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(54) **RECOIL REDUCER WAD FOR SHOTGUN AMMUNITION**

PROPFEN FÜR SCHROTPATRONEN ZUR VERMINDERUNG DES RÜCKSTOSSES

BOURRE A REDUCTION DE RECUL POUR DES MUNITIONS DE FUSIL DE CHASSE

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Description

The present invention relates to a device for reducing recoil in weapons. It is applicable to all types of weapons in which the ignition of gunpowder, or cordite, or the like, is employed to propel a projectile or projectiles in a forward direction.

A known shotgun cartridge is shown in the accompanying Fig. 1. A casing 10 encloses, in sequence, a primer 12 held by an end cap 13, a charge 14, and wad 16, and a quantity of shot 18. The shot is retained in place by a cap 20. The cartridge is fired by striking the primer 12, causing ignition thereof and hence ignition of the charge 14. Gases are produced by this latter ignition under high pressure which propel the rear face 22 of the wad 16 in a forward direction. This initially causes crushing of the wad 16 and then forward acceleration of the shot 18, and rupture of the cap 20. The purpose of wad 16 is to protect the shot 18 from too sudden acceleration.

Such cartridges are described in FR 2362362, FR 2251775, US 4151799, and US 3722412.

US-A-3359906 discloses a shotgun shell having a base wad of plastic material disposed between the shell base and a charge. The precharacterising part of Claim 1 is based on the disclosure of US-A-3359906.

US-A-4805535 discloses a shotgun cartridge having a wad of plastic material disposed between the charge and a plurality of projectiles.

The present invention provides a round of ammunition comprising a casing, and a base, within the casing there being contained a charge, at least one projectile forward of the charge, and a gap between the base and the charge, the gap being at least partially occupied by a charge support which separates the charge from the base, wherein on discharge of the round, the charge support undergoes compressive deformation, characterised in that the charge support incorporates one or more hollow, air-filled formations which undergo resilient or crushing deformations on discharge of the round. In addition, a crushable material can be provided in the space between the rear internal face of the round and the rear jacket portion. A suitable material is expanded polystyrene.

It is necessary to provide a striking face of the primer in the rear external face of the round, to allow actuation of the round by a firing pin. It is also necessary for the efflux of the primer to contact the charge in order to ignite it. To satisfy these design requirements, it is possible either to employ an elongate primer capable of extending from the rear face of the round to the charge, or to provide a duct to direct the efflux from the primer to the charge. Such a duct can be provided within the above-mentioned column. It is preferable that such a duct, where provided, is internally fluted to improve the flow of efflux from the primer.

To prevent "suck-back" of the rear jacket portion into the weapon barrel siter firing, circumferential ribs can be provided on an internal face of the round or on an

external surface of the column, (where provided). Thus, during rearward motion of the rear jacket portion under pressure of the propellant gases, the rear jacket portion passes over these ribs and is then retained against subsequent forward motion, preventing it from leaving the cartridge and becoming lodged in the barrel.

Embodiments of the present invention showing its applications to shotgun cartridges will now be described by way of example, with reference to the accompanying drawings. It is of course to be understood that the present invention is not limited to shotgun cartridges and is equally applicable to other types of ammunition. In the drawings:

Fig. 1, already described, is a prior art shotgun cartridge;

Fig. 2 is a cross-section through a shotgun cartridge related to the present invention;

Figs. 3A and 4 are, respectively, a cross-sectional side view and a top view of the column and rear jacket portion of another related shotgun cartridge, while Fig. 3B is a cross-sectional side view of the column and rear jacket portion of Fig. 3A incorporated into a cartridge, the recess of the rear jacket portion being alternatively positioned;

Figs. 5A and 6 are, respectively, part cross-sectional side view and a top view of a third related cartridge while Fig. 5B is a cross-sectional side view of the embodiment of Fig. 5A incorporated into a cartridge, the recess of the rear jacket portion being alternatively positioned.

Fig. 7 is a side view of the column and rear jacket portion of the cartridges illustrated in Figs. 2 to 6 after firing of the round;

Fig. 8 is a cross-sectional view of the base portion of a cartridge, in a further modification;

Fig. 9 is a cross-sectional view of the base portion of a cartridge, in a yet further modification;

Fig. 10 is a sectional side view of a front jacket portion according to a first embodiment of the present invention;

Fig. 10A shows part of the embodiment of Fig. 10 following firing of a charge; and

Figs. 11 and 12 show alternative arrangements of the first embodiment incorporated into a shotgun cartridge.

In the Figures, like parts are denoted by like reference numerals.

In the shotgun cartridge of the Fig. 2, a shotgun casing 10 has an end cap 13 holding a primer 12. The primer 12 communicates with an internally fluted duct 22 formed axially within a tapering column 24. The duct 22 leads to a charge 14 enclosed by a jacket consisting of a forward jacket portion 28 and rear jacket portion 30. The rear jacket portion 30 has an aperture 32 which fits snugly about the end of the column 24. The forward jacket portion 28 has a rearwardly directed axial projection

34 in the shape of a truncated circular pyramid. Ahead of the forward jacket portion 28 is a quantity of shot (not shown) in the region 18. The shot would normally be retained within the casing by a cap (not shown) similar to the cap 20 of Fig. 1.

