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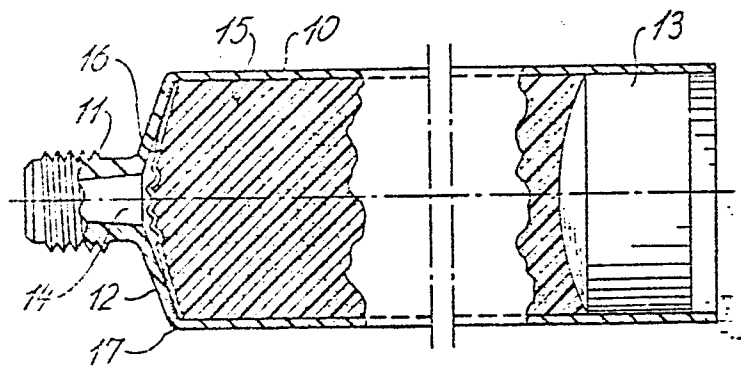
(54) A container for containing liquid substances and a method for making the same.

(57) The container of the invention is adapted to contain a liquid or viscous substance (15) such as a sealing compound or an adhesive in an air tightly sealed condition. The container comprises a rigid or stiff peripheral wall (10) which is closed at one end by means of a distendable membrane (16) the outer surface of which is exposed to ambient atmospheric pressure. In a preferred embodiment the container is shaped as a cylindrical cartridge which is closed at the other end by means of an ejection piston (13). The distendable membrane may be made from a stretchable sheet material which is fastened to the cylindrical container body in a tight condition, whereafter the sheet material is permanently stretched by filling a heated substance into the container and exposing said substance to a compressive force.

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Fig. 1.



A container for containing liquid substances
and a method for making the same

The present invention relates to a container or package for containing liquid substances, especially viscous substances, in a hermetically sealed condition, and comprising a substantially rigid or stiff peripheral wall.

5 Such containers or packages containing liquid or viscous substances are often stored for a long period of time under greatly varying temperature conditions before the content of the container is used.

As the thermal coefficients of expansion of the container
10 and its content, respectively, are normally different a partial vacuum may be generated in containers or packages of the type in question. When sealing compounds, adhesives, and other similar viscous masses or substances are packed in containers or packages of this known type the more fluid
15 components, such as solvents, have a disadvantageous tendency to separate during storage of containers or packages containing such viscous substances or masses.

It has been found that this tendency to separation of fluid components is substantially reduced by using the container
20 according to the invention which is characterized in that the peripheral wall is air-tightly closed at one end thereof by a distendable membrane or wall part. This advantage is presumably due to the fact that even during storage with greatly varying temperature conditions the content of a
25 container according to the invention is not exposed to

pressure conditions differing substantially from the ambient atmospheric pressure because the distendable membrane or wall part will function as a kind of thermal expansion and contraction compensator. The said membrane or wall part may possibly be protected against mechanical stresses, for example by means of a lid-shaped rigid end wall. However, in this case the said end wall must be provided with one or more greater or smaller air passages securing that the outer surface of the distendable membrane or wall part is always exposed to the ambient atmospheric pressure. If desired, the distendable membrane or wall part may be sealed to the lid-shaped end wall along its periphery, and when the content has been filled into the container or package the distendable membrane or wall part may be fastened thereto together with and possibly also by means of the lid-shaped end wall. Alternatively, the rim portion of the membrane or wall part may be wedged or clamped between the container and the lid-shaped end wall without being united with the latter. In any case, the lid-shaped end wall may have a form so that the distendable membrane or wall part may freely move so as to compensate for variations of the volume of the substance or mass contained in the container.

Thus, the container or package according to the invention may, for example, have the form of a bucket or pot provided with a lid. The invention may, however, with special advantage be used in connection with a cylindrical container or cartridge for containing a sealing compound, an adhesive, or other viscous masses or substances, and of the type being closed at one of its ends by means of an ejection piston displaceable within the cylinder. When the content of such a container or cartridge is to be used the cartridge is normally placed in a so-called ejection pistol which comprises a plunger to cooperate with the ejection piston of the cartridge, and which may be operated manually or by means of pressurized air so that the viscous substance, for example a sealing compound, is discharged through a spout

or nozzle.

Containers or cartridges of the said type provided with an integrally formed spout the free end of which is closed, but adapted to be cut off immediately before the content
5 of the cartridge is to be discharged, are known. It is also known to provide cartridges with a discharge opening defined by a threaded pipe stub on which a discharge spout or nozzle may be fastened. In that case the discharge opening of the cartridge or container may be closed by a
10 perforatable wall which is stretched tightly across said tube stub and which may be perforated by means of a pointed tool immediately before the content of the cartridge is to be discharged or ejected.

