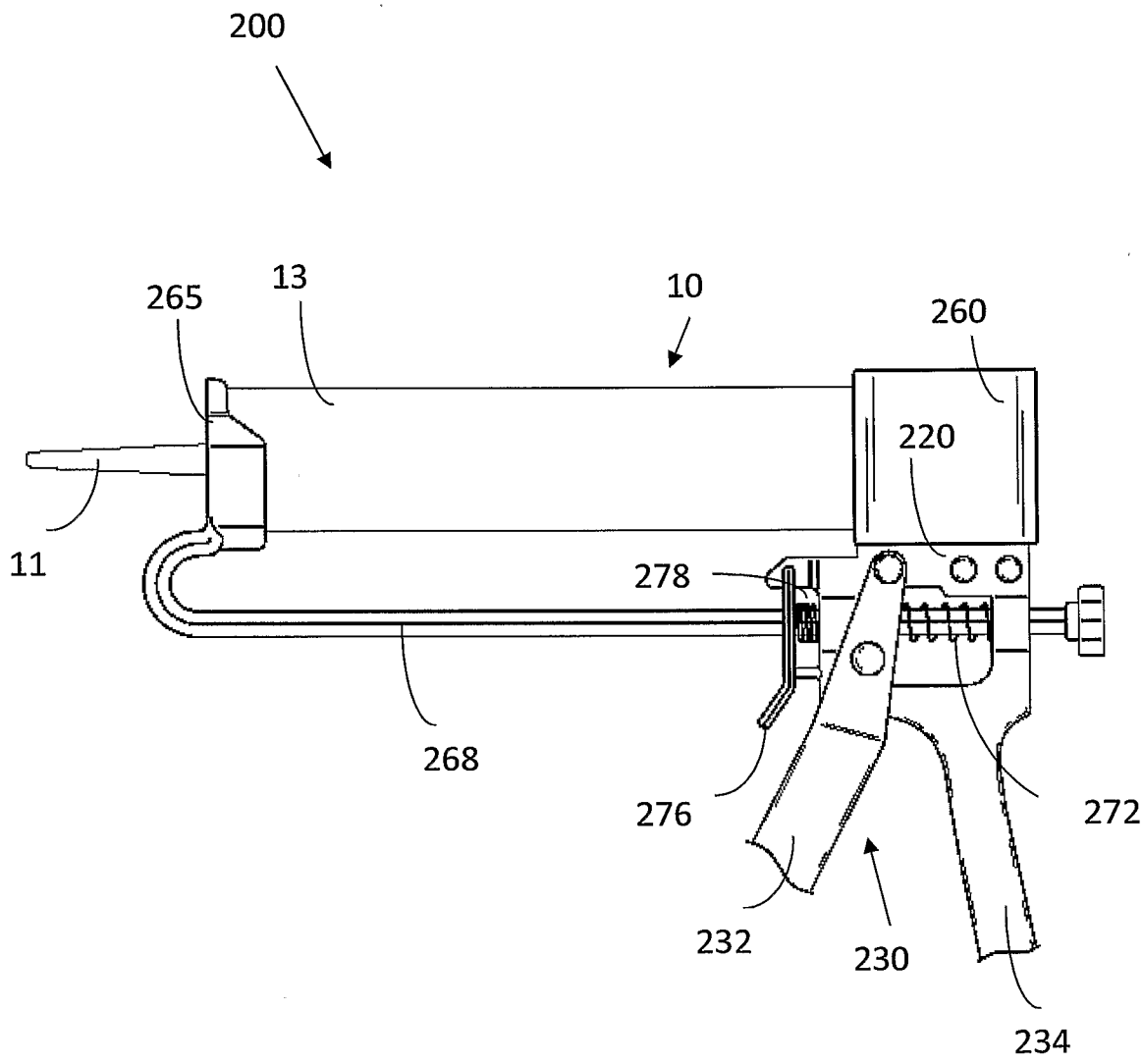

Figure 3A

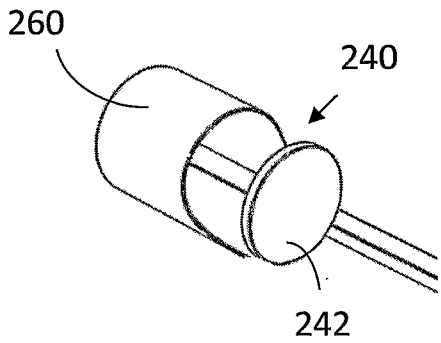

Figure 3B

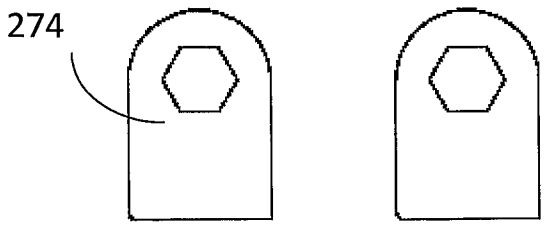

Figure 3C

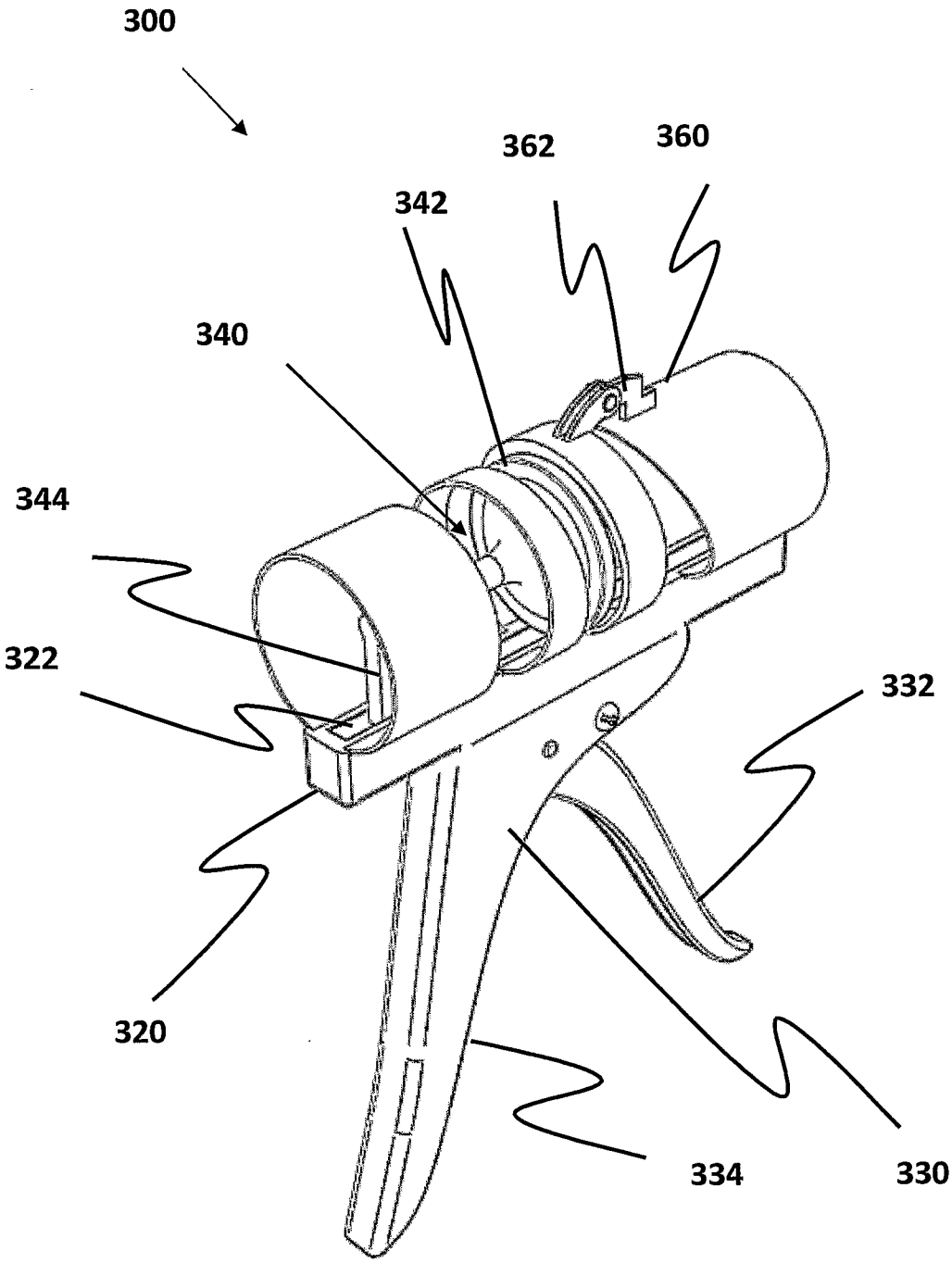

Figure 4a

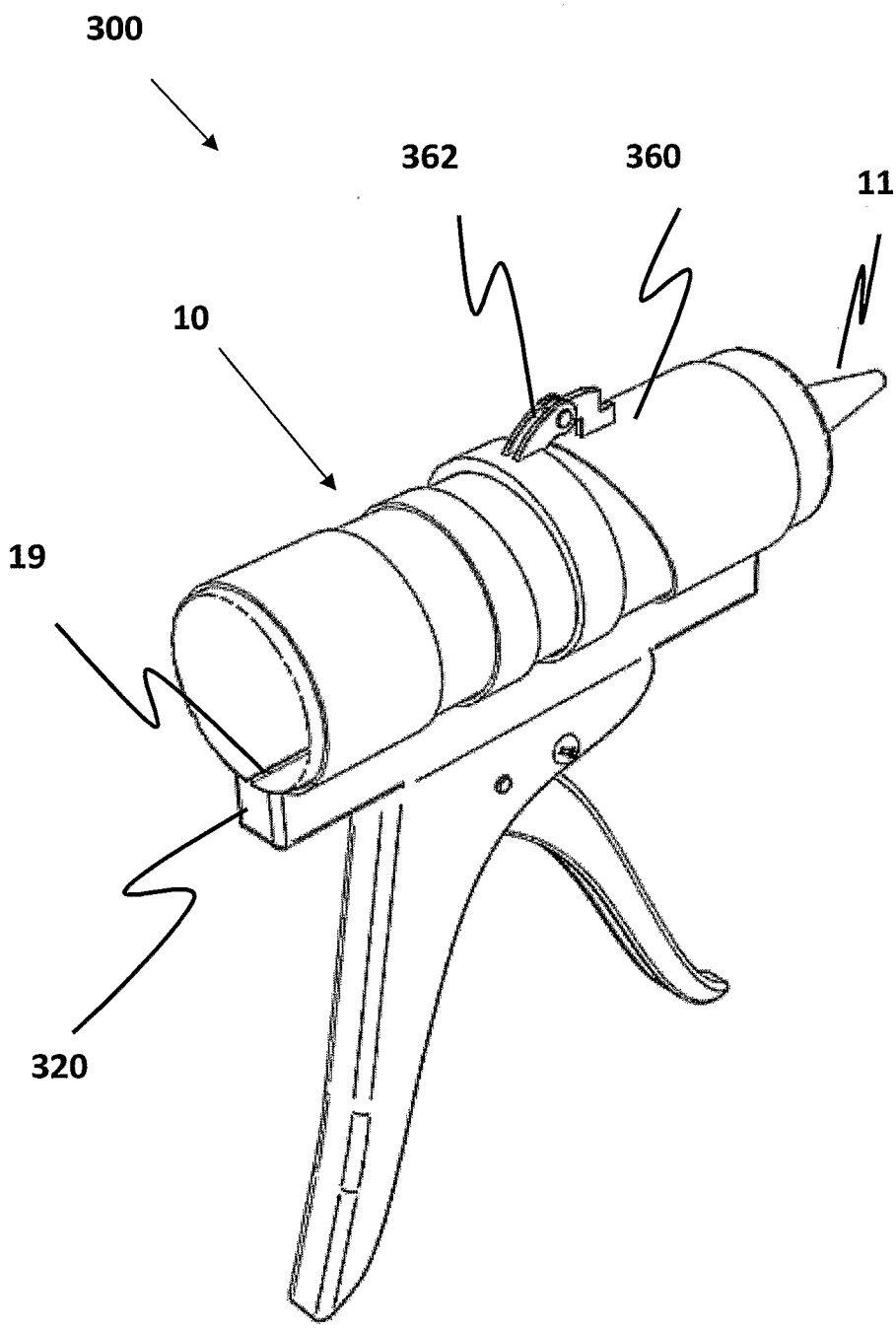

Figure 4B

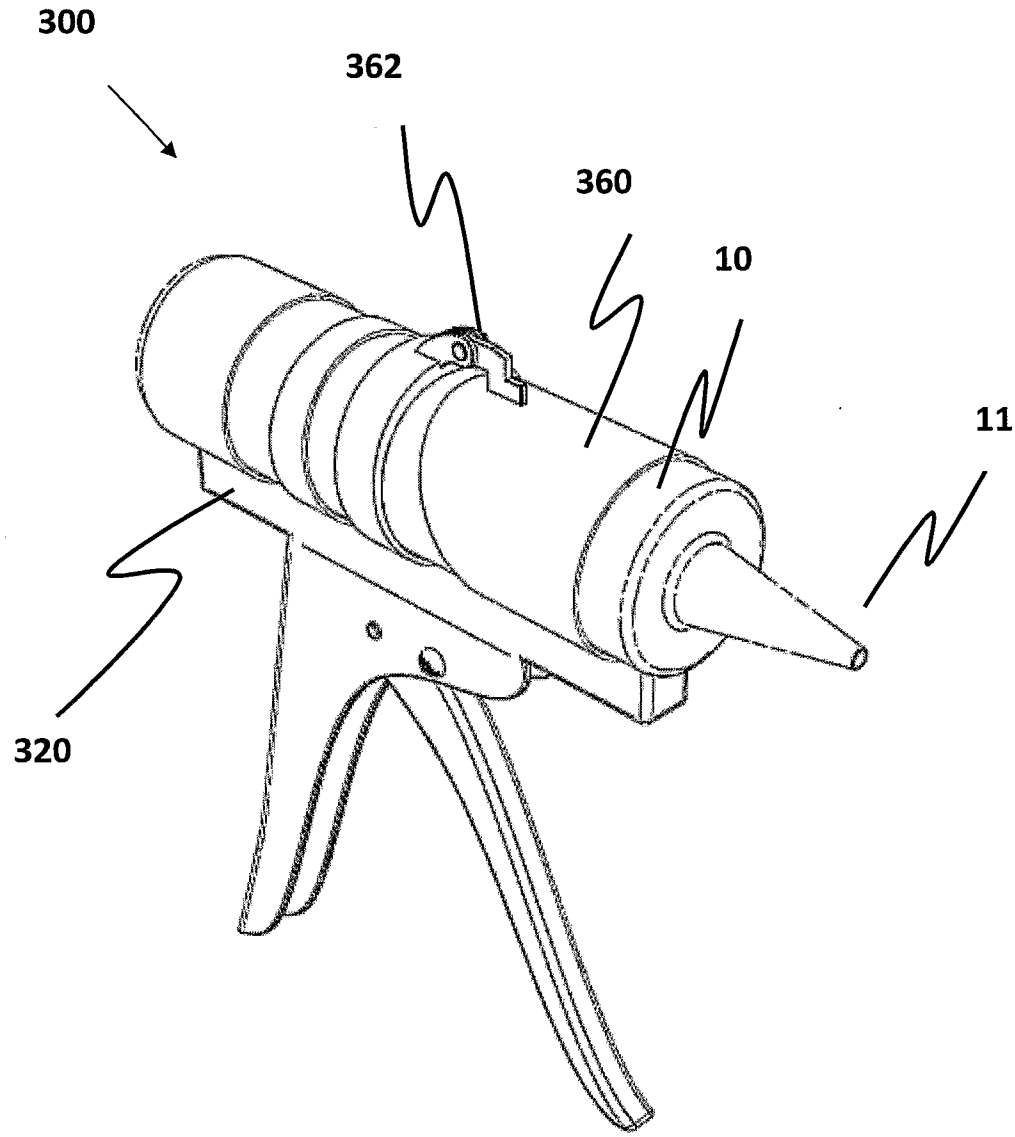

Figure 4C

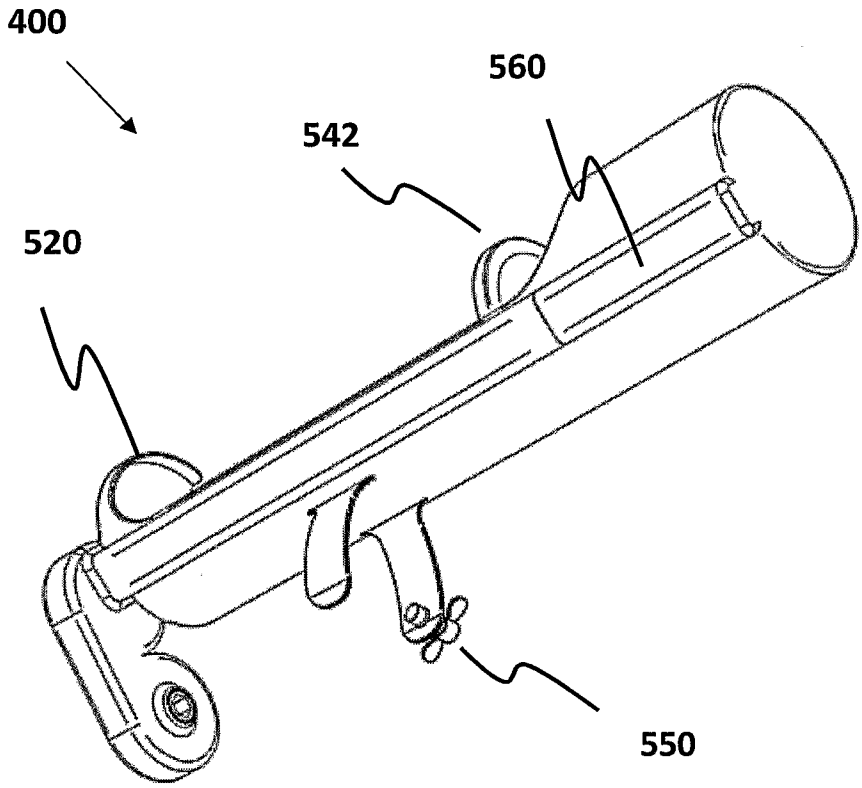

