

12

EUROPEAN PATENT APPLICATION

21 Application number: 79302408.4

51 Int. Cl.³: **F 42 B 3/00**
B 65 D 39/00

22 Date of filing: 01.11.79

30 Priority: 15.01.79 GB 7901348

43 Date of publication of application:
23.07.80 Bulletin 80/15

64 Designated Contracting States:
BE DE FR GB IT SE

71 Applicant: **IMPERIAL CHEMICAL INDUSTRIES LIMITED**
Imperial Chemical House Millbank
London SW1P 3JF(GB)

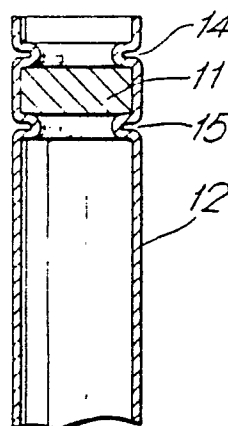
72 Inventor: **Wright, Arthur Stephen**
Nobel House
Stevenston Ayrshire KA20 3LN(GB)

74 Representative: **Reid, Thomas James et al,**
Imperial Chemical Industries Limited Legal Department
Patents Thames House North Millbank
London SW1P 4QG(GB)

54 Cartridge end-closure.

57 A tubular explosives cartridge (12) having at least one end closed by a transverse closure disc (11) of resilient closed-cell foamed synthetics plastics material, for example, foamed polyethylene, the disc having an uncompressed diameter greater than the internal diameter of the tubular cartridge case. The closure provides a waterproof seal without preventing communication of detonation between cartridges and may be readily pierced for the insertion of a detonator. When the closure consists of nitrogen blown polyethylene, it does not increase the risk of firedamp ignition in coal mines.

Fig.3.



- 1 -

Cartridge end-closure

This invention relates to explosive cartridges and to a method of closing an end of an explosive cartridge. The invention is especially advantageous
5 for cartridge nitroglycerine gelatinous explosives and aqueous slurry explosive compositions.

Explosive compositions have for many years been packaged in rigid tubular cardboard or tough plastics containers, the ends of the containers being closed
10 by inwardly crimping a portion of the container wall or by covering the end with a thin cardboard or plastics disc. This form of closure is not water resistant and the cartridges were not suitable for use in wet surroundings unless the explosive composition
15 was itself water resistant.

When employed in cartridge form in a wet drill-hole for rock blasting, deformable, water sensitive explosive composition such as aqueous slurry explosives are usually packed in closed waterproof bags of thin
20 flexible synthetic plastics such as polyethylene and the bags are placed inside rigid or tough tubular containers of cardboard or plastics material. Because of the need to seal the plastics inner bags and plug the ends of the rigid containers there is often
25 excessive space between the explosive contents of adjacent cartridges so that with relatively insensitive explosives in small diameters the detonation may fail

to propagate between adjacent cartridges in file.
There is therefore a requirement for a cartridge
case to protect the explosive composition from ambient
water without unduly interfering with the communication
5 of detonation between cartridges. Moreover for
cartridges to be used in coal mines it is desirable
that the materials used in the cartridge case should
not increase the risk of igniting firedamp in the
vicinity of the explosion.

10 Accordingly it is an object of this invention to
provide an improved waterproof end-closure for a rigid
cartridge case.

In accordance with this invention at least one
end of a tubular cartridge case is closed by a trans-
15 verse closure disc of resilient closed-cell foamed
synthetic plastics material, said disc having an
uncompressed diameter greater than the internal
diameter of the tubular case. The dimensions of the
closure disc may be readily chosen such that the
20 disc resilience causes sufficient outward radial
pressure against the case that the case is sealed
against the ingress of ambient water.

The cartridge case end may be plain but more
reliable retention of the closure disc is obtained if
25 the end rim of the tubular case is folded over
internally to form an end bead, or if one or more
internal projections, for example, one or more
cannelures are formed in the end portion of the case
to engage the closure disc and hold it in position.

30 The degree of foaming and the thickness of the
closure disc are not narrowly critical, the practical
requirement being that the foamed material should be
sufficiently resilient to provide the required seal.
Thus a foamed material having a density of 30 to 70
35 kg/m³ is generally satisfactory and discs having a
thickness to uncompressed diameter ratio of 1:2.5 to
1:5 are generally sufficiently robust to provide an

adequate seal, to resist displacement and to be readily pierced for the insertion of a detonator in the field.

For cartridges to be used in mines where incendive gases are present, it is preferred that the
5 closure disc should be made from foamed polyethylene, preferably blown with an inert gas, for example, nitrogen. A convenient, easily made closure disc is one shaped by stamping from a sheet of foamed plastics material, for example, closed-cell foamed polyethylene
10 commercially available under the name "Plastazote" (Registered Trade Mark) from Bakelite Xylonite Limited.