In practice containers or cartridges with a content of a
15 viscous substance is often stored for a long period of time before use, under greatly varying temperature conditions as mentioned above. As the thermal expansion coefficients of the container or cartridge and its content, respectively, are normally different, the varying storing temperatures
20 cause that the ejection piston is displaced backwards and forwards in the cylinder-shaped container or cartridge. It has been found, however, that a temperature caused reduction of the content of the container or cartridge is often partly or totally compensated for by suction of air from
25 the ambient atmosphere through the space between the inner wall of the container and the outer wall of the cylindrical skirt of the ejection piston into the inner space of the cylindrical container or cartridge. Such suction of air into the container or cartridge may be rather disadvantage-
30 ous, partly because the air reacts with the content of the container in an undesired manner, and partly because air bubbles included in the viscous substance in the container or cartridge may cause an undesired splashing or spattering of the substance when it is later discharged or ejected
35 from the container or cartridge.

According to another aspect of the invention the said peripheral wall may have the shape of a circular cylinder which at its other end opposite to said distendable membrane or wall part is adapted to be closed by an ejection piston displaceable in said cylinder. The container
5 according to the invention may then be used as a cartridge of the type described above. In that case the distendable membrane or wall part will not only hermetically close or seal said other end of the cylinder, but due to its distendability it may also serve as a thermal expansion
10 compensator, because without exerting any substantial resistance it may be distended more or less dependent on the actual temperature of the mass or substance contained in the cylinder. Consequently, the ejection piston may
15 remain stationary in relation to the cylinder, and undesired suction of air into the cylinder may be avoided. Furthermore, the tendency of solvents and other fluid components to separate from the remaining content of the cylinder or cartridge is reduced as explained above.

20 The container or package may at said one end comprise an end wall defining a discharge opening therein, and according to the invention the distendable membrane or wall part may then be arranged within the container so as to cut off communication between said discharge opening and the
25 inner space of the container. A distendable membrane or wall part will then be arranged well protected within the cylinder.

When the inner surface of said end wall has a concave shape, the edge portion of said distendable membrane or
30 wall part may, according to the invention, be sealingly fastened to the inner surface of said end wall, preferably along the transition to said peripheral wall, and adapted to engage with and be supported by said end wall in its fully or partly distended condition. By this embodiment it

is obtained that the distendable membrane or wall part may be made from a relatively weak or thin-walled material because when distended it is supported by the adjacent, much more heavy concave end wall. When the viscous substance is
5 filled into the container in a hot condition and at a temperature substantially above the maximum temperature to which the container or package may be exposed during storage, the membrane or wall part may be distended and caused to engage with the end wall of the cylinder during
10 the filling operation whereby the membrane is supported and a complete utilization of the space of the cylinder is obtainable. When the viscous substance is later cooled, the membrane or wall part may move away from the cylinder end wall to an extent corresponding to the thermal contraction
15 of the viscous substance or mass.

The distendable membrane or wall part may be of any suitable material, for example an elastic rubber or plastic material which may be stretched without offering any substantial resistance when the temperature of the container content is
20 increased. It is preferred, however, to produce the membrane or wall part of a substantially inelastic material of a type permitting heat sealing or gluing of the rim portion of the membrane or wall part to the container. When the said membrane or wall part is of a substantially
25 inelastic material it is preferably provided with folds or pleatings in its non-distended condition, whereby collapsing of the distendable membrane or wall part is facilitated when the volume of the liquid or viscous substance
contained in the container is reduced due to thermal contraction.
30

The distendable membrane or wall part is preferably made from a thin sheet material which is impervious to air and which may easily be heat sealed to the container wall. Therefore, according to the invention the said membrane or

wall part is preferably made from a metal foil such as an aluminum foil, coated by a layer of heat sealable plastic material, such as a plastic film or a heat sealable lacquer.

5 The present invention also provides a method of making a cylinder-shaped container or cartridge of the above type, and the method according to the invention is characterized in closing one end of a cylindrical tube length or section by positioning a thin stretchable sheet material, such as a film or a foil across said one end and sealing it to the surface of said tube length, filling the liquid substance to be packed into the tube length through the open other end thereof and exposing said substance to a compressive force so as to stretch said sheet material permanently. The sheet material may then be fastened to the tube length in a tight condition whereby the fastening process is facilitated, and the distendable membrane or wall part is then provided by the later stretching process.

20 The liquid substance is preferably filled into the tube length in a heated condition. Thereby the filling process is facilitated, and provided that the temperature of the heated mass or substance exceeds the maximum temperature to which said substance is expected to be exposed during the later storage, the membrane or wall part will never be distended to the same extent during storage as during filling of the container. On the contrary it may be expected that the mass or substance is contracted so that the membrane or wall part will become more slack. Because the sheet material has been stretched permanently during the filling process and thereby obtained a certain over-size, it will be able to compensate even for the reductions of volume occurring at extremely low temperatures.

35 The said compressive force may be applied to the liquid or viscous mass filled into the tube length by any suitable means. The said compressive force may, however, advantageously be applied by means of an ejection piston which is

inserted into the open end of the tube length or section.

As mentioned above the membrane or wall part may be fastened to said one end of the cylindrical tube length in any suitable manner, for example by gluing or heat sealing
5 depending on the materials from which the tube length and the membrane or wall part are made. The sheet material being used for making the distendable membrane or wall part may, for example, be a laminate of a metal foil, such as an aluminium foil, and a plastic film, such as a poly-
10 ethylene film. The plastic film may be used as the inner layer, and the sheet material may then be heat sealed to the cylindrical tube length which may also be made from plastic material. The purpose of the plastic film is to make the membrane or wall part impervious to vapour and
15 solvents.

