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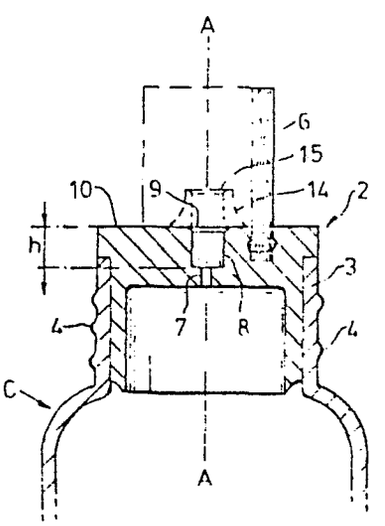
(54) A container and closure cap for said container.

(57) A container for dispensing flowable material through a metering orifice (7), and which orifice discharges into a duct (8), and a closure cap (1) for the container and which cap (1) presents an internal pin (12) arranged to enter into the duct (8) to terminate discharge of material from the orifice (7) without touching the orifice (7). To prevent flowable material from lodging between the pin and the duct, thus adversely affecting the closure, the duct (8), and the pin (12), have cylindrical configurations so that the pin (12) slides piston-like into the duct (8).



-FIG.2-

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A container and closure cap for said container.

The present invention relates to a container and a closure cap for said container and wherein container contents are dispensed through a metering orifice and said cap includes a pin which, when the cap is mounted in a closure condition, prevents discharge of container contents through said metering orifice.

Containers for flowable materials, such as liquids, pastes, gels and powders, arranged to dispense such materials through a metering orifice to obtain controlled discharge of the container contents are well known in the art.

It is also known to provide such a container with a cap which presents a pin engageable in the metering orifice to close the container when the cap is in a closure condition.

A serious disadvantage with such container and cap combinations is that, after a number of cap closures, wear between the pin and the metering orifice enlarge the metering orifice whereby said orifice no longer affords the desired controlled discharge and such enlargement of the orifice with wear on the pin renders the closure defective.

To overcome this problem the Swiss Patent No. 426565 proposes a container structure in which the metering orifice discharges into an elongate conical chamber which increases in cross section towards that

end remote from the metering orifice and the cap presents a conical pin the taper of which is identical with the taper of the conical chamber. In a closure condition, the conical pin is entered into the conical chamber to prevent material flow from said chamber, and thereby from the metering orifice, without the pin contacting the metering orifice.

The container and cap combination proposed by Swiss Patent No. 426565 suffers from an inherent defect in that, as the conical pin is entering into the conical chamber to effect a closure, container contents in the chamber can be trapped between the tapered side of the pin and the tapered wall of the chamber, and as the pin advances into the chamber, the escape route for such trapped material is progressively lengthened and reduced in cross section. Whilst some low viscosity liquids can escape to permit full closure without undue axial pressure on the assembly such full closure cannot be obtained with liquids of higher viscosity or solids materials in powder or granular form.

The invention as claimed is intended to provide a simple design for a container closure and by which closure of the container metering orifice can be effected for most low pressure flowable materials without excessive loadings on the closure and without the danger of container contents being adversely trapped between closure surfaces of the assembly.

The advantages offered by the invention are mainly that a pin presented by a closure cap has a generally cylindrical form, a duct into which the metering orifice discharges has a cylindrical form, and closure is effected by the cylindrical pin sliding piston-like into the cylindrical duct so that container contents in said duct are pushed ahead of the pin and, when substantial, back through the

metering orifice.

Two specific embodiments for practising the invention are described in detail below with reference to drawings in which:-

Figure 1 is an axial cross section through one form of closure cap according to the invention, and

Figure 2 is an axial cross-section through a container neck assembly showing alternative duct arrangements for the discharge of container contents.

The figures show in full line a first embodiment closure arrangement for a container C and, in broken line, a second closure arrangement for said container C.

Referring now to the first embodiment a closure for a container (C) comprises a closure cap 1 and a closure body 2, frictionally secured in the neck part 3 of container C. The closure cap 1 and closure body 2 may conveniently be made of a semi-rigid plastics material by moulding processes.

The neck part 3 has an external thread 4 co-operable with an internal thread 5 formed in the closure cap 1.

The closure body 2 conveniently includes an applicator, illustrated as bundles of fibres 6 surrounding the discharge outlet from the container C.