The cartridge is fired by striking the external surface of the primer 12, causing explosion thereof. Flames travel along the duct 22 to the charge 14. The projection 34 promotes uniform distribution of the flames about the charge 14 and thus gives near simultaneous ignition of the entire charge. Expansion of the gases produced by ignition of the charge 14 drive the forward jacket portion forward and the rear jacket portion rearward. The forward motion of the forward jacket portion 28 causes expulsion of the shot in the conventional fashion. Rearward motion of the rear jacket portion 30 is gradually arrested by absorption of its kinetic energy through deformation of the opening 32 as it is driven down the taper of the column 24.

Hence, the rearward momentum corresponding to the forward momentum of the shot is transmitted to the rear jacket portion 30, rather than the weapon itself. Since the energy of this motion is absorbed in deformation of the jacket portion, a significantly reduced recoil is produced. Hence, a better shooting performance can be obtained due to decreased fatigue or nervousness on the part of the firer. Alternatively, a larger charge can be employed to give a greater muzzle velocity with no substantial increase in recoil over the prior art cartridge.

Various modifications and improvements are possible to the design of Fig. 2, which are illustrated in Figs. 3 to 6.

In Figs. 3A and 4, the forward surface of the rear jacket portion 30 has an axially centred ring-shaped recess 36 (an alternative being shown in Fig. 3B where the recess 36 is in rearward surface). This recess 36 increases the radial flexibility of the rear jacket portion 30, the effect of which is to take up the increase in diameter of the opening 32 without causing an increase in the overall diameter of the rear jacket portion 30. Thus, bulging of the cartridge during firing is inhibited, allowing easier removal of the cartridge from the barrel of the weapon. Also shown in Fig. 4 are radially extending grooves 38, which allow better distribution of the flames from the primer 12 about the charge 14.

Figs. 5A and 5B show an alternative to the circular-cross section column 24 of Figs. 2 to 4, being a column of polygonal cross section (or of round cross section, this being particularly suited for manufacture by injection moulding), the column could conveniently be manufactured as an integral part of an injected, moulded or drawn shotgun cartridge.

Fig. 7 shows the column and rear jacket portion of Figs. 3 and 4 after firing. As can be seen, the rear jacket portion 30 is retained against forward motion by the rib 26. Forward motion of the rear jacket portion 30 into the barrel of the weapon is undesirable since this could cause bulging of the barrel on firing of a further round.

It is, in fact, undesirable for any part of the recoil reducer to travel forward into the barrel of the weapon. Therefore, to anchor the column 24 to the base of the cartridge, the column 24 is formed with a dovetail section 39 which engages with a corresponding recess provided on an internal face of the cartridge.

Additionally, as shown in Fig. 13, the primer 12 may be formed with external ribs 60 which engage and grip the inner wall of the duct 22 to further resist forward movement of the inner jacket portion, and/or the recoil device.

Figs. 8 and 9 show alternative arrangements for restraining forward motion of the column 24 into the barrel. In this arrangement, the column 24 has a recess 37 which fits around a corresponding annular dovetail 39 on the base of the cartridge. Alternatively, of course, the column 24 could be formed integrally with the cartridge 10, as shown in Fig. 2.

Fig. 9 also shows the use of hollow crushable rings of plastics within the region around the column 24, as an energy absorbing means. Alternatively, expanded polystyrene can be employed, as solid rings or spheres or the like.

With reference to Figs. 10 to 12, here will be described a first embodiment of the invention. A forward jacket portion 28 consists of a generally cylindrical structure 40 divided into a shot retaining portion 42 and a charge retaining portion 44 by a dividing portion 46. As described earlier with reference to Fig. 2, the dividing portion 46 has a member 34 projecting into the charge retaining portion to promote uniform distribution of flames from the primer (not shown).

The dividing member further has an axially centred, annular projection 48 which extends into the shot-retaining portion 42, and a central, generally conical projection 34 which extends into the charge-retaining portion 44.

Additionally, there is provided a charge support 31 disposed between the cartridge base 13 and the jacket portion 28. The charge support 31 (which is separate from the jacket portion 28) comprises a platform member 32 into which the charge is received which is supported on a recoil-absorbing structure which is, in turn, carried on the base plate. The recoil absorbing structure comprises two toric members 116 of resilient material in each of which is an air space 41. A duct 22 extends axially through the cartridge base 13 and the toric members 116 to provide a flame path between a primer (not shown in Figs. 10 to 12) and the platform member 32.

When the cartridge of this embodiment is discharged, recoil energy is absorbed by resilient compression of the toric members 116 (as shown in Fig. 10A), so reducing the recoil transmitted to the weapon itself.

Figs. 11 and 12 illustrate alternative constructions of cartridges embodying the above described components.

As shown in Fig. 11, the charge support 31 could be formed integrally with the base plate of the cartridge. This is made possible since the reduction in recoil forces

resulting from the invention allows the base plate to be formed from a wider range of materials (including, for example, plastics, which may, for example, be drawn or injection moulded) than hitherto possible.

Alternatively, as shown in Fig. 12, a substantially conventional base plate 13 may be used. In this case, it is highly desirable to provide means to anchor the charge support 31 in the cartridge case. With reference to Fig. 12, this may be achieved by forming an inwardly-directed nip 50 in the case, the internal diameter of which is too small to allow the charge support 31 to pass freely therethrough. Alternatively, a dovetail formation (as described above) may be employed to this end.