The invention will now be further explained with reference to the drawings illustrating various embodiments of the method and container according to the invention, and
20 wherein

Fig. 1 is a side view and partially sectional view of a container or cartridge according to the invention filled with a viscous mass and comprising a membrane shown in a substantially distended condition,

25 Fig. 2 is a view similar to that in Fig. 1, but with the membrane in a non-distended condition,

Fig. 3 is a side view and partially sectional view of a second embodiment of the container or cartridge according to the invention,

30 Fig. 4 is the same as Fig. 3, but with the membrane in another position,

Figs. 5 to 7 illustrate various steps of a method for making a third embodiment of a cylindrical container or cartridge provided with an ejection piston,

35 Fig. 8 is a side view and partial sectional view of a cylindrical container or cartridge made by the method

illustrated in Figs. 5 to 7 and being provided with an end wall having a discharge spout,

Fig. 9 is a side view and partial sectional view of the container or cartridge and the end wall shown in Fig. 8

5 arranged in a conventional, manually operatable ejection pistol, and

Fig. 10 is a side view and partially sectional view of a modified embodiment of the container or cartridge shown in Fig. 8 and 9 placed in an ejection pistol which may be
10 actuated by means of pressurized air.

Figs. 1 to 4 show a cylindrical container or cartridge 10 having an end wall 12 provided with a threaded tube stub 11. The other end of the cartridge or cylinder 10 is
15 closed by an ejection piston 13 which is displaceable in the cylinder. The threaded tube stub 11 defines a discharge passage 14 therein. The passage 14 is separated from the inner space of the cylinder 10 which contains a viscous substance or mass 15, by means of a distendable wall part
20 or membrane 16.

In the embodiment shown in Figs. 1 and 2 the rim portion of the membrane 16 is sealingly fastened to the end wall 12 along a transitional zone 17 between said end wall and
25 the cylindrical wall of the cartridge or container 10. The membrane 16 has such a size that it may be brought into engagement with the concave inner surface of the end wall 12 as shown in Fig. 1. The membrane 16 may, for example, be in this position immediately after the filling process
30 by which the viscous mass 15 has been filled into the cartridge or container 10, preferably in a heated condition. When the mass or substance 15 is cooled so that the volume thereof is reduced the piston 13 may remain in the position shown in Fig. 1 in relation to the cylinder
35 because the reduction of the volume is compensated for by the distendable membrane 16 which is moved a suitable

distance towards the piston 13 as indicated in Fig. 2. In this manner the membrane 16 may serve as a thermal volume change compensator as well as for hermetically sealing the inner space of the cylinder or cartridge 10.

5
When the content of the cartridge 10 is to be used it is placed in an ejection pistol of a type as that shown in Fig. 9 or 10 and comprising a plunger by means of which an inwardly directed pressure may be applied to the piston 10
13 of the cartridge 10. Thereafter, the membrane or wall part 16 is perforated by means of a suitable, pointed tool or instrument and a kind of discharge spout, not shown, may be mounted on the threaded tube stub 11. The viscous substance or mass 15 may now be ejected or discharged at
15 the place of use in a manner known per se.

The embodiment shown in Figs. 3 and 4 corresponds to that shown in Figs. 1 and 2 apart from the fact that in Fig. 3 and 4 the rim portion of the membrane 16 is fastened to the
20 inner surface of the end wall 12 immediately adjacent to the discharge passage 14, and the distendable membrane or wall part 16 has a folded or pleated shape. Also in this embodiment the membrane may serve as a thermal volume change compensator as illustrated in Fig. 3 and 4 so that displacement of the piston 13 in relation to the cylinder is
25 avoided even when the cartridge or container 10 is stored under varying temperature conditions. Consequently, suction of air through the space between the piston and the cylinder wall and into the inner of the cylinder is avoided.

30
The cylinder 10 and the piston 13 may be of any suitable material, but they are preferably made by ejection moulded plastic material. In principle, the membrane or wall part 16 may be made as an integral part of the container or
35 cartridge 10. However, in order to facilitate production it is preferred to make the membrane 16 and the cylinder

10 separately and the membrane may then be fastened to the cylinder by heat sealing, gluing, or in any other suitable manner. The membrane or wall part 16 is preferably a laminate of metal foil, preferably aluminium foil, and a heat sealable plastic material, such as polyethylene. Such a laminate is impervious to vapour, gases, and liquid solvents and may be heat sealed to the cylinder or container 10.

