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(12) # EUROPEAN PATENT APPLICATION

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(54) **Flexible tubular container.**

(57) A flexible tubular container having at least one end gathered and bound by filamentary material (4) which is held in position by adhesive material.

The container is advantageously made from a continuous length of flexible tube by gathering and constricting the tube (1) at spaced apart positions, winding filamentary binding material along a portion of the constricted tube, applying adhesive material to the binding material to fix the binding material in position and cutting the bound portion of the tube transversely (7) whereby a container sealed at each end is defined and separated from the adjacent portions of the flexible tube. The preferred adhesive is cyanoacrylate adhesive or hot-melt adhesive.

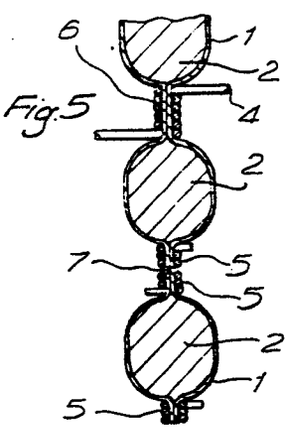

Fig.5

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Flexible Tubular Container

This invention relates to a flexible tubular container which is sealed at least at one end by a compression closure embracing the gathered tube end and to a method of making the said container. Such containers are generally made by dividing a continuous length of stock tubular material, usually plastics material and often in the form known as 'lay-flat' seamless tube. The closures are often applied to a filled continuous length of tube before the tube is cut transversely to separate the individual sealed containers.

In known flexible tubular containers, for example, those containing liquid or gelatinous materials such as slurry explosive compositions or grouting resin for anchor bolts used in mines, the tube ends are usually closed by self-sustaining metal or plastic clips. These clips are rather expensive and difficult to apply. The metal clips constitute a hazard in blasting operations in mines as they may give rise to sparks which could ignite firedamp. Also during application to the tube and in blasting the clips can be projected at high velocity and thus be a danger to personnel. The plastic clips tend to expand when the containers are stored under pressure with consequent leakage or exposure of the contents.

It is an object of this invention to provide a

container sealed with an improved closure which is reliable and suitable for containers for use in coal mines.

In accordance with this invention a flexible tubular container has at least one of its ends closed by a length of filamentary material bound tightly around the container end, said container end being gathered and constricted and said filamentary material being held in position by adhesive material.

Preferably the filamentary material is bonded both to itself and to the tubular container by a mutually compatible adhesive material.

The filamentary material is advantageously wound or tied in a generally helical manner so as to extend along a length of the constricted container end.

Convenient filamentary binding materials include flexible tying materials such as cord, tape, string and textile yarn. The adhesive material is advantageously a fast acting adhesive such as cyanoacrylate adhesive or a hot-melt adhesive comprising a mixture of thermoplastics resin and tackifying resin such as a mixture of ethylene/vinyl acetate copolymer and rosin ester.

The container is advantageously made from a continuous length of flexible tube by a method which comprises gathering and constricting the flexible tube at each of two spaced apart positions, winding under tension around the tube at each of said positions a length of filamentary binding material to bind the constricted tube along a portion of its length at each position, applying an adhesive material to the binding material to fix said binding material in position on the constricted portions of the tube, and cutting the applied binding material and tube transversely at positions dividing the constricted portions of the tube, whereby a container sealed at each end is defined and separated from the adjacent

portions of the flexible tube.

It will be understood that the tube may be constricted, bound and cut at the two positions consecutively, simultaneously or, in any order which is convenient. Thus the tube may be cut at one end of the container either before or after the binding material is applied around the tube at the position defining the other end of the tube.

Tubes of smaller diameter, for example, 5 cm diameter or less, can advantageously be gathered and constricted by the application of the filamentary material but with large diameter tubes or tubes containing highly viscous filling material it may be desirable to pre-waist the tube at the positions where the binding material is to be wound.

The adhesive may be applied to the binding material as it is being wound around the tube or it may be applied in a preliminary operation, the binding material serving as a carrier for the adhesive.

Advantageously the tubular container may contain the filling material which is to be packaged in the container. The filling may be a continuous length of deformable material which is displaced from the constricted portion of tube during the gathering and constriction of the tube, or it may be spaced apart discrete portions of rigid or dimensionally stable material, the binding material being applied around the tube at positions between these portions.