Claims

1. A round of ammunition comprising a casing (10), and a base (13), within the casing (10) there being contained a charge (14), at least one projectile (42) forward of the charge (14), and a gap between the base and the charge (14), the gap being at least partially occupied by a charge support (31) which separates the charge (14) from the base (13), wherein on discharge of the round, the charge support (31) undergoes compressive deformation, characterised in that the charge support (31) incorporates one or more hollow, air-filled formations (116) which undergo resilient or crushing deformations on discharge of the round.
2. A round of ammunition according to claim 1 in which the hollow air-filled formations (116) comprise a plurality of formations of tubular cross section.
3. A round of ammunition according to claim 2 in which the formations (116) are disposed between a platform member (32) in contact with the charge (14) and the base (13) of the round.
4. A round of ammunition according to claim 3 in which the two or more formations (116) are disposed in line between the platform member (32) and the base.
5. A round of ammunition according to claim 4 in which either two or three of the formations (41) are disposed between the base (13) and the platform member (32).
6. A round of ammunition according to any preceding claim in which the charge support is an injection moulding of plastics material.
7. A round of ammunition according to any preceding claim in which the charge support is integral with the base of the round.

8. A round of ammunition according to any one of claims 1 to 6 in which the charge support is a discreet component which is inserted into the body, retention means (37; 50) for retaining it therein being provided.

9. A round of ammunition according to claim 8 in which the retention means comprises interlocking formations (39) on the charge support and on the base (13) of the round.

10. A round of ammunition according to claim 8 in which the retention means comprises a region of reduced diameter (50) of the body (10) of the round.

11. A round of ammunition according to any preceding claim further comprising a jacket portion (28) within the case (10), the jacket portion (28) having a dividing wall (46) which is disposed between the charge (14) and at least one projectile (42).

12. A round of ammunition according to claim 11 in which the dividing wall (46) has a formation (34) which projects into the charge (14) to provide uniform distribution of combustion therein.

13. A round of ammunition according to claim 11 or claim 12 in which the jacket portion (28) has a generally cylindrical shot retaining portion extending forwardly of the dividing wall (46).

14. A round of ammunition according to any one of claims 11 to 13 in which the jacket (28) portion is a close fit within the case (10) of the round.

15. A round of ammunition according to claim 14 in which a primer (12) is mounted in the base (13) of the round, there being a duct (22) extending through the charge support (30) to guide flames from the primer (12) towards the charge (14).

16. A round of ammunition according to claim 15 in which the duct (22) tapers towards the primer (12).

Patentansprüche

1. Patrone zum Verfeuern, umfassend eine Hülse (10) und einen Boden (13), wobei sich in der Hülse (10) eine Ladung (14), zumindest ein Geschöß (42) vor der Ladung (14) und ein Zwischenraum zwischen dem Boden und der Ladung (14) befindet, wobei der Zwischenraum zumindest teilweise von einem Ladungsträger (31) eingenommen wird, der die Ladung (14) vom Boden (13) trennt, wobei beim Abfeuern der Patrone der Ladungsträger (31) Verformung durch Zusammendrücken erfährt, dadurch gekennzeichnet, daß der Ladungsträger (31) eine

oder mehrere hohle, luftgefüllte Formationen (116) umfaßt, die beim Abfeuern der Patrone elastische oder Zerdrückungsverformung erfahren.

2. Patrone zum Verfeuern nach Anspruch 1, bei der die hohlen luftgefüllten Formationen (116) eine Vielzahl von Formationen mit rohrförmigem Querschnitt umfassen. 5
3. Patrone zum Verfeuern nach Anspruch 2, bei der die Formationen (116) zwischen einem die Ladung (14) berührenden Plattformelement (32) und dem Boden (13) der Patrone angeordnet sind. 10
4. Patrone zum Verfeuern nach Anspruch 3, bei der die zwei oder mehreren Ausbildungen (116) in einer Linie zwischen dem Plattformelement (32) und dem Boden angeordnet sind. 15
5. Patrone zum Verfeuern nach Anspruch 4, bei der entweder zwei oder drei Formationen (41) zwischen dem Boden (13) und dem Plattformelement (32) angeordnet sind. 20
6. Patrone zum Verfeuern nach einem der vorangehenden Ansprüche, bei der der Ladungsträger ein Spritzgußformkörper aus Kunststoffmaterial ist. 25
7. Patrone zum Verfeuern nach einem der vorangehenden Ansprüche, bei der der Ladungsträger einstückig mit dem Boden der Patrone verbunden ist. 30
8. Patrone zum Verfeuern nach einem der Ansprüche 1 bis 6, bei der der Ladungsträger eine diskrete Komponente ist, die in den Körper eingesetzt ist, wobei Haltemittel (37; 50) vorgesehen sind, um sie darin zu halten. 35
9. Patrone zum Verfeuern nach Anspruch 8, bei der das Haltemittel ineinander verriegelnde Formationen (39) auf dem Ladungsträger und auf dem Boden (13) der Patrone umfaßt. 40
10. Patrone zum Verfeuern nach Anspruch 8, bei der das Haltemittel einen Bereich mit verringertem Durchmesser (50) des Körpers (10) der Patrone umfaßt. 45
11. Patrone zum Verfeuern nach einem der vorangehenden Ansprüche, umfassend einen Mantelabschnitt (28) innerhalb der Hülse (10), wobei der Mantelabschnitt (28) eine Trennwand (46) aufweist, die zwischen der Ladung (14) und zumindest einem Geschoß (42) angeordnet ist. 50
12. Patrone zum Verfeuern nach Anspruch 11, bei der die Trennwand (46) eine Ausbildung (34) aufweist, 55

die in die Ladung (14) ragt, um für gleichmäßige Verteilung der Verbrennung darin zu sorgen.