The uncompressed diameter of the disc is preferably 10 to 25% greater than the internal diameter of the cartridge case. Thus for a case having an
15 internal diameter of 30 mm a disc having a diameter of 33 to 37.5 mm, preferably 35 mm is convenient. The thickness of the disc in this case is conveniently 7 to 12 mm.

The cartridge case may conveniently be made from
20 any of the materials commonly used for that purpose, for example, cardboard, helically wound multi-ply paper or extruded plastics material.

The invention is further illustrated by the cartridge end-closures illustrated in the accompanying
25 drawings wherein

Figs. 1 to 4 inclusive are longitudinal medial sections of cartridge ends closed in accordance with the invention. In the drawings like parts are depicted by the same numeral.

30 In the cartridge end of Fig. 1 a disc 11 of resilient closed cell polyethylene is inserted into an end portion of a cartridge case 12. In its normal state the disc 11 has a greater diameter than the internal diameter of the cartridge case 12 and is
35 compressed to permit its insertion into the cartridge case. Because of its resilient nature the disc 11 presses tightly around its periphery against the

case 12 and seals the case against the ingress of water, so that the explosive contents of the cartridge, which may advantageously be aqueous slurry explosive or a powdered explosive based on ammonium
5 nitrate, are protected from ambient water. The other end of the cartridge case 12 may if desired be closed with a similar closure although any other waterproof closure may be used.

10 In Fig. 2 the end of the cartridge case 12 is turned over to form a top bead 13 against which the disc 11 abuts so that the disc is more difficult to displace from the case 12 by distortion of the case.

In the cartridge end of Fig. 3 the cartridge
15 case is shaped at the end by two cannellures 14 and 15 between which the disc 11 is positively located.

The cartridge end of Fig. 4 is a modification of the cartridge end of Fig. 3 in which the mouth end of the cartridge case 12 is extended beyond the cann-
20 elure 14 to provide an internally threaded portion 16 which is adapted to receive an externally threaded portion of an end of an adjacent cartridge. By screwing the cartridge ends together a file of cartridges may be readily assembled for loading in a
25 borehole.

Claims:

1. A tubular cartridge case closed at least at one end by a transverse closure disc characterised in that the closure disc is made from resilient closed-cell foamed synthetics plastics material, and has an uncompressed diameter greater than the internal diameter of the tubular case.
2. A cartridge case as claimed in Claim 1 wherein the closure disc has dimensions such that the disc resilience causes sufficient outward radial pressure against the case that the case is sealed against the ingress of ambient water.
3. A cartridge case as claimed in Claim 1 or Claim 2 wherein the end rim of the tubular case is folded over internally to form an end bead to retain the closure disc in the cartridge case end.
4. A cartridge case as claimed in any one of Claims 1 to 3 inclusive wherein one or more cannellures are formed in the end portion of the case to engage the closure disc and hold it in position.
5. A cartridge case as claimed in any one of Claims 1 to 4 inclusive wherein the foamed material has a density of 30 to 70 kg/m³.
6. A cartridge case as claimed in any one of Claims 1 to 5 inclusive wherein the closure disc has a thickness to uncompressed diameter ratio of 1:2.5 to 1:5.
7. A cartridge case as claimed in any one of Claims 1 to 6 inclusive wherein the synthetics plastics material of the closure disc is foamed by blowing with an inert gas.
8. A cartridge case as claimed in any one of Claims 1 to 7 inclusive wherein the closure disc has been shaped by stamping from a sheet of foamed plastics material.
9. A cartridge case as claimed in Claim 8 wherein the closure disc has been stamped from a sheet of closed-cell foamed polyethylene.

10. A cartridge case as claimed in any one of Claims 1 to 11 inclusive wherein the uncompressed diameter of the closure disc is 10 to 25% greater than the internal diameter of the cartridge case.
- 5 11. An explosive cartridge comprising gelatinous nitroglycerine explosive composition, aqueous slurry explosive composition or ammonium nitrate powder explosive composition encased in a tubular cartridge case as claimed in any one of Claims 1 to 10 inclusive.

111

Fig. 1.

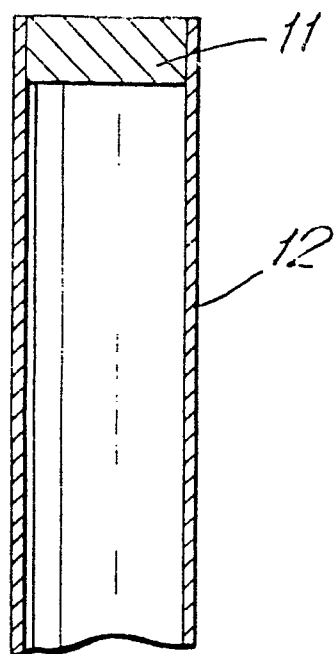


Fig. 2.

