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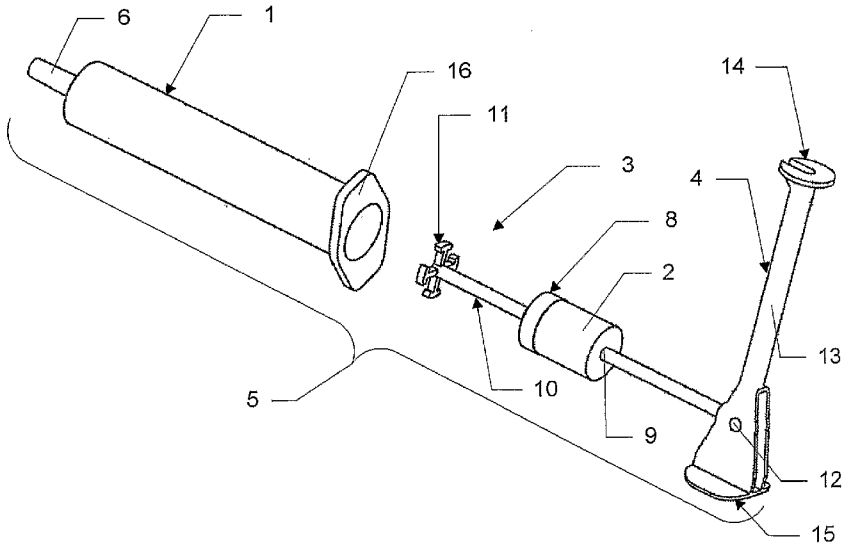
— *of inventorship (Rule 4.17(iv))*

Published:

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

(54) **Title**: SINGLE CHAMBER DEVICE FOR DRAWING IN AND DISPENSING COMPONENTS

FIG. 2



(57) **Abstract**: The single chamber device (5) for drawing in and dispensing components comprises a syringe housing (1) and a piston (2) that is actuatable by a plunger unit. This device is further provided with a mixing assembly (3) whose rod (10) is guided through the piston (2) and operatively connected to the plunger unit (4, 21, 24), the plunger unit (4) comprising a plunger rod (13) that is articulated (12) at the mixing rod (10) and provided with means that are engageable with the mixing rod. In this manner, a mixture (26) of different components, particularly also bone cement, can be both created and dispensed in a simple and inexpensive single chamber device.

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Single Chamber Device For Drawing In And Dispensing Components

The present invention relates to a single chamber device for drawing in and dispensing components according to the preamble of claim 1. Such a device is known from US-A-3 195 778 where a separate pusher that is driven by the mixing rod has to be inserted for dispensing the mixture.

In the field of medical technique, systems and devices are often required where two or more components in liquid, paste, and/or powder form, such as bone cement, for example, are blended for various applications. The components are generally stored in separate chambers or containers. Particularly in the case of sterile products, the safety with regard to hygiene and the simplicity in the preparation and application are of high importance. Therefore, manually metering, combining, and mixing the components in the open, on one hand, and a complicated handling involving multiple steps in closed systems, on the other hand, should be avoided.

On the background of this prior art, it is the object of the present invention to improve and simplify a single chamber device for drawing in and dispensing components in such a manner that different components in liquid, paste, or powder form can be brought together and mixed in order to subsequently dispense the resulting mixture by means of the same device.

This object is attained by the device according to claim 1. Further possibilities and advantages of the invention are described in the dependent claims.

The invention will be explained in more detail hereinafter with reference to drawings of exemplary embodiments.

Fig. 1 shows an exemplary embodiment of a device according to the invention in the assembled state,

Fig. 2 shows the device of Fig. 1 in an exploded view,

Fig. 3 shows the device of Fig. 1 in a longitudinal section,

Figs. 4.1 to 4.4 schematically show the device of Fig. 1 in different working positions,

Fig. 5 shows the mixing operation in the device of Fig. 1 in a sectional view,

Fig. 6 shows an embodiment variant of the device of Fig. 1.

The first exemplary embodiment of the device is described with reference to Figs. 1 to 5, in particular Fig. 2. Device 5 comprises a syringe housing 1, a piston 2, a mixing assembly 3, and a plunger unit 4. Outlet or inlet 6, respectively, hereinafter called the outlet of syringe 1 is provided with a closure 7 during transport. The dimensions of outlet 6 are standard, e.g. according to the Luer-Lok system.