13. Patrone zum Verfeuern nach Anspruch 11 oder 12, in der der Mantelabschnitt (28) einen im allgemeinen zylindrischen Schrothalteabschnitt aufweist, der sich von der rennwand (46) nach vorne erstreckt.
14. Patrone zum Verfeuern nach einem der Ansprüche 11 bis 13, in der der Mantelabschnitt (28) innerhalb der Hülse satt an der Patrone anliegt.
15. Patrone zum Verfeuern nach Anspruch 14, bei der ein Zündhütchen (12) im Boden (13) der Patrone angeordnet ist, wobei sich ein Kanal (22) durch den Ladungsträger (30) hindurch erstreckt, um Flammen vom Zündhütchen (12) zur Ladung (14) hin zu lenken.
16. Patrone zum Verfeuern nach Anspruch 15, bei der sich der Kanal (22) zum Zündhütchen (12) hin verjüngt.

Revendications

1. Cartouche pour des munitions comportant un boîtier (10), et une base (13), dans le boîtier (10) se trouvant une charge (14), au moins un projectile (42) en amont de la charge (14) et un espace entre la base et la charge (14), l'espace étant au moins partiellement occupé par un support de charge (31) qui sépare la charge (14) de la base (13), où lors de la décharge de la cartouche, le support de charge (31) subit une déformation de compression, caractérisée en ce que la charge de support (31) incorpore une ou plusieurs formations creuses, remplies d'air (116) qui subissent des déformations élastiques ou d'écrasement lors de la décharge de la cartouche.
2. Cartouche pour des munitions selon la revendication 1, où les formations creuses, remplies d'air (116) comportent une pluralité de formations de sections transversales tubulaires.
3. Cartouche pour des munitions selon la revendication 2, où les formations (116) sont disposées entre un élément de plate-forme (32) en contact avec la charge (14) et la base (13) de la cartouche.
4. Cartouche pour des munitions selon la revendication 3, où deux ou plusieurs formations (116) sont disposées en ligne entre l'élément de plate-forme (32) et la base.
5. Cartouche pour des munitions selon la revendica-

tion 4, où soit deux soit trois des formations (41) sont disposées entre la base (13) et l'élément de plate-forme (32).

charge (14).

6. Cartouche pour des munitions selon l'une des revendications précédentes, où le support de charge est un moulage par injection en matière plastique. 5
7. Cartouche pour des munitions selon l'une des revendications précédentes, où le support de charge est réalisé intégralement avec la base de la cartouche. 10
8. Cartouche pour des munitions selon l'une des revendications 1 à 6, où le support de charge est un composant discret qui est inséré dans le corps, un moyen de retenue (37; 50) pour le retenir dans celui-ci étant prévu. 15
9. Cartouche pour des munitions selon la revendication 8, où le moyen de retenue comporte des formations d'interverrouillage (39) sur le support de charge et sur la base (13) de la cartouche. 20
10. Cartouche pour des munitions selon la revendication 8, où le moyen de retenue comporte une région d'un diamètre réduit (50) du corps (10) de la cartouche. 25
11. Cartouche pour des munitions selon l'une des revendications précédentes, comportant en outre une portion formant chemise (28) dans le boîtier (10), la portion de chemise (28) ayant une paroi de division (46) qui est disposée entre la charge (14) et au moins un projectile (42). 30
35
12. Cartouche pour des munitions selon la revendication 11, où la paroi de division (46) a une formation (34) qui fait saillie dans la charge (14) pour permettre une distribution uniforme de la combustion dans celle-ci. 40
13. Cartouche pour des munitions selon la revendication 11 ou la revendication 12, où la portion de chemise (28) comporte une portion de retenue de tir généralement cylindrique s'étendant vers l'avant de la paroi de division (46). 45
14. Cartouche pour des munitions selon l'une des revendications 11 à 13, où la portion de chemise (28) est ajustée d'une manière serrée dans le boîtier (10) de la cartouche. 50
15. Cartouche pour des munitions selon la revendication 14, où une amorce (12) est installée dans la base (13) de la cartouche, et un conduit (22) étant prévu s'étendant à travers le support de charge (30) pour guider les flammes de l'amorce (12) vers la 55

16. Cartouche pour des munitions selon la revendication 15, où le conduit (22) retrace vers l'amorce (12).

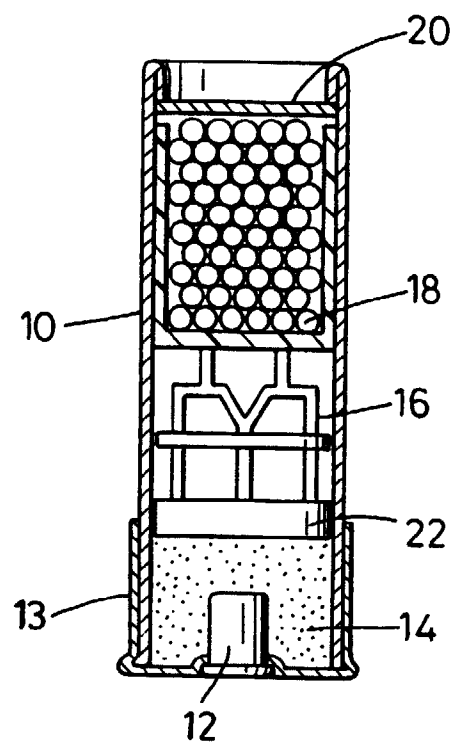


Fig. 1
(PRIOR ART)