Figure 5A

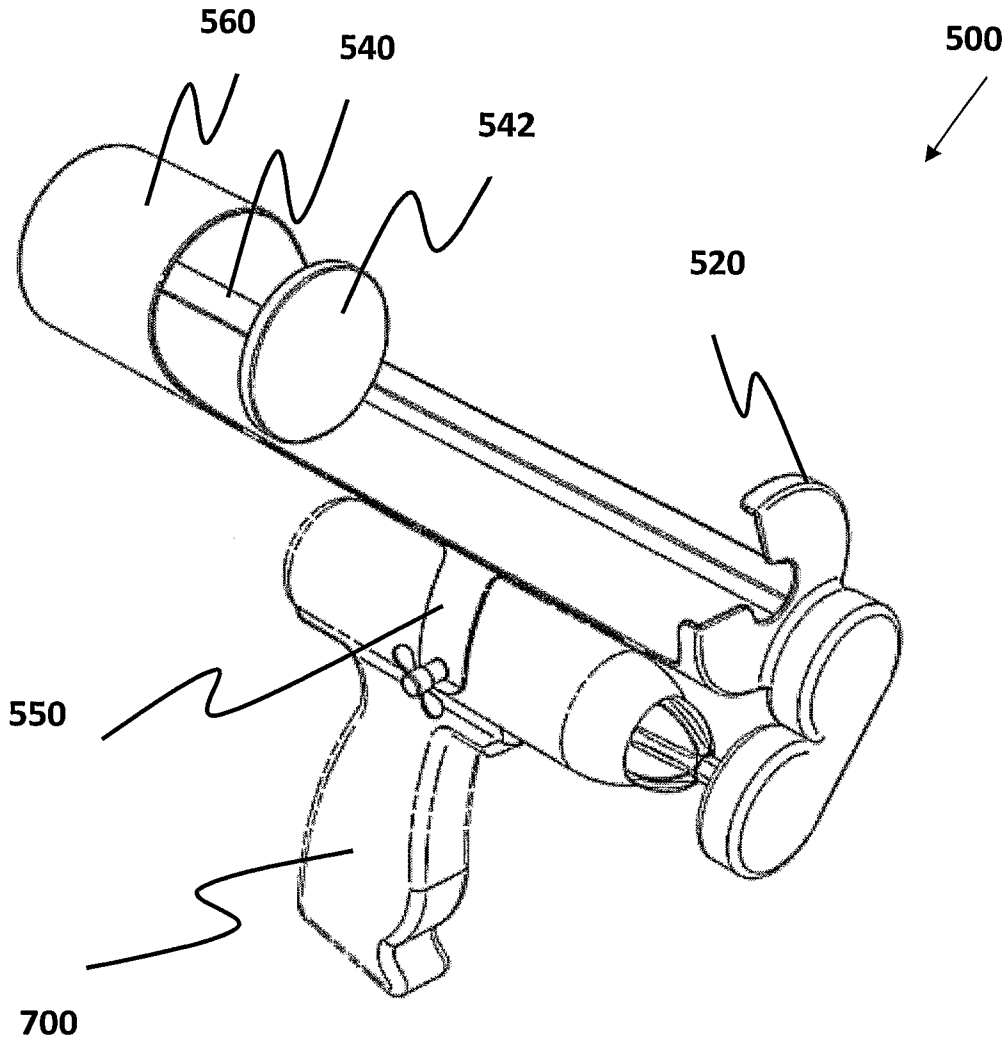

Figure 5b

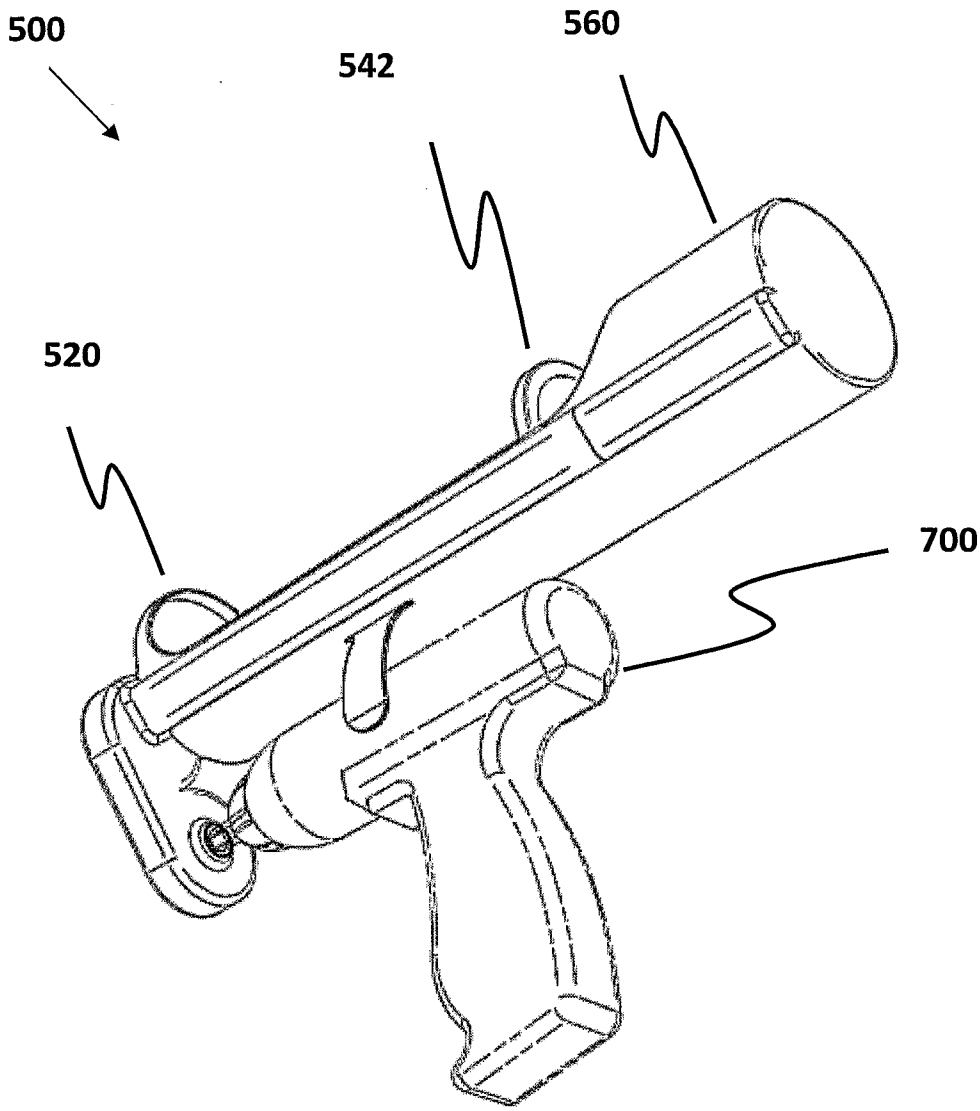

Figure 5c

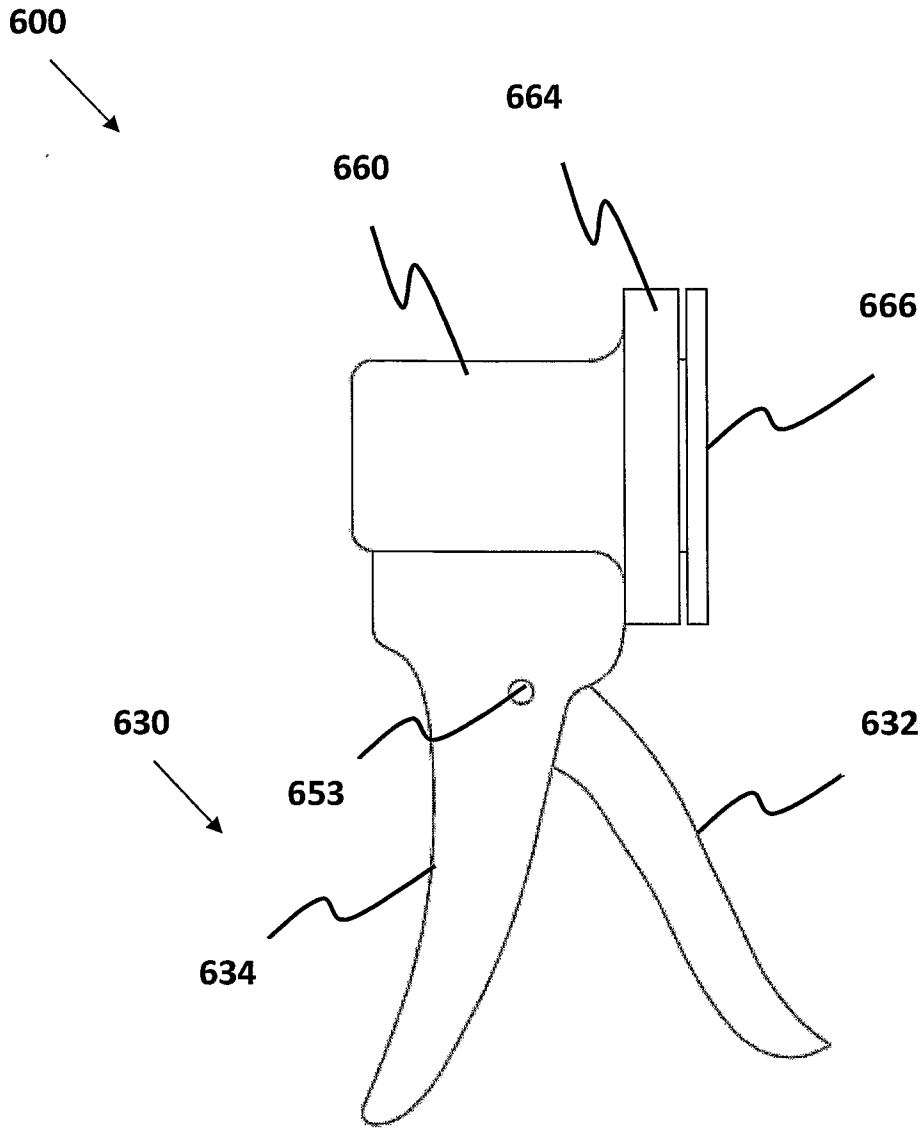

Figure 6A

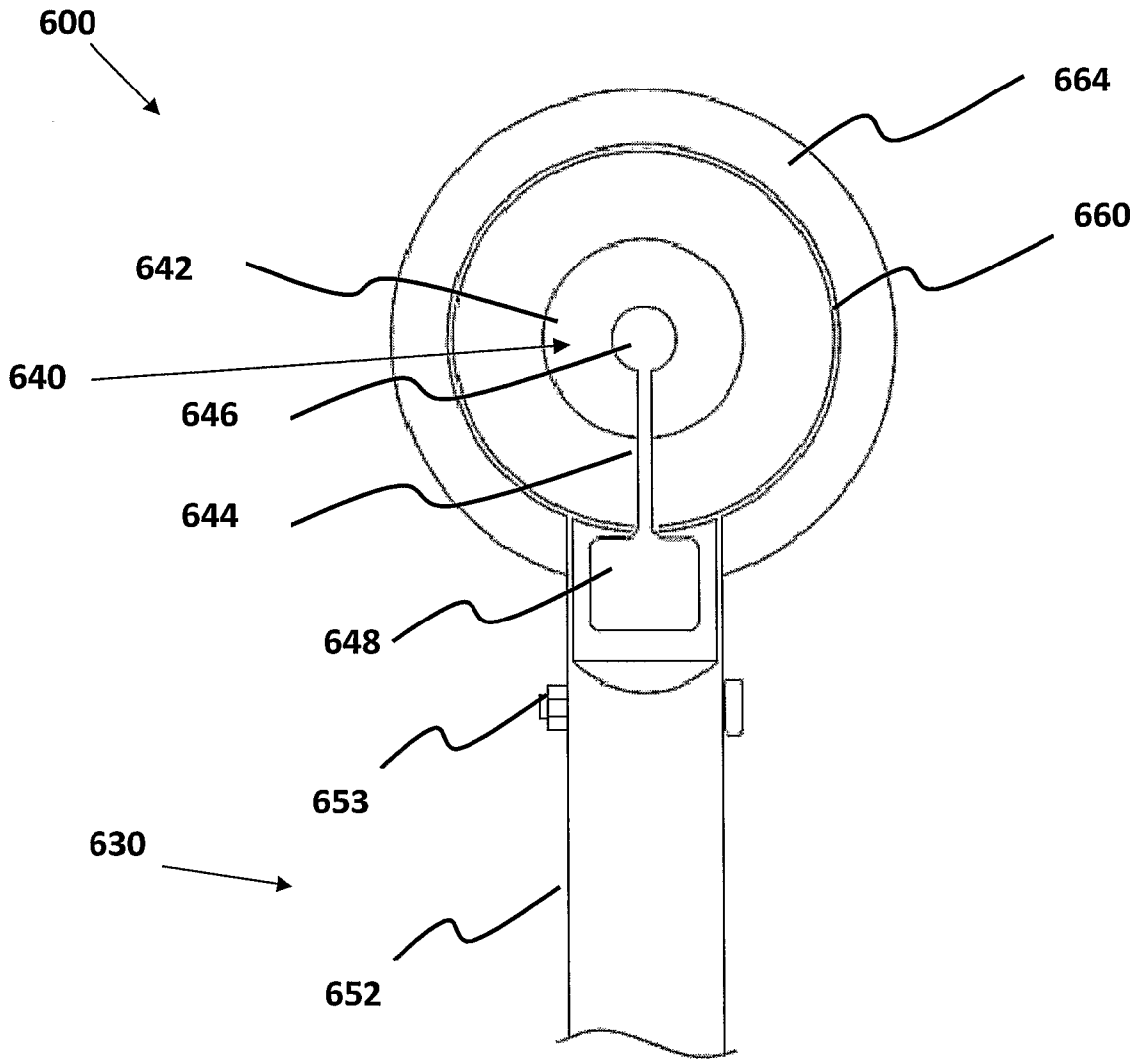

Figure 6B

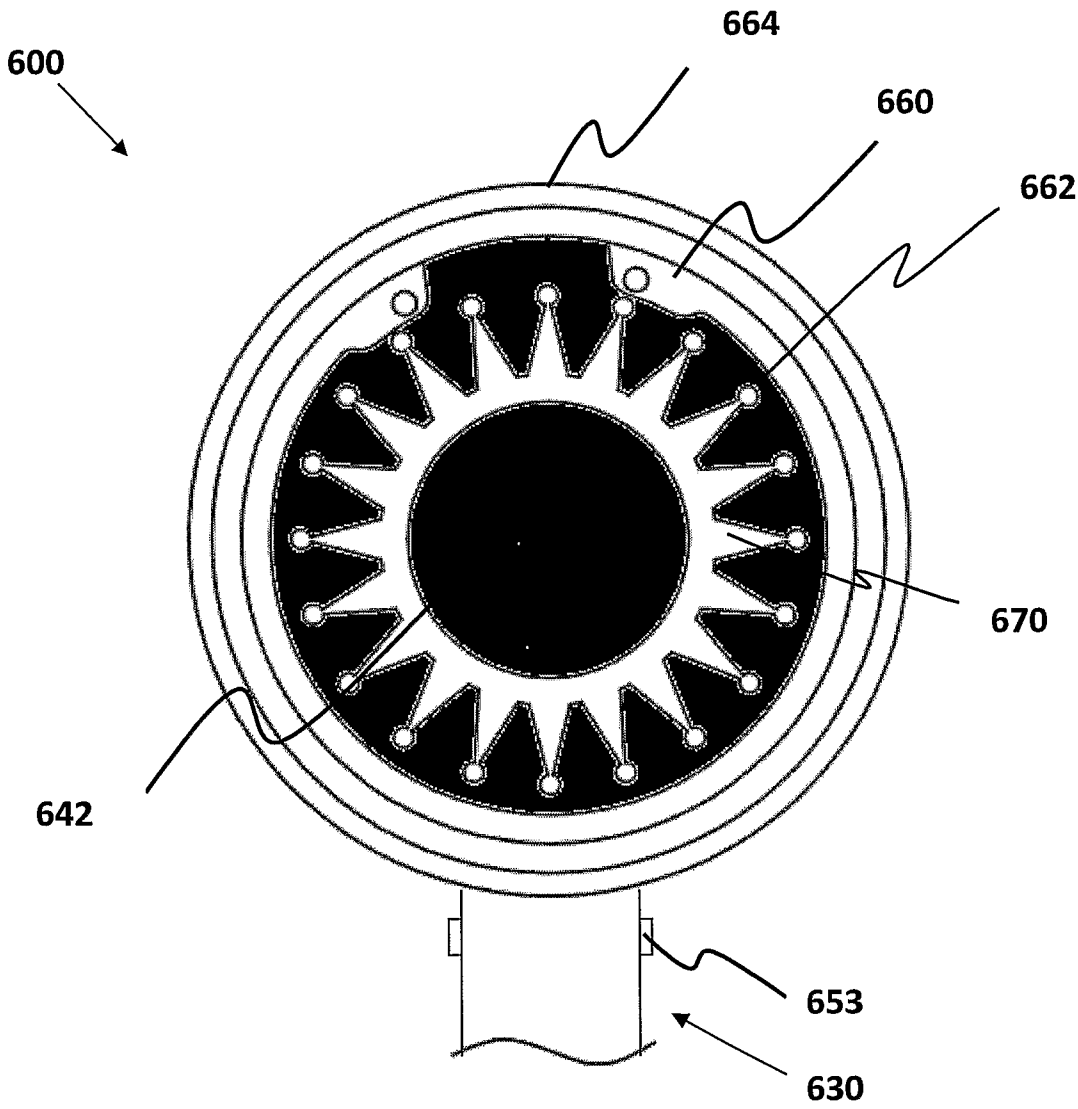

Figure 6C

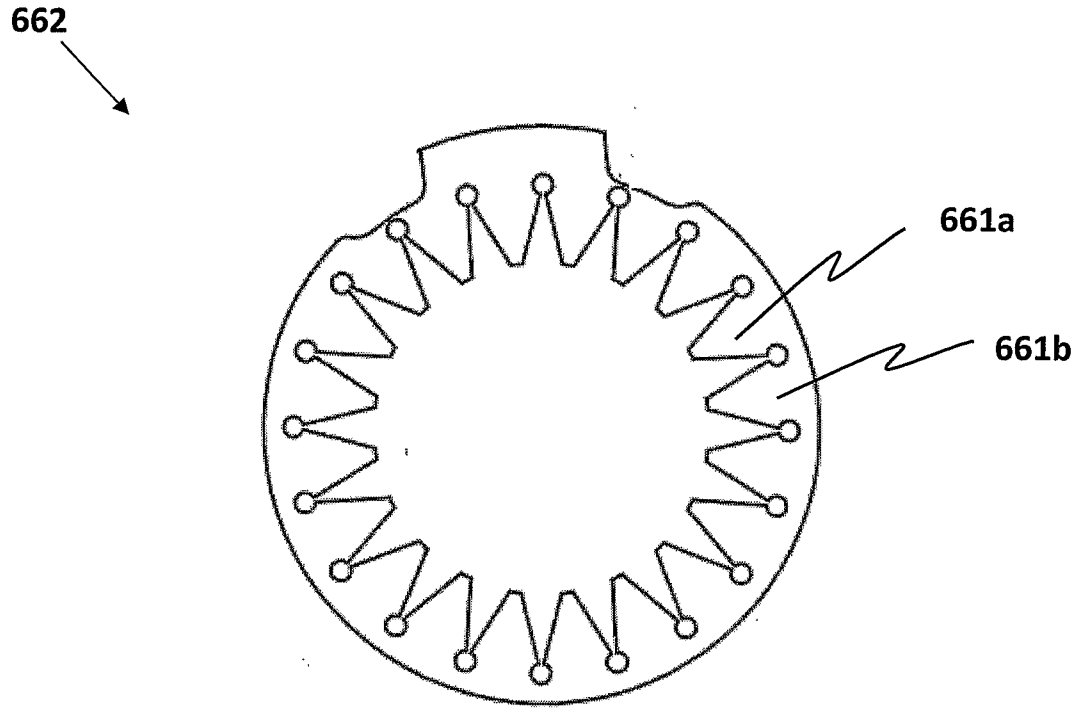

Figure 6D