The closure body 2 includes a metering orifice 7, in open communication with the interior of container C, and orifice 7 opens into a cylindrical duct 8 of larger cross sectional area than said orifice 7. The container C, closure body 2, and, the closure cap 1 when in a closure condition, are, with the exception of threads 4 and 5 and bundles of fibres 6, concentric about a common axis A:A so that, as illustrated, metering orifice 7 and duct 8 are co-axial. The open end of duct 8 (remote from orifice 7) has a chamfered

or lead-in edge 9 and said end opens at an external face 10 of closure body 2. The metering orifice 7 and/or duct 8, may be formed in body 2 at moulding or subsequent thereto.

The closure cap 1 presents an axial pin 12 of such diameter as to slidably engage in duct 8 with minimal clearance and the free end of pin 12 is preferably hemispherical, as illustrated, to facilitate entry of said end into duct 8.

The closure cap 1 further includes an internal shoulder 13 intended to define an annular abutment surface which, when engaged with face 10 of the closure body 2 limits the axial advance of the closure cap 1 on the container neck 3. The shoulder 13 lies in a plane P at right angles to axis A:A and the free end of pin 12 passes through plane P by axial length L which is slightly less than the axial length h of the duct 8.

In practice, container contents are discharged by removing closure cap 1 and tipping or flexing the container to cause the container contents to discharge through metering orifice 7 and duct 8 from which the container contents may be spread or smeared by fibres 6.

To close the container the closure cap 1 is mounted on the neck 3, the threads 4 and 5 are engaged and, by rotation of cap 1 relative to container (C) the cap is axially advanced onto the neck 3. With the threads 4 and 5 intially engaged the pin 12 of cap 1 is axially located for entry into duct 8 and, as the axial displacement of cap 1 onto neck 3 progresses, the pin 12 enters duct 8 and axially advances thereinto. As pin 12 is a sliding fit with minimum clearance, in duct 8 the pin 12 acts in the manner of a piston and pushes container contents in duct 8 ahead of its free end and back towards metering orifice 7.

The advance of pin 12 into duct 8 continues with axial advance of closure cap 1 onto neck 3 until the abutment surface 13 of cap 1 engages the face 10 of closure body 2 to define the closure condition for cap 1 and, as axial length L is less than axial length h, the displacement of pin 12 along duct 8 is arrested before the free end of pin 12 engages the bottom of duct 8 and therefore does not contact metering orifice 7.

Thus, when the closure cap 1 is in its closure condition, a relatively small volume exists in duct 8 between the free end of pin 12 and the bottom of duct 8, as stated hereinbefore, container contents remaining in duct 8 when said duct is initially closed by pin 12 will be pushed ahead of the pin 12 as pin 12 advances into duct 8 and, if the volume of container contents in duct 8 exceeds the volume in duct 8 with the pin fully advanced, the excessive volume readily flows back into the container through the metering orifice 7 so container contents in duct 8 do not unduly obstruct the advance of pin 12 along duct 8 or generates unacceptable resistance to closure.

In the second embodiment, shown in broken line in Fig. 2, the bundles of bristles 6 are omitted and an annular wall 14 outstanding from surface 10 extends the axial length of duct 8 away from metering orifice 7 so that, all other parts and dimensions being the same as for the first embodiment, the closure operates in identical manner to the first embodiment with the exception that the pin 12 enters the duct 8 earlier in the advance of closure cap 1 onto neck 3 and the axial length of pin 12 engaged in duct 8 when the cap is in its closure condition is greater. Such an embodiment is well suited to a so-called "dropper" type dispensing container.

As illustrated in Fig. 2 the internal edge of annular wall 14 may be chamfered, as at 15, to

assist entry of pin 14 into duct 8.

It will be appreciated that in both the above described embodiments an effective closure of the container, which may be fluid tight when the fit of pin 12 in duct 8 is so designed, is obtained without container contents adversely affecting the fit between pin 12 and duct 8 and without creating unacceptable stresses in the closure parts. Further however, the closure proposed by the invention has the further advantage that all container contents within duct 8 when the pin 12 first closes the entry to duct 8 are prevented from passing the free end of pin 12 so that no leakage of container contents occurs during closure, an important feature when the container contents are high-priced materials.

Claims.