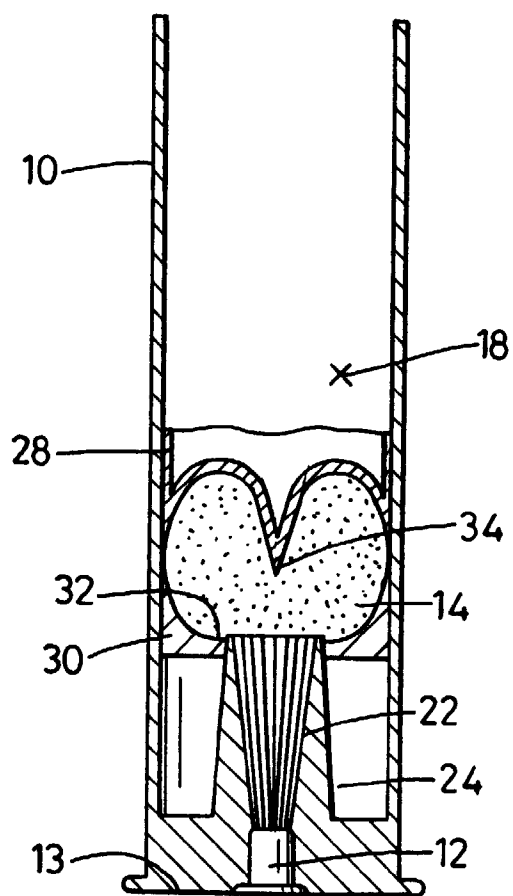


Fig. 2

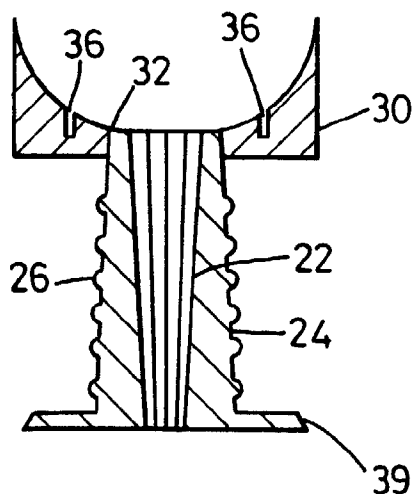


Fig. 3A

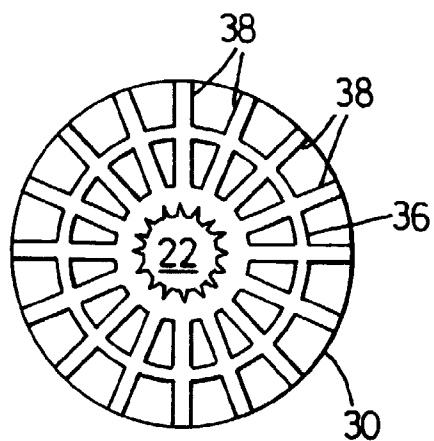


Fig. 4

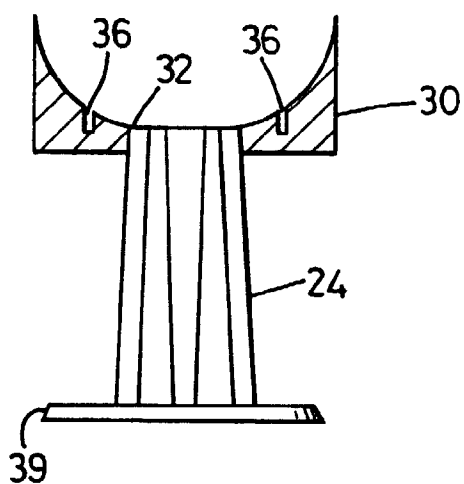