Figs. 7 to 10 show other embodiments of a cylinder-shaped container or cartridge 10 made from a relatively stiff or rigid cylindrical tube length 18, one end of which is closed by means of an ejection piston 19 which may, for example, be of the type which is described in Danish patent application No. 1149/78 and which cooperates with a separate piston engaging member 20. At its other end the tube length 18 is closed by means of a distendable membrane or end wall 21 the rim portion of which is sealingly fastened to the adjacent part of the outer surface of the tube length 18. The end wall or membrane 21 may be of the same type as the membrane 16 previously described, and the membrane 21 may be fastened to the tube length 18 in any of the manners described above in connection with the membrane 16. In its mounted condition the end wall or membrane 21 has a certain oversize, which means that its area exceeds the cross sectional area of the tube length 18. The end wall or membrane may, alternatively, be of a highly elastic material. As indicated by broken lines in Fig. 8 the membrane or end wall 21 may be moved to such an extent that it may compensate for thermal changes of volume of a viscous substance or mass 15 contained in the container or cartridge 10 so that at any time the substance or mass will be subjected to a pressure corresponding substantially to the ambient atmospheric pressure whereby the advantages previously described may be obtained.

The substance or mass 15 contained in the cartridge 10 may, for example, be a sealing compound, an adhesive, or a similar viscous mass. When the content of the cartridge or container shown in Fig. 8 is to be used, the cartridge
5 may be placed in a conventional ejection pistol as that shown in Fig. 9 and generally designated by 22. Immediately before the container or cartridge 10 is placed in the pistol 22 a discharge spout 23 having a socket 24 is mounted on the end of the cartridge which is closed by the
10 membrane or end wall 21. A cutting edge 25 forming an extension of the wall of the spout 23 extends axially from the inner surface of the socket 24, and a pair of concentric, annular sealing ridges 26 surround the cutting edge 25 as best shown in Fig. 8. When the trigger 27 on the pistol 22
15 is operated in the usual manner the piston 19 of the cartridge 10 is pressed inwardly by means of a plunger 28 of the pistol 22. Thereby the membrane or end wall 21 of the cartridge 10 is caused to move outwardly, and the cartridge 10 will be pressed tightly against the inner
20 surface of the socket 24. As a result, the cutting edge 25 will make a curved cut in the membrane 21 whereby communication is established between the inner space of the cartridge 10 and the passage of the spout 23. At the same time the membrane 21 is pressed tightly against the
25 sealing ridges 26 (Fig. 9) so that the content of the cartridge is prevented from penetrating between the end wall or membrane 21 and the inner surface of the socket 24.

In the embodiment shown in Fig. 10 the outer surface of the
30 cylindrical tube length 18 is provided with locking projections or cams 29 and 30, respectively, at both ends. The socket 24 of the discharge spout 23 is provided with corresponding inner cam surfaces 31 by means of which the spout 23 may be fastened to one end of the cartridge 10 as
35 shown in Fig. 10. When the socket 24 is mounted on the cartridge the cutting edge 25 will perforate the membrane

or end wall 21 as described above. By means of the locking
cams 30 the other end portion of the cartridge 10 may be
fastened to a conventional ejection pistol generally
designated by 32 and being of the type operated by
5 pressurized air. When the trigger 33 of the pistol 32 is
operated the piston 19 of the container or cartridge 10
will be pressed inwardly by means of pressurized air so
that the viscous substance 15 is ejected from the cartridge
through the discharge spout 23 as described above.

10

In conventional sealing compound cartridges of the type
described the discharge spout forms an integrating part of
the cylindrical wall of the cartridge or container, and
therefore these conventional cartridges must be produced
15 by ejection moulding for which reason they are relatively
expensive. In the embodiments of the container according to
the invention shown in Figs. 7 to 10 the tube length may
be cut from a tube of a longer length which may be produced
in a substantially cheaper way, for example by extrusion.

20

The tube length 18 may be made from plastic or metal, such
as aluminium, or it may be made from a laminate of plastic
material and metal, for example an extruded plastic tube
being outwardly coated by an aluminium foil in order to
make it impervious to gases, vapours, and liquid solvents.

25

As shown in Fig. 7, the membrane or end wall 21 may
similarly consist of a laminate formed by an inner plastic
film, such as polyethylene, and an outer metal foil, such
as aluminium. It may, however, involve certain technical
difficulties to fasten the membrane or end wall 21 to the
30 tube length 18 so that a hermetical seal is obtained
because, as mentioned above, the membrane must have a certain
oversize and must consequently be in a folded or pleated
condition when fastened.

35

However, according to the invention a method has been pro-
vided by means of which a container or cartridge as that

described above may be produced in a much more simple manner. This new method is illustrated in Figs. 5 to 7. As shown in Fig. 5 a stretchable sheet material 21' which may be a laminate of films or foils or may consist of a single layer of material, is fastened to one end of a tube length 18. The sheet material 21' is fastened to the inner or outer surface of the tube length 18 in a substantially tight condition, preferably by heat sealing or gluing. The container or package manufacturer may then deliver this semi-manufactured article together with associated piston parts to the manufacturer of the viscous substance or mass 15 to be packed in the container or cartridge. The viscous substance 15 is filled into the open end of the semi-manufactured article shown in Fig. 5 in a hot condition, the said article being arranged so that the end of the tube length 18 closed by the sheet material 21' is engaging with a concave surface of a die 34 as shown in Fig. 6. The open other end of the filled tube length 18 is now closed by the piston 19 whereafter an inwardly directed force is applied to the piston 19 by means of a plunger 35 of a suitable force applying apparatus, not shown. The plunger 35 applies such a force or pressure to the piston 19 that the sheet material 21' is stretched permanently to such an extent that it is brought into engagement with the concave surface of the die 34 whereby the distendable membrane or end wall 21 is formed. The plunger 35 may now be removed and the piston engaging member 20 may be mounted on the container or cartridge which is now ready for storage or shipment. When the mass or substance 15 contained in the container or cartridge 10 is cooled the volume of the mass or substance is reduced, and the membrane or end wall 21 will then take up a folded or pleated shape as shown in Fig. 7. Provided that the maximum temperature to which the content 15 of the container 10 is exposed during storage and shipment does not exceed the temperature during the filling process, the end wall will be able to compensate