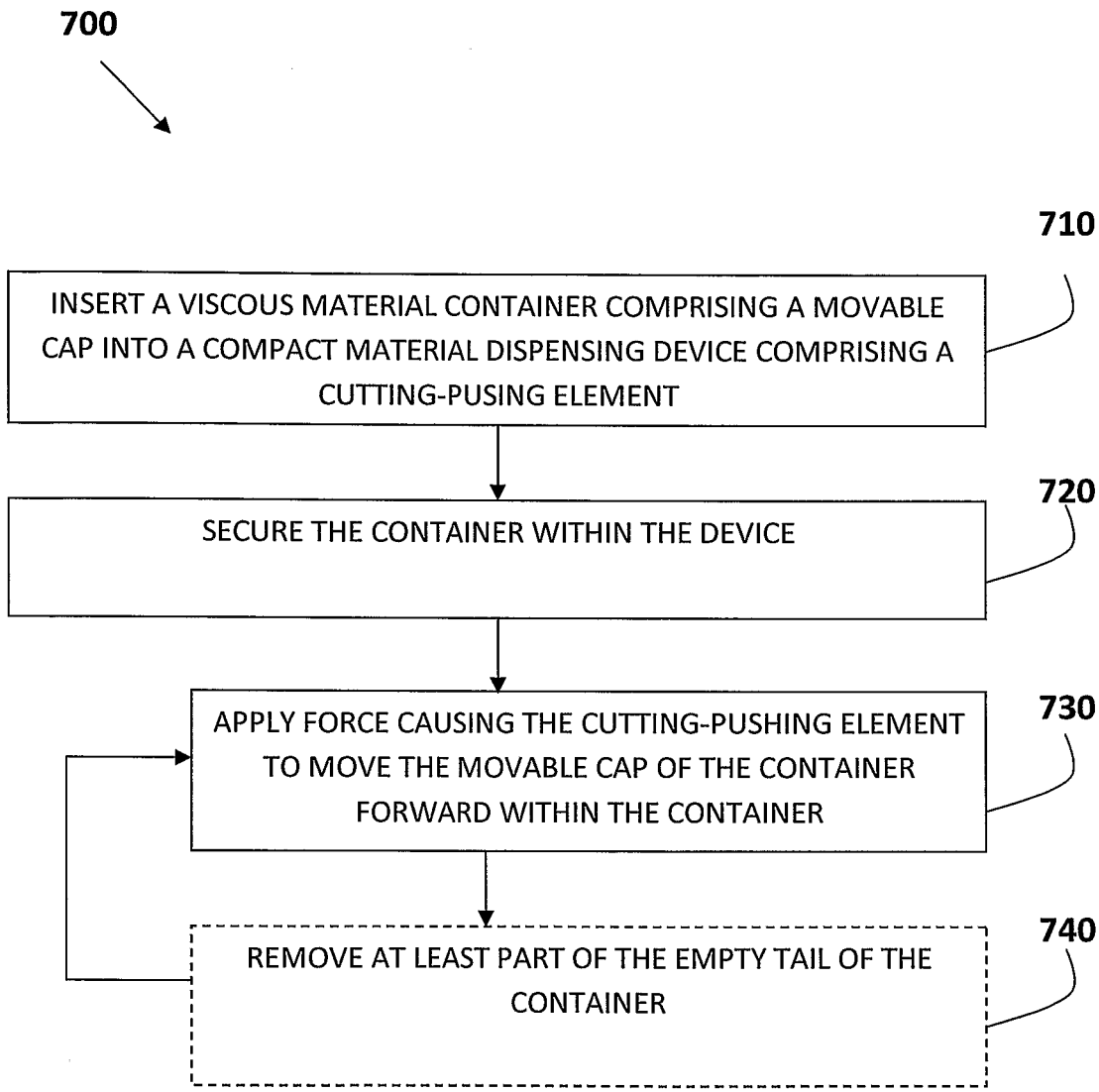
700
710
INSERT A VISCOUS MATERIAL CONTAINER COMPRISING A MOVABLE CAP INTO A COMPACT MATERIAL DISPENSING DEVICE COMPRISING A CUTTING-PUSING ELEMENT
720
SECURE THE CONTAINER WITHIN THE DEVICE
730
APPLY FORCE CAUSING THE CUTTING-PUSHING ELEMENT TO MOVE THE MOVABLE CAP OF THE CONTAINER FORWARD WITHIN THE CONTAINER
740