Fig. 5A

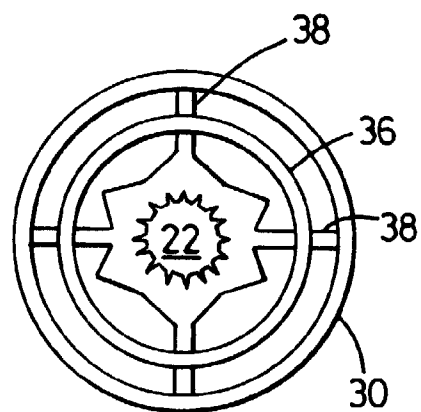


Fig. 6

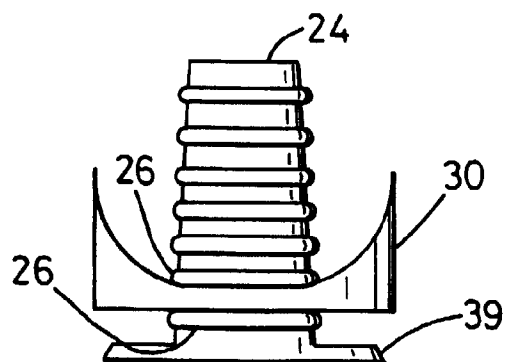


Fig. 7

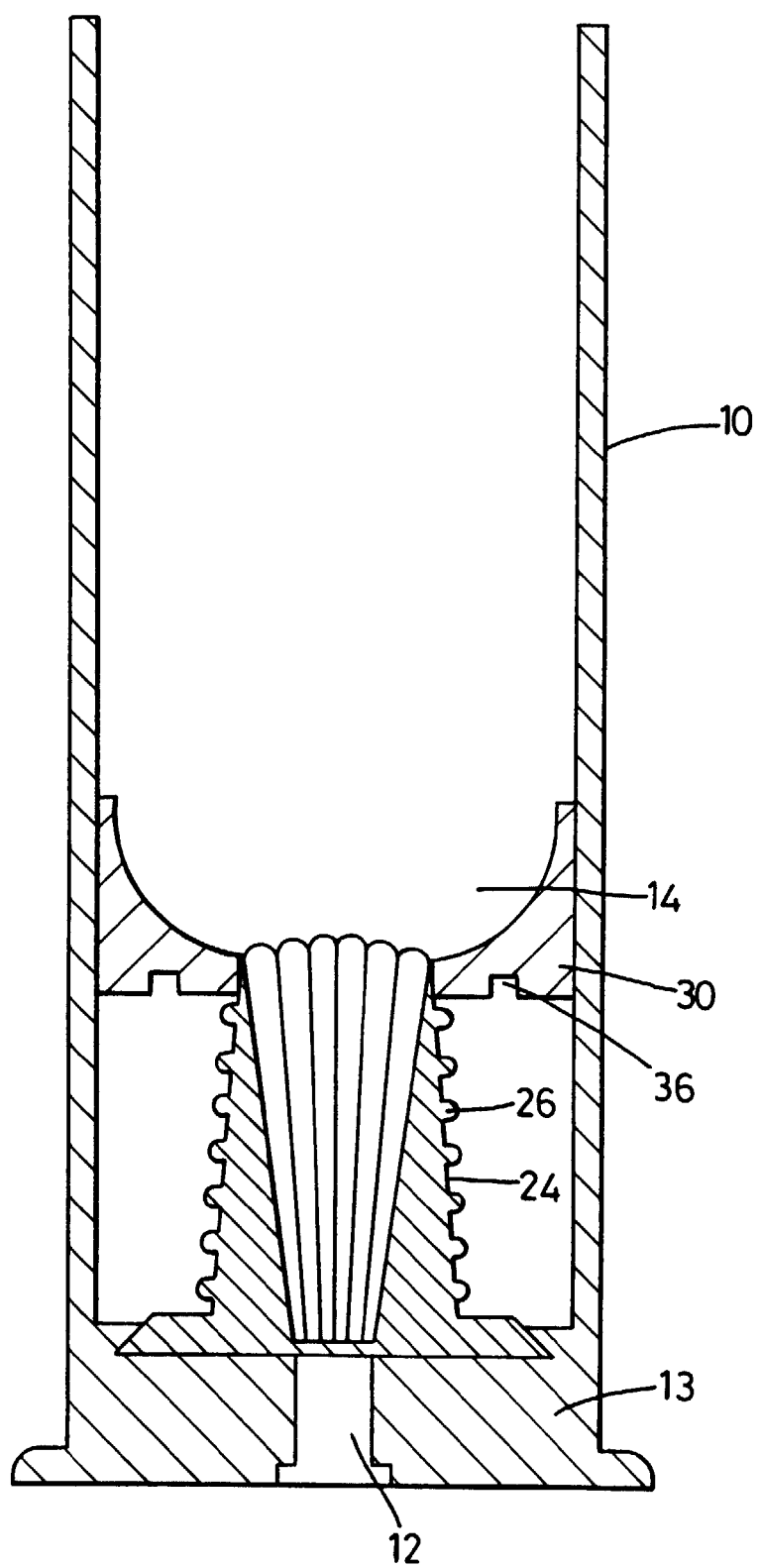


Fig. 3B