Piston 2 has is provided with sealing means 8 which both seal its circumference with respect to syringe housing 1 and its passage 9 with respect to mixing rod 10. At the end on the outlet side of mixing rod 10, a mixing disk 11 is

arranged, and at its other end, plunger unit 4 is attached via an articulation 12.

In the present embodiment, at one end of plunger rod 13, plunger unit 4 is provided with a flange having a snap recess 14, snap recess 14 being dimensioned so as to catch on mixing rod 10. At the other end of plunger rod 13, a handle with a finger rest 15 is provided, the latter cooperating with retaining flange 16 on syringe housing 1 while the mixture is being dispensed. In order to prevent the piston from being pulled out of the syringe housing, a piston stop 17 is provided at the end of the housing.

In the sectional view of figure 3 it is seen that the syringe housing is partly filled with a component, e.g. a powder 18, or a component mixture, such that after the removal of closure 7, the mixing assembly 3 and thus also piston 2 may be retracted by plunger unit 4, thereby allowing a liquid to be drawn or injected into the syringe housing. The sealing means 8 on the piston prevent that the mixture may exit on the other side of the syringe housing.

Figs. 4.1 to 4.4 and 5 show different working phases in drawing in and mixing the components before they can be dispensed. Fig. 4.1 shows piston 2 with plunger unit 4 in the filled, i.e. retracted position, the plunger rod being engaged to mixing rod 10 by the flange with its snap recess 14, and fully retracted. In the position of Fig. 4.2, the plunger rod has been pivoted by 90° in order to allow the mixing rod to be displaced and rotated without acting upon the piston.

This longitudinal displacement and simultaneous rotational movement is illustrated in Fig. 4.3 and symbolized by twisted arrow 19. In Figs. 4.2 and 4.3 it is further seen

that the closure has been attached prior to this operation. In the view of Fig. 4.4, the mixing operation has been completed, the plunger rod pivoted back by 90° and snapped onto mixing rod 10 such that the latter may act upon the piston via the flange with its snap recess. Subsequently, by applying pressure to the finger rest, the plunger unit, the piston, and the mixing assembly are pushed toward the outlet in order to dispense the material. In Fig. 5, the mixing operation is again illustrated in a sectional view and symbolized by twisted arrow 19. Of course, prior to dispensing mixture 26, closure 7 is removed.

Fig. 6 shows an embodiment variant of plunger unit 4 where the handle with finger rest 15 of device 20 is arranged on mixing rod 10 and plunger unit 21 is in the form of an articulated part that is connected to the handle via a hinge 22. The function of this plunger unit 21 is the same as in the preceding example, i.e. for the mixing operation, plunger unit 21 is brought to the position of Fig. 7 and for drawing in liquid or ejecting the mixture, the plunger unit is snapped onto mixing rod 10, the plunger rod of this embodiment variant being in the form of a channel section that corresponds to mixing rod 10.

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Claims

1. Single chamber device for drawing in and dispensing components, comprising a syringe housing (1) and a piston (2) that is actuatable by a plunger unit, the single chamber device (5, 20, 23) comprising a mixing assembly (3) whose rod (10) is guided through the piston (2) and operatively connected to the plunger unit (4, 21, 24), characterized in that the plunger unit (4) comprises a plunger rod (13) that is articulated (12) at the mixing rod (10) and provided with means that are engageable with the mixing rod.

2. Device according to claim 1, characterized in that the plunger rod (13) is provided at one end with a flange having a recess (14) that corresponds to the mixing rod and is engageable to the mixing rod.

3. Device according to claim 2, characterized in that a handle with a finger rest (15) is provided at the other end of the plunger rod (13).

4. Device according to claim 1, characterized in that the plunger unit (21) is connected to the mixing rod (10) by a hinge (22) and shaped so as to catch on the mixing rod, and a handle with a finger rest (15) is provided on the mixing rod (10).

5. Device according to any one of claims 1 to 4, characterized in that the piston (2) arranged in the syringe housing (1) is provided with sealing means (8) which both seal its circumference with respect to the syringe housing and its passage (9) with respect to the mixing rod (10).

6. Device according to any one of claims 1 to 5, characterized in that the mixing assembly (3) has a mixing

disk (11) that is arranged at the end on the outlet side of the mixing rod (10).