The invention is further illustrated by the method of forming containers of the invention which is hereinafter particularly described, by way of example only, with reference to the accompanying drawings wherein

Fig. 1 is a diagramatic fragmentary side view of a plastics tube filled with a continuous deformable material;

Fig. 2 is a diagramatic fragmentary side view of

a plastics tube containing preformed discrete portions of a filling material;

Fig. 3 shows diagramatically the tube of Fig. 1 with a cord wound as a ligature around the tube and constricting a portion of the tube;

Fig. 4 shows diagramatically the tube of Fig. 2 with a cord wound around and constricting portions of the tube intermediate discrete portions of filling material;

Fig. 5 shows diagramatically the constricted tube of Fig. 3 with two adjacent constricted portions cut transversely to separate a sealed filled container from the adjacent tube portions;

Fig. 6 shows diagramatically the constricted tube of Fig. 4 with two adjacent constricted portions cut transversely to separate a sealed container containing a preformed portion of filling material from the adjacent tube portions. The same numeral is used to denote like elements in all Figs.

Referring to Figs. 1, 3 and 5, the flexible tube 1 is filled with a continuous deformable material 2 and lengths of cord 4 (Fig. 3) are wound tightly in helical manner around longitudinally spaced portions 6 of the tube 1 whereby the portions 6 are gathered together and tube 1 is closed. Adhesive material is applied to the cord lengths 4 whereby the cord lengths 4 are maintained tightly bound in position on the tube portions 6. The tube is then cut transversely at the positions 7, whereby the closed portions 6 and the surrounding cord lengths are divided into two parts 5, each part 5 forming a sealed closure on the tube, the portions of the tube between the adjacent cuts at positions 7 forming individual sealed containers.

The filling material in the plastics tube 1 of Fig. 2 is in preformed portions 3 and, in forming the individual sealed containers, the tube 1 is closed by cord lengths 4 wound around portions 6 and cut at

positions 7 as described for Figs. 1, 3 and 5, the portion 6 in this case being intermediate the filling portions 3.

In putting the invention into practice the plastics tube 1 may conveniently be a thin tube of polyethylene, polypropylene or polyvinyl chloride which may be preformed or continuously formed from sheet material during the filling process. The tube may be filled, for example, by continuously pumping or extruding fluent material, or loading discrete portions of filling material into the tube. The filled tube is fed past a closure applying position where, at appropriate intervals, a length of cord is helically wound around the tube to close tube portions 6. Adhesive material is applied to the cord 4 or alternatively to the tube 1, to hold the cord 4 firmly in position. The portion 6 is then cut transversely to divide the two closed portions 6 into two portions 5 and separate a sealed container from the following portion of filled tube 1, each portion 5 sealing an end of a container.

The cord 4 may conveniently be cotton, jute, or synthetic plastics string such as is used for conventional parcel binding.

An especially effective and preferred adhesive is cyanoacrylate adhesive, which may be obtained from Loctite (UK) Limited as Loctite (Registered Trade Mark) superfast cyanoacrylate adhesive I.S.-415 or I.S.-495, although, as previously mentioned, hot-melt adhesives are also advantageous. When the adhesives are applied to the cord, this may be done before or after the cord is wound on the tube 1. Alternatively, the tube 1 may be pre-coated with adhesive before the cord 4 is wound around it. In any case the adhesive will advantageously bond the cord to itself and to the tube 1.

Claims:

1. A flexible tubular container having at least one of its ends closed by a length of filamentary material bound tightly around a gathered and constricted portion of said end, characterised in that the filamentary material is held in position by adhesive material.

2. A container as claimed in Claim 1 characterised in that the filamentary material is adhered both to itself and to the container by an adhesive material which is compatible with the filamentary material and the container.

3. A container as claimed in Claim 1 or Claim 2 characterised in that the filamentary material is wound or tied in a generally helical manner so as to extend along a length of the constricted container end.

4. A container as claimed in any one of Claims 1 to 3 inclusive characterised in that the filamentary binding material comprises cord, tape, string or textile yarn.

5. A container as claimed in any one of Claims 1 to 4 inclusive characterised in that the adhesive material is fast acting.

6. A container as claimed in Claim 5 characterised in that the adhesive material comprises cyanoacrylate adhesive or a hot-melt adhesive.

7. A container as claimed in Claim 6 characterised in that the adhesive comprises a mixture of thermoplastics resin and tackifying resin.

8. A container as claimed in Claim 7 characterised in that the hot-melt adhesive comprises a mixture of ethylene/vinyl acetate copolymer and rosin ester.

9. A method of closing a flexible tubular container wherein an end portion of the container is gathered and constricted, and a length of filamentary material is bound tightly around the constricted portion of the container end characterised in that the filamentary material is bonded in position by adhesive material.

10. A method as claimed in Claim 9 characterised in that the filamentary material is bonded both to itself and to the tubular container.

11. A method of making a flexible tubular container from a continuous length of flexible tube which method comprises gathering and constricting the flexible tube at each of two spaced apart positions and cutting the constricted portions of the tube transversely whereby a container sealed at each end is defined and separated from the adjacent portions of the flexible tube, characterised in that at each of said positions a length of filamentary binding material is wound under tension around the tube to bind the constricted tube along a portion of its length at each position, an adhesive material is applied to the binding material to fix said binding material in position on the constricted portions of the tube and cutting the applied binding material and tube transversely at positions dividing the constricted portions of the tube.