for the thermal volume changes which will occur during storage and shipment.

5 Even though the container or package according to the invention has predominantly been explained with reference to so-called cartridges for sealing compounds and similar substances, it should be understood that the invention may also be used in connection with packages and containers of other types being adapted to contain a viscous mass or
10 substance in a hermetically sealed condition. As an example, the container according to the invention may be shaped as a can having its upper end closed by means of a membrane like distendable end wall which may possibly be protected by means of a removable lid provided with one or more air
15 passages securing that the membrane like end wall is exposed to the ambient pressure.

It should also be mentioned that even though the distendable membrane or wall part is preferably made from a
20 substantially inelastic sheet material it may, alternatively, be made from an elastic material extending across the end of the cylinder 10 in its strainless condition. The membrane may then have such a resiliency that it may be stretched sufficiently to for example engage with the
25 concave inner surface of the end wall 12 shown in Figs. 1 to 4 without applying any substantial elastic force to the content 15 of the container 10.

30

35

CLAIMS

1. A container for containing liquid substances, especially viscous substances (15), in a hermetically sealed condition,
5 and comprising a substantially rigid peripheral wall (10, 18),

10 c h a r a c t e r i z e d in that the peripheral wall (10, 18) is airtightly closed at one end thereof by a distendable membrane or wall part (16, 21).

2. A container according to claim 1,
c h a r a c t e r i z e d in that said peripheral wall has the shape of a circular cylinder (10, 18) which at its other end opposite to said distendable membrane or wall
15 part (16, 21) is adapted to be closed by an ejection piston (13, 19) displaceable in said cylinder.

3. A container according to claim 1 or 2, comprising at said one end an end wall (12) defining a discharge opening (14)
20 therein,

c h a r a c t e r i z e d in that said distendable membrane or wall part (16) is arranged within the container (10) so as to cut off communication between said discharge opening (14) and the inner space of the container.

25 4. A container according to claim 3, wherein the inner surface of said end wall (12) has a concave shape,
c h a r a c t e r i z e d in that the edge portion of said distendable membrane or wall part (16) is sealingly fastened
30 to the inner surface of said end wall, preferably along the transition (17) to said peripheral wall (10), and is adapted to engage with and be supported by said end wall (12) in its fully or partly distended condition.

35 5. A container according to any of the claims 1 to 4,
c h a r a c t e r i z e d in that said distendable

membrane or wall part (16, 21) is of substantially inelastic material and is provided with folds or pleatings in its non-distended condition.

- 5 6. A container according to any of the claims 1 to 5,
c h a r a c t e r i z e d in that said membrane or wall
part (16, 21) is made from a metal foil coated by a layer
of heat sealable plastic material.
- 10 7. A method of making a cylinder-shaped container according
to any of the claims 2 to 4,
c h a r a c t e r i z e d in closing one end of a cylindrical
tube length or section (18) by positioning a thin, stretch-
able sheet material (21') across said one end and sealing
it to the surface of said tube length, filling the liquid
20 substance (15) to be packed into the tube length through
the open other end thereof, and exposing said substance to
a compressive force so as to stretch said sheet material
(21') permanently.
- 25 8. A method according to claim 7,
c h a r a c t e r i z e d in that said liquid substance
(15) is filled into the tube length (18) in a heated
condition.
- 30 9. A method according to claim 7 or 8,
c h a r a c t e r i z e d in that said compressive force
is applied by means of an ejection piston (19) which is
inserted into the open end of the tube length (18).
- 35 10. A method according to any of the claims 7 to 9,
c h a r a c t e r i z e d in using a sheet material (21')
which is a metal foil, such as aluminium foil, laminated
with a plastic film.

Fig. 1.