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FIG. 1

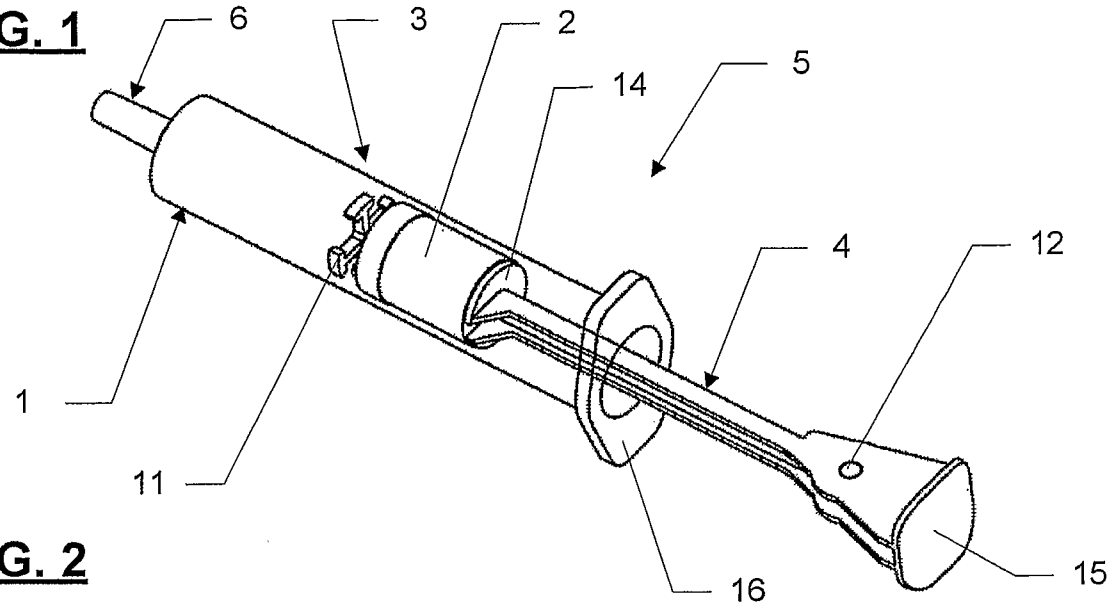


FIG. 2

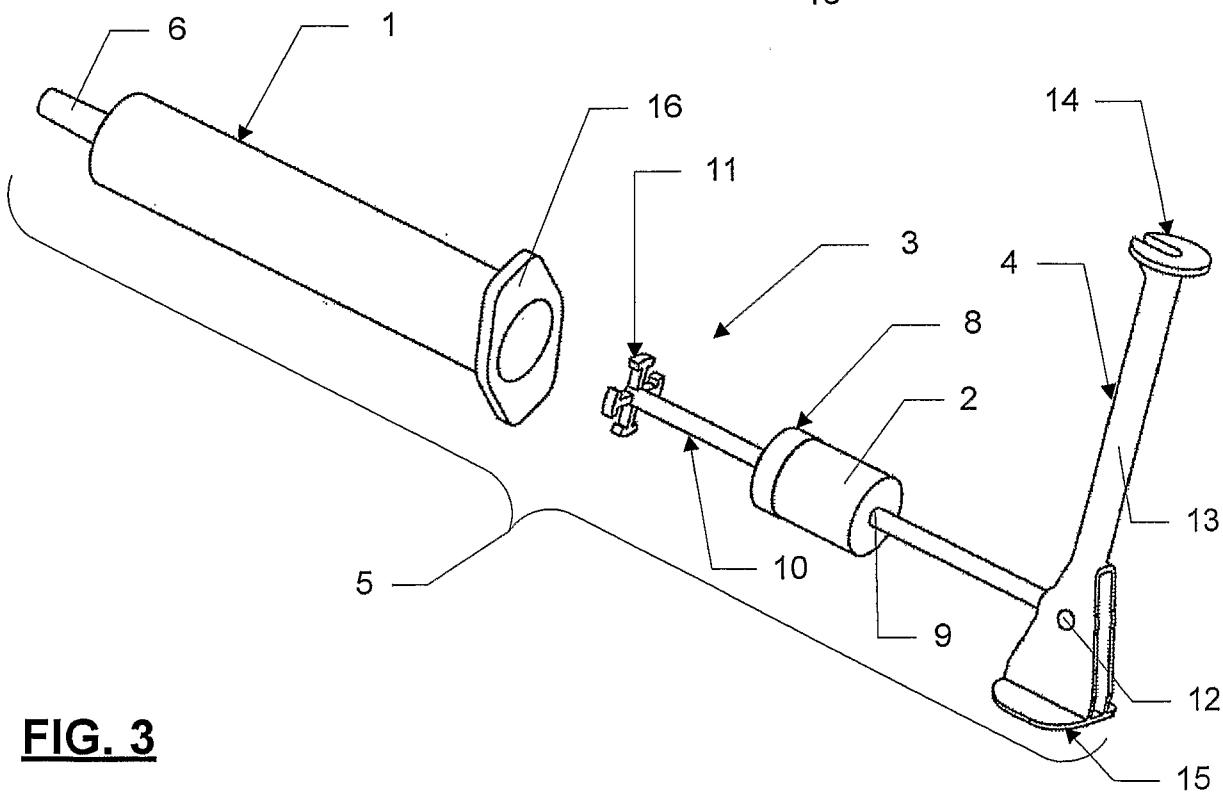


FIG. 3

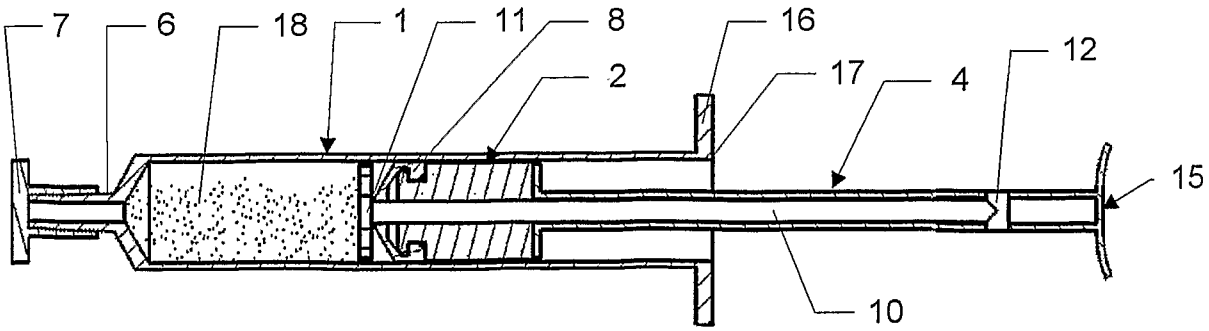


FIG. 4.1

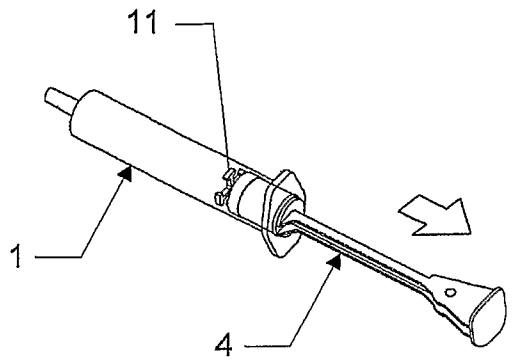


FIG. 4.2

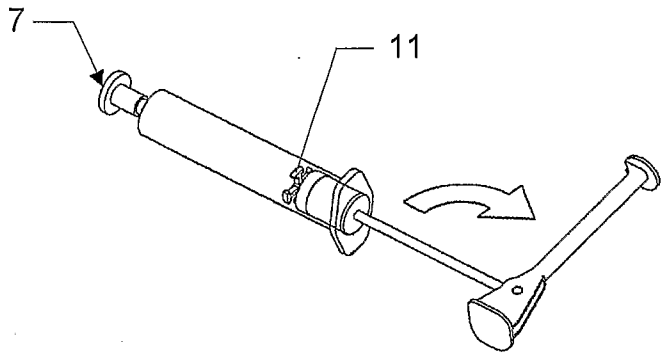


FIG. 4.3

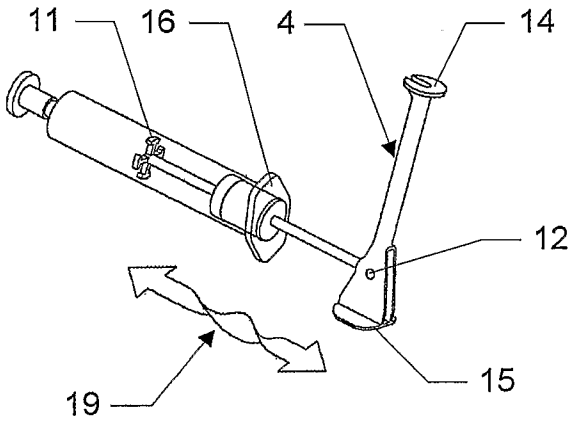