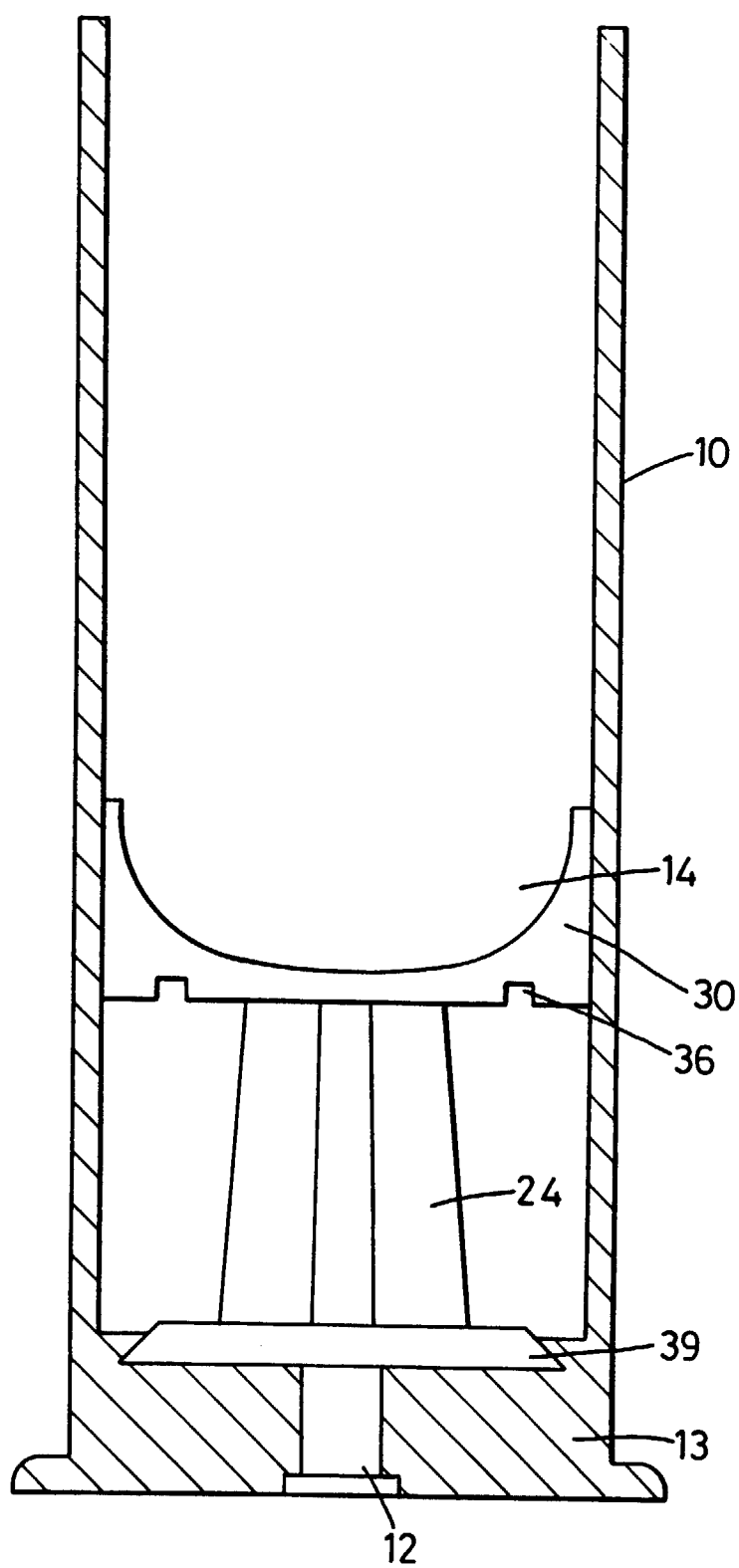


Fig. 5B

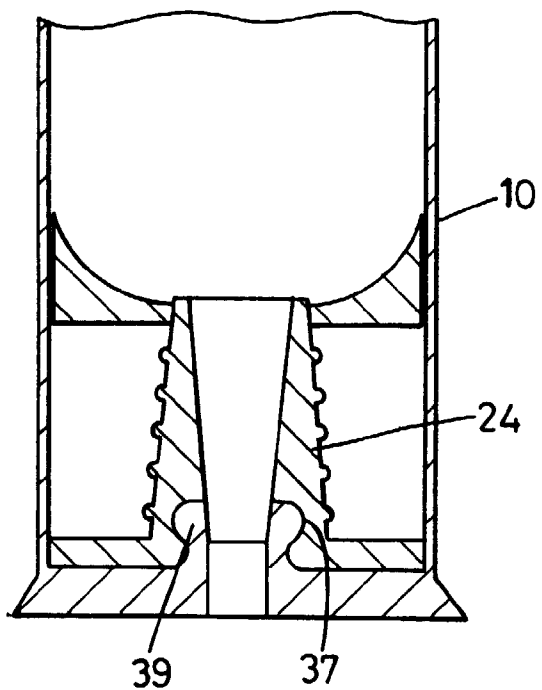


Fig. 8

Fig. 9

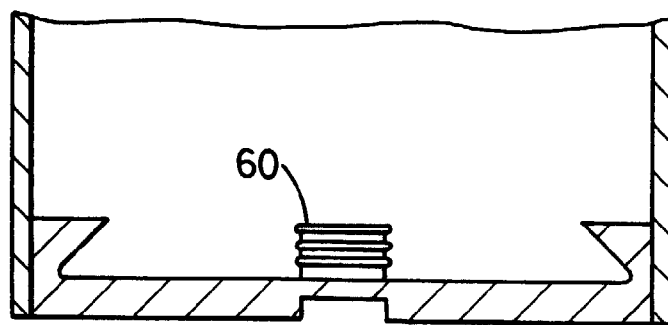
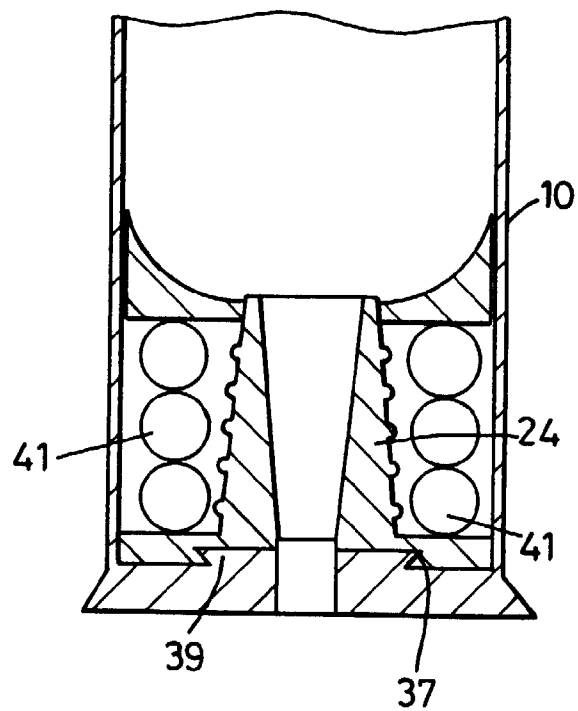