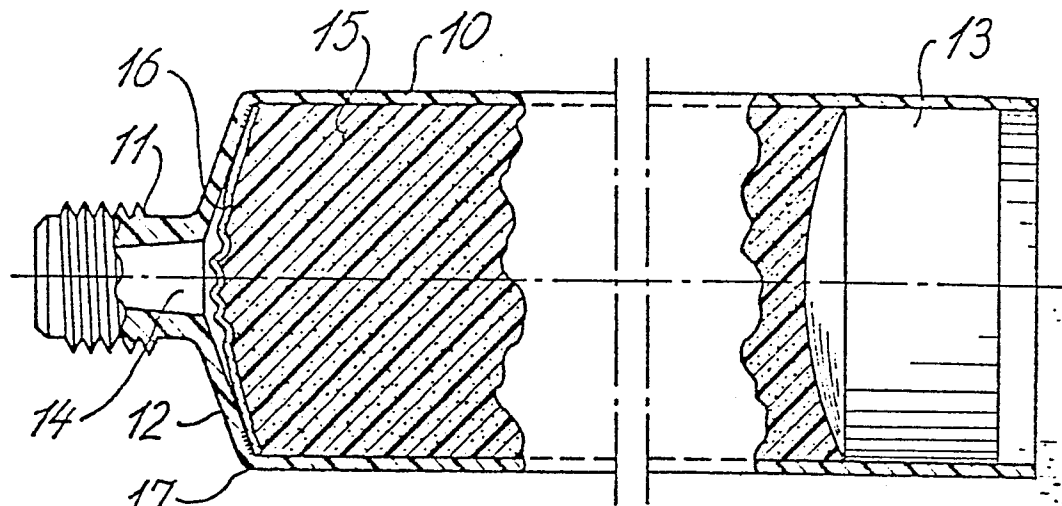


Fig. 2.

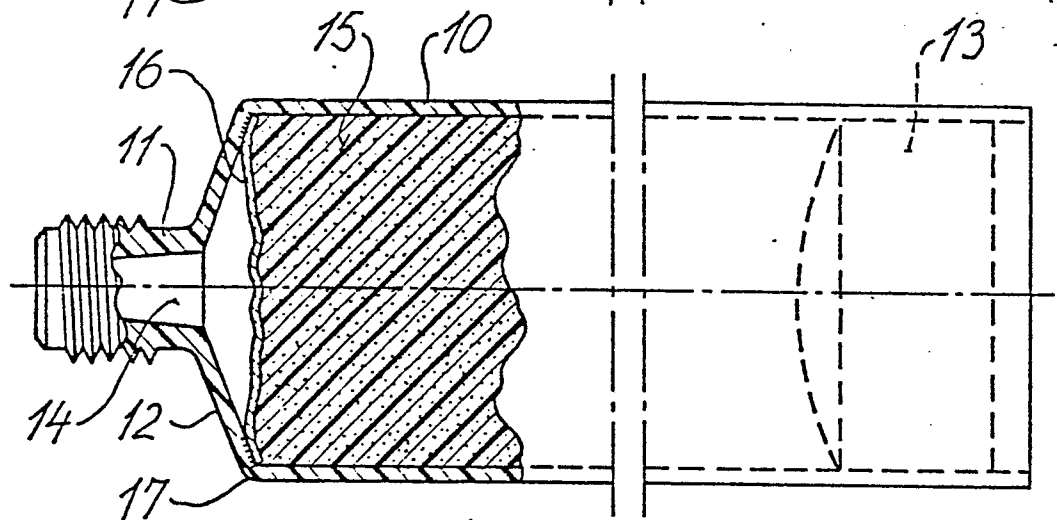


Fig. 3.

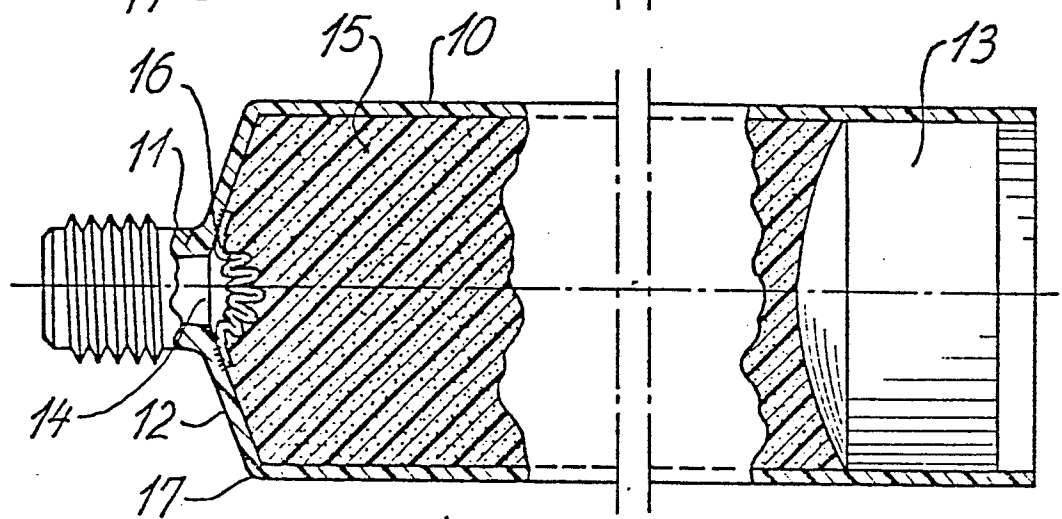
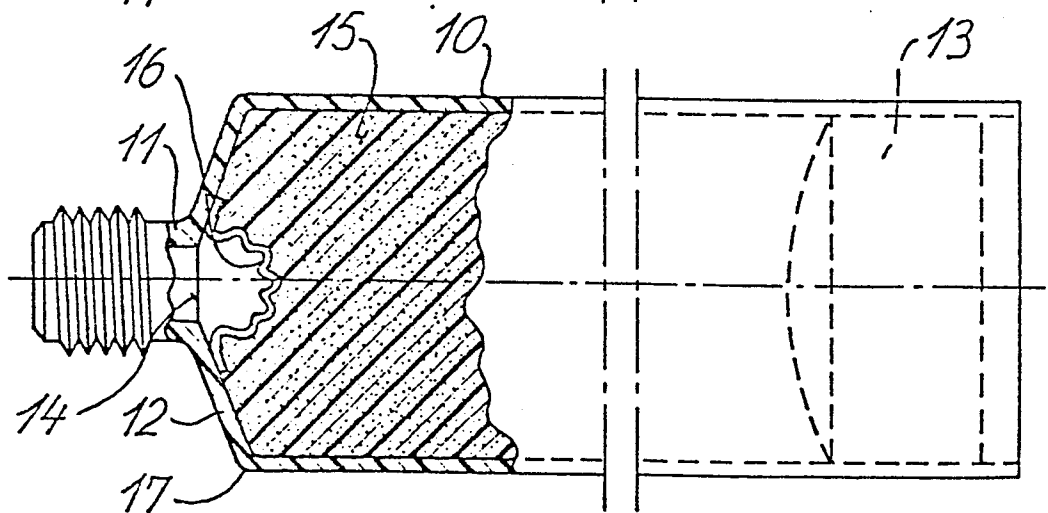