1. In combination, a container (C) and a closure cap (1) for said container (C), and wherein container contents are dispensed through a metering orifice (7) and said closure cap (1) includes a pin (12) which, when the closure cap (1) is in a closure condition, prevents discharge of container contents from said metering orifice (7) characterised in that the metering orifice (7) discharges into a cylindrical duct (8.14) of greater cross sectional area than said orifice (7) and said pin (12) has a cylindrical form and enters said duct (8.14), when the closure cap is in a closure condition, to prevent the dispensing of container contents from said duct (8.14) and thereby from said metering orifice (7).

2. A combination as claimed in claim 1 in which the metering orifice (7) and the duct (8.14) are both concentric with the major axis of the container (C).

3. A combination as claimed in claim 1 or 2 in which the closure cap (1) engages an abutment surface (10) to define a closure condition for said cap (1) on the container (C) and in said closure condition the pin (12) is spaced from said metering orifice (7).

4. A combination as claimed in claim 1, 2 or 3 in which the container (C) includes a neck part (3), the neck part (3) is closed by a closure (2) and said metering orifice (7) and duct (8.14) are formed in said closure (2).

5. A combination as claimed in claim 1, 2, 3 or 4 in which the closure cap is a screw cap and engages with a thread on the container before the pin (12) enters the duct (8).

6. A combination as claimed in claim 1, 2, 3, 4 or 5 including an applicator device located to receive container contents dispensed from the duct (8).

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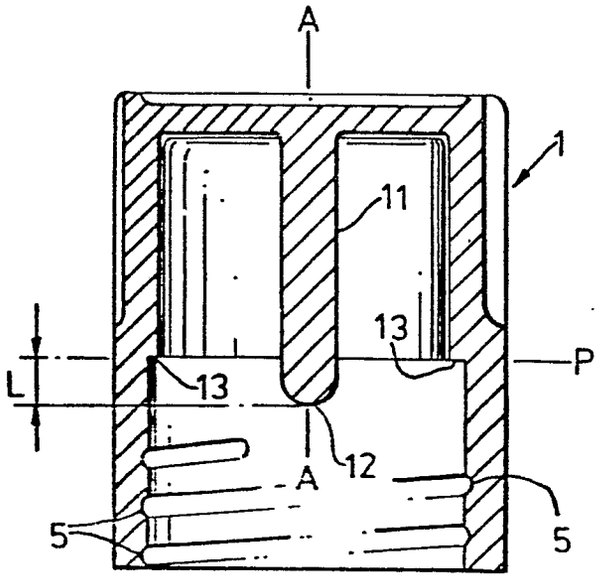
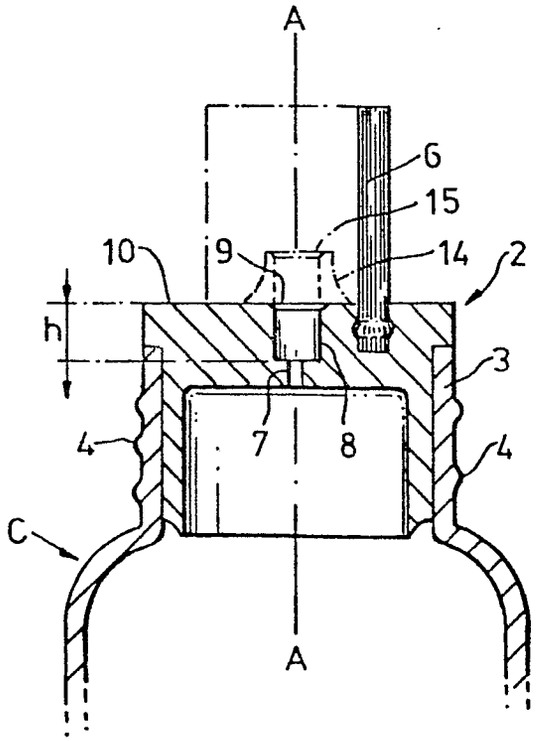


-FIG.1-



-FIG.2-

European Patent Office

EUROPEAN SEARCH REPORT

0009926

Application number
EP 79 30 2000

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
D	CH - A - 426 565 (GONNET & CIE.) * In its entirety * --	1-4,6
A	GB - A - 1 059 574 (FLEXILE METAL COMPANY LTD.) * Page 3, line 78 - page 4, line 36; figure 1 * ----	1,2,6

CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)

B 65 D 47/42

TECHNICAL FIELDS SEARCHED (Int.Cl. ³)

B 65 D
A 47 L
A 45 D

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	12-11-1979	MARTENS