Fig. 13

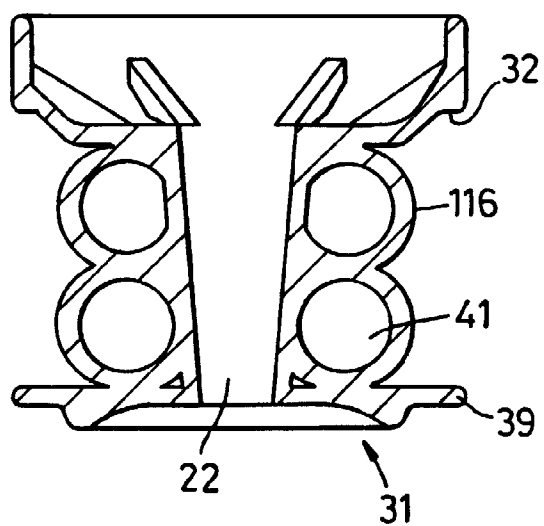
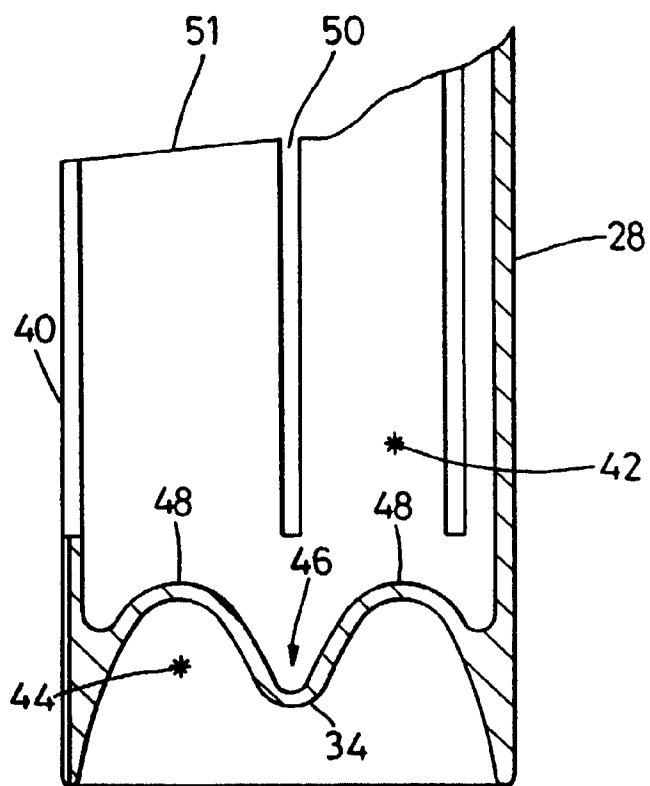


Fig. 10

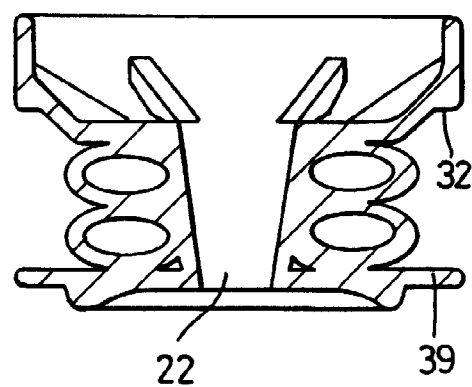


Fig. 10A

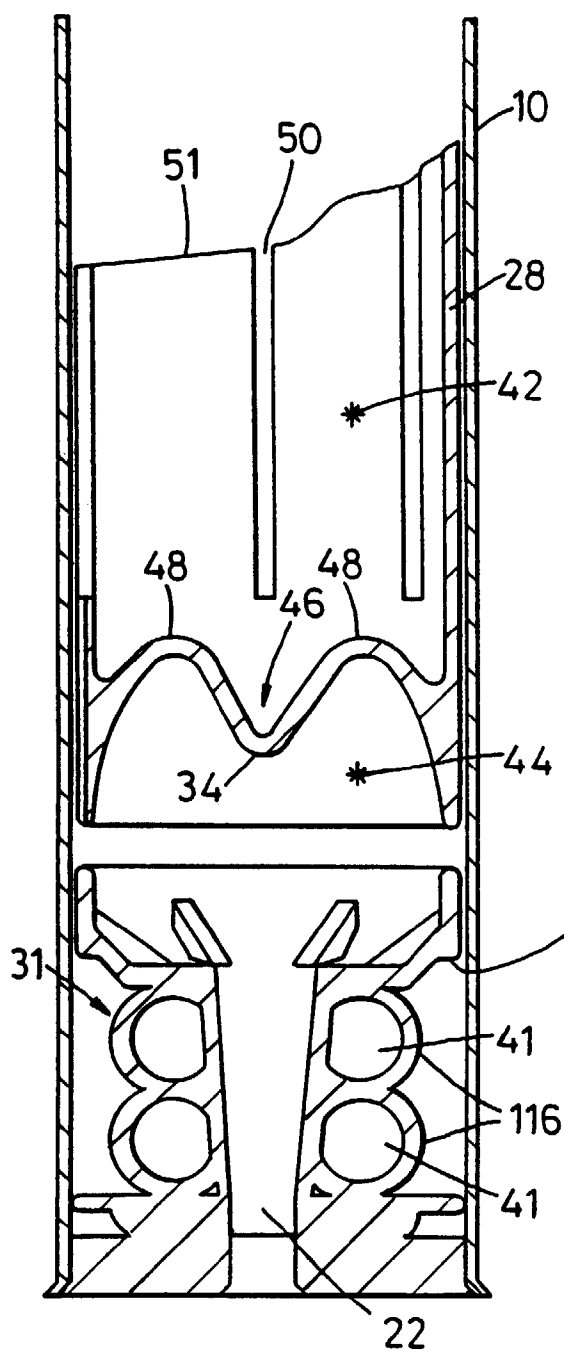


Fig. 11