Fig. 4.



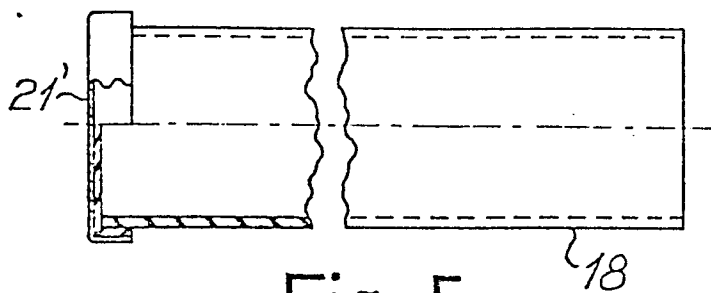


Fig. 5.

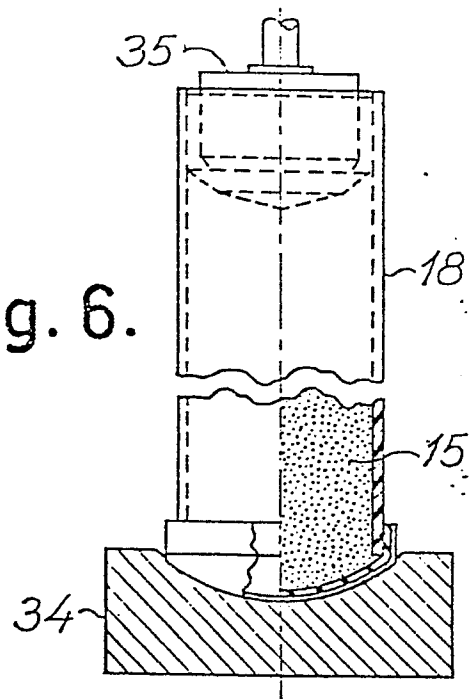


Fig. 6.

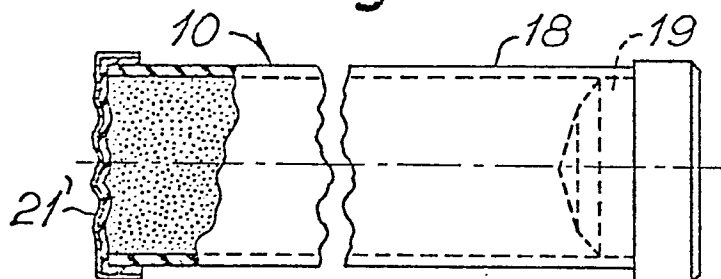


Fig. 7.

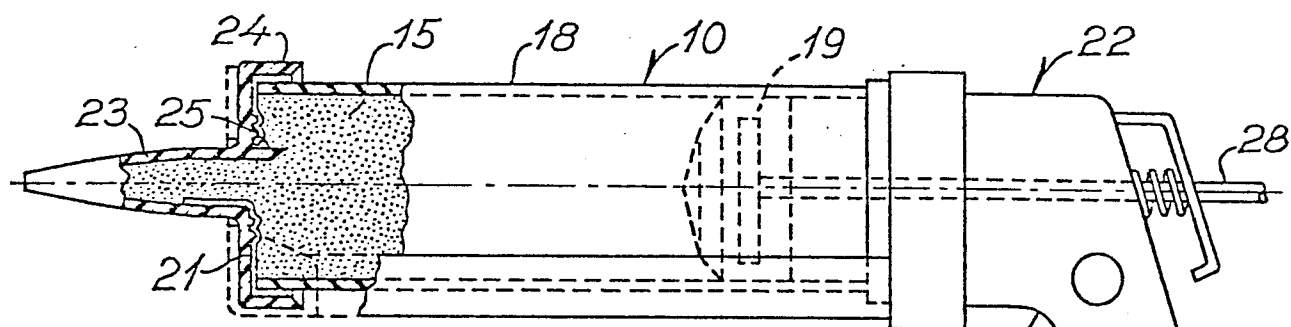


Fig. 9.

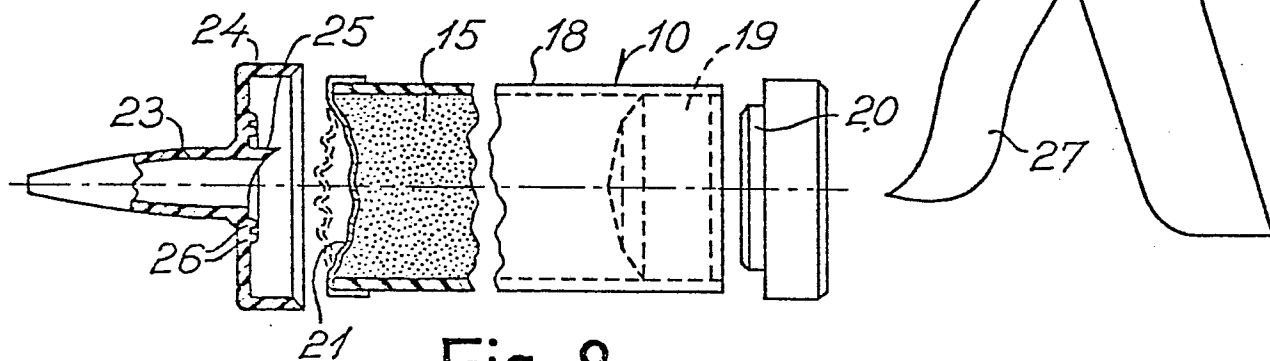


Fig. 8.

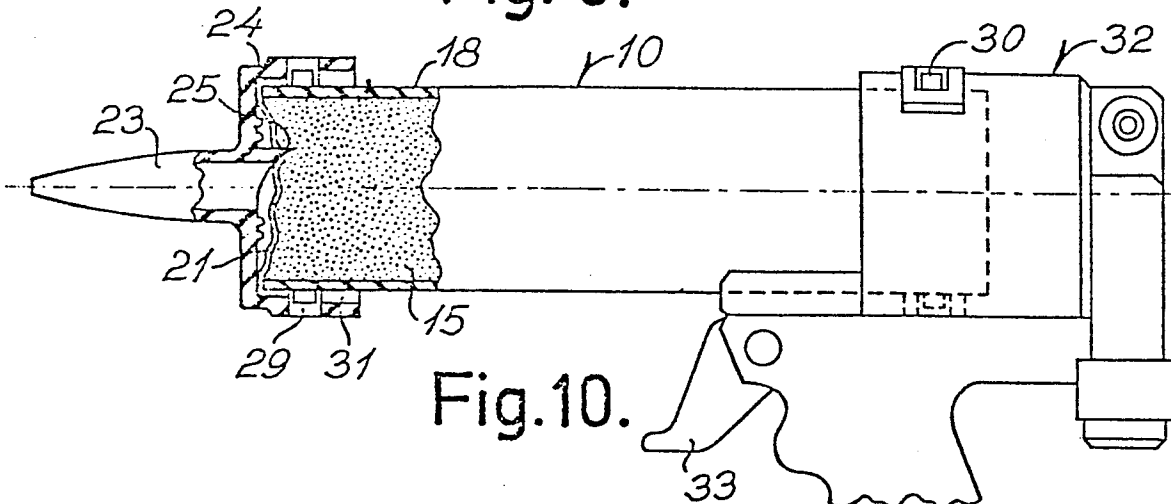


Fig. 10.



European Patent
Office

EUROPEAN SEARCH REPORT

0003039

Application number

EP 78 10 1824

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. ²)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	<u>CH - A - 443 951 (MOSSI & GHISOLFI)</u> * In its entirety * --	1,3,4,5	B 65 D 83/00
X	<u>US - A - 2 955 728 (L.A. MACKLANBURG)</u> * Column 3, line 25 - column 5, line 61; figures 1-7 * --	1,5	
X	<u>FR - A - 1 014 627 (S.A. DES MANUFACTURES DES GLACES ET PRODUITS CHIMIQUES SAINT-GOBAIN CHAUNY et CIREY)</u> * In its entirety * --	1,5	TECHNICAL FIELDS SEARCHED (Int.Cl. ³) B 65 D B 05 C
X	<u>FR - A - 1 305 395 (JANNIAUX)</u> * In its entirety * -- <u>FR - A - 2 273 722 (ALBY)</u> * Page 3, line 14 - page 4, line 14; page 5, line 3 - line 11; figures 1,2,3,4,8,9 * -- <u>US - A - 3 071 294 (J.J. GALBIERZ)</u> * In its entirety * ----	1,8 1,2,3,6,8	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 The Hague		Date of completion of the search 26-03-1979	Examiner MARTENS