12. A method as claimed in Claim 11 characterised in that the flexible tube is gathered and constricted by the application of the filamentary material.

13. A method as claimed in Claim 11 characterised in that the flexible tube is gathered and constricted before the filamentary binding material is wound around the constricted portions of the tube.

14. A method as claimed in any one of Claims 11 to 13 inclusive characterised in that the adhesive is applied to the binding material as it is being wound around the tube.

15. A method as claimed in any one of Claims 11 to 14 inclusive characterised in that the adhesive is applied to the binding material before the binding material is wound around the tube.

16. A method as claimed in any one of Claims 11 to 15 inclusive characterised in that the continuous

length of flexible tube contains a continuous length of deformable material which is displaced from the constricted portion of the tube during the gathering and constricting of the tube.

17. A method as claimed in any one of Claims 11 to 16 inclusive characterised in that the flexible tube contains discrete portions of rigid or dimensionally stable material and the binding material is applied around the tube at positions between these portions.

18. A method as claimed in any one of Claims 9 to 17 inclusive wherein the adhesive material comprises cyanoacrylate adhesive or a hot-melt adhesive.

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Fig.1

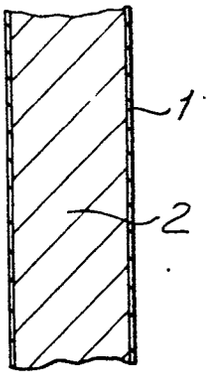


Fig.2

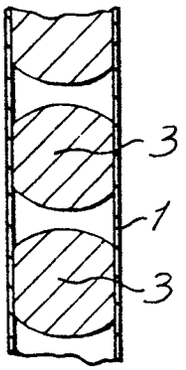


Fig.3

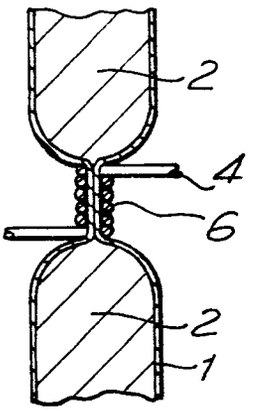


Fig.4

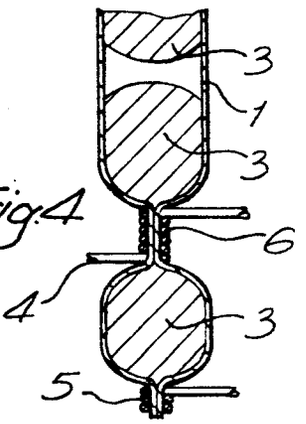


Fig.5

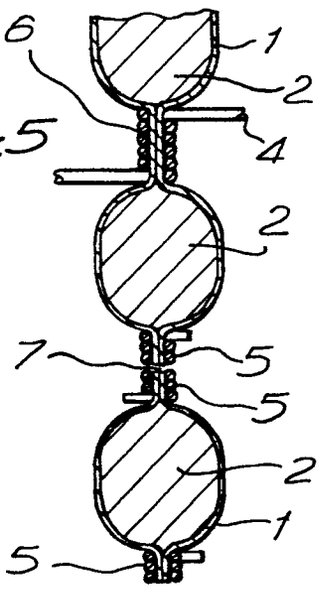
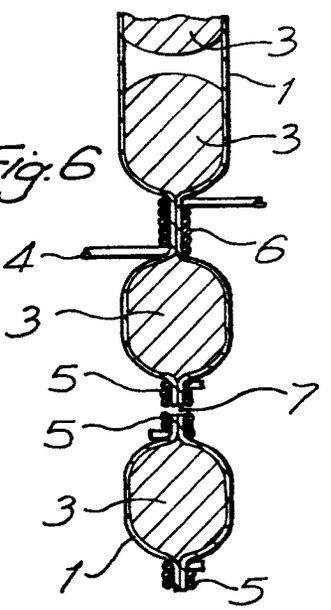


Fig.6



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EUROPEAN SEARCH REPORT

0003256
Application number
EP 78 30 0769

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
	US - A - 3 922 834 (NORPAK) * Entire document * --	1,2,4, 5,9,10, 13,15
	GB - A - 235 762 (RECKITT) * Complete specification * --	1,2,3
	US - A - 3 397 775 (OSCAR MAYER) * Entire document * ----	16

CLASSIFICATION OF THE APPLICATION (Int. Cl.²)

B 65 D 77/18
51/08

TECHNICAL FIELDS SEARCHED (Int.Cl.²)

B 65 D
B 65 B
A 22 C

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

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	20-04-1979	MARTIN

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