FIG. 4.4

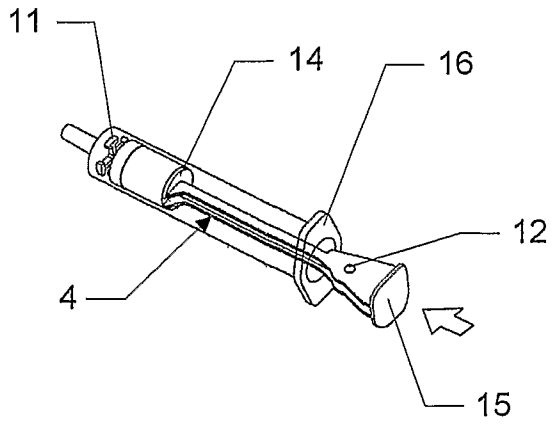


FIG. 5

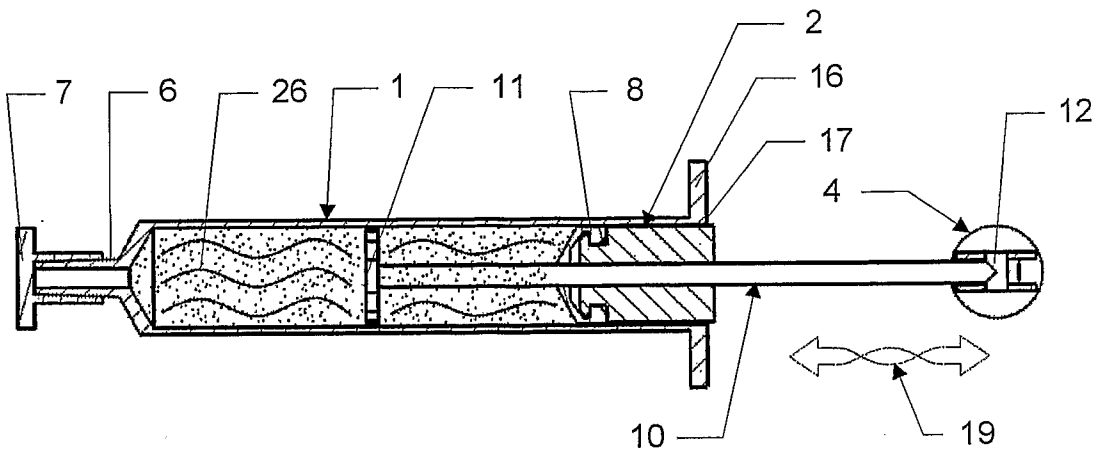
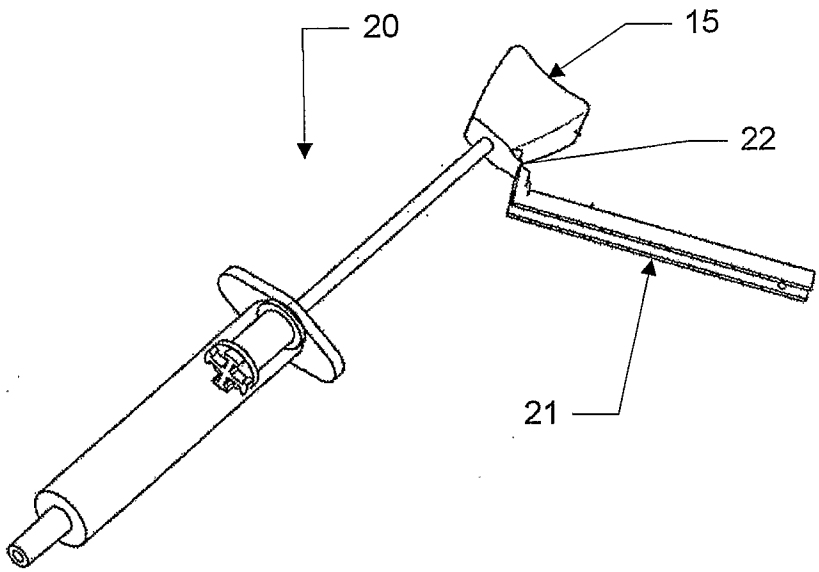


FIG. 6



INTERNATIONAL SEARCH REPORT

International application No
PCT/CH2009/000070

A. CLASSIFICATION OF SUBJECT MATTER
INV. B01F13/00 B05C17/005

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 B01F A61M

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.
A	US 3 195 778 A (EDWIN COATES J) 20 July 1965 (1965-07-20) the whole document	1-6

☐ 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
26 May 2009	05/06/2009

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/CH2009/000070

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3195778 A	20-07-1965	NONE	