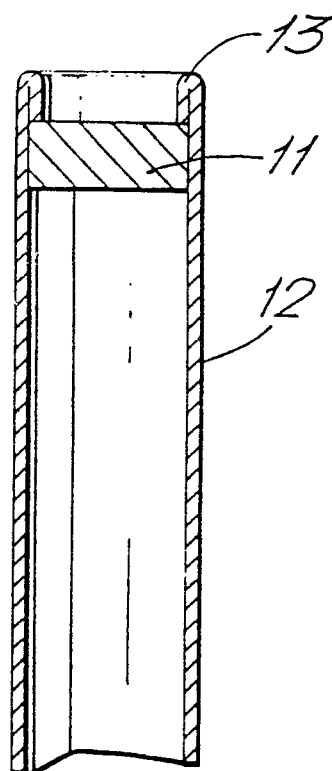


Fig. 3.

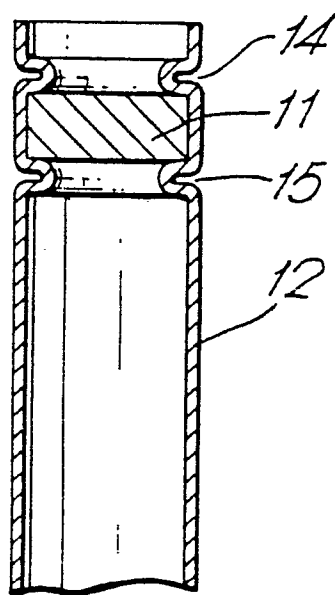
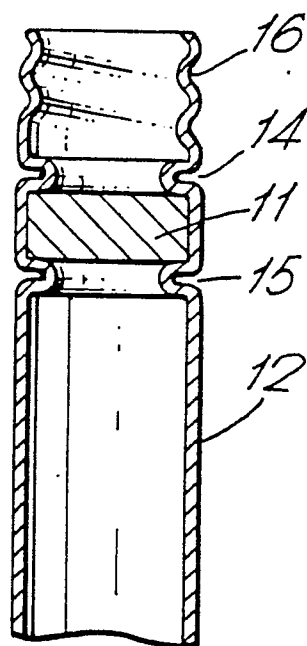


Fig. 4.





European Patent
Office

EUROPEAN SEARCH REPORT

0013473

Application number

EP 79 30 2408

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.)
Category	Citation of document with indication where appropriate of relevant passages	Relevant to claim	
X	DE - A - 2 506 865 (PYROTECHNISCHE FABRIK) * Page 1, paragraph 2; page 3, paragraphs 2,3,5; page 4, paragraphs 5,6; page 5, paragraph 2; page 11, paragraphs 3-5; page 13, claim 7; figure 1 * --	1,3,8,9,11	F 42 B 3/00 B 65 D 39/00
X	US - A - 3 952 656 (FOX) * Column 2, lines 34-68; column 3, lines 1-15; column 7, lines 9-14; column 8, lines 44-57; column 9, lines 44-68; column 10, lines 1-21; column 12, lines 3-11; figures 1,5 * --	1,2,9,11	TECHNICAL FIELDS SEARCHED (Int. Cl.) F 42 B F 42 D B 65 D
X	FR - A - 2 254 486 (KWM SCHLICHTER) * Page 4 * -- FR - A - 1 458 434 (DYNAMIT NOBEL) * Page 2, left-hand column, paragraphs 9,10; figures 1,2 * -- FR - A - 808 136 (SPENGLER) * Whole document * -- FR - A - 2 001 030 (DYNAMIT NOBEL) * Page 2, lines 18-24; page 4, lines 19-24; page 6, lines 15-17 * -- . / .	1,9 3 4 5,7	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
The present search report has been drawn up for all claims			&: member of the same patent family, corresponding document
Place of search	Date of completion of the search	Examiner	
The Hague	22-04-1980	VAN DER PLAS	



European Patent
Office

EUROPEAN SEARCH REPORT

0013473
Application number

EP 79 30 2408

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.)
Category	Citation of document with indication where appropriate of relevant passages	Relevant to claim	
	<u>US - A - 2 916 995</u> (DOUGLASS) * Column 2, lines 3-19; figures 1,2 *	1,10	
	--		
A	<u>US - A - 3 264 992</u> (BECK)		
A	<u>US - A - 2 918 003</u> (TEMPLE)		
A	<u>US - A - 4 091 136</u> (O'BRIEN)		
A	<u>DE - C - 183 441</u> (CAHUC)		TECHNICAL FIELDS SEARCHED (Int. Cl.)
A	<u>US - A - 2 996 232</u> (WALKER)		
A	<u>US - A - 2 345 887</u> (ROTHROCK)		
A	<u>FR - A - 2 307 843</u> (SIMFLEX)		
A	<u>US - A - 4 000 696</u> (FRIANT)		
A	<u>US - A - 2 930 275</u> (SENTZ)		
A	<u>FR - A - 1 365 996</u> (RUGGIERI)		
A	<u>US - A - 3 477 373</u> (FALTERMAN)		