REMOVE AT LEAST PART OF THE EMPTY TAIL OF THE CONTAINER

Figure 7

INTERNATIONAL SEARCH REPORT

International application No
PCT/IL2010/000323

A. CLASSIFICATION OF SUBJECT MATTER
INV. B05C17/01
ADD.

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

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	US 2008/006654 A1 (LAMPE JOHN K [US] ET AL) 10 January 2008 (2008-01-10) paragraph [0053] - paragraph [0063] paragraph [0076] - paragraph [0082] figures	1-22
X	US 2002/108971 A1 (LAFOND LUC [CA]) 15 August 2002 (2002-08-15) paragraph [0044] - paragraph [0056] figures	1-22
X	GB 2 251 462 A (HAMLYN NIGEL CAMDEN HAMLYN NIGEL CAMDEN [GB]) 8 July 1992 (1992-07-08) page 4 figures	1-22

-/--

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

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 August 2010	01/09/2010

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, Fax: (+31–70) 340–3016	Roldán Abalos, Jaime

INTERNATIONAL SEARCH REPORT

International application No
PCT/IL2010/000323

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 640 998 B1 (KERN THOMAS D [US]) 4 November 2003 (2003-11-04) paragraph [0021] - paragraph [0003] figures	1-10, 15-22
X	JP 63 185475 A (WAKAI SANGYO KK) 1 August 1988 (1988-08-01) * abstract figures	1-10, 15-22
X	US 3 606 085 A (SPILMAN IAN BUTLER) 20 September 1971 (1971-09-20) column 3, line 68 - column 4, line 36 figures	1-10, 15-22

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IL2010/000323

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2008006654 A1	10-01-2008	NONE	
US 2002108971 A1	15-08-2002	NONE	
GB 2251462 A	08-07-1992	NONE	
US 6640998 B1	04-11-2003	NONE	
JP 63185475 A	01-08-1988	JP 1812324 C JP 5018631 B	27-12-1993 12-03-1993
US 3606085 A	20-09-1971	GB 1277450 A	14-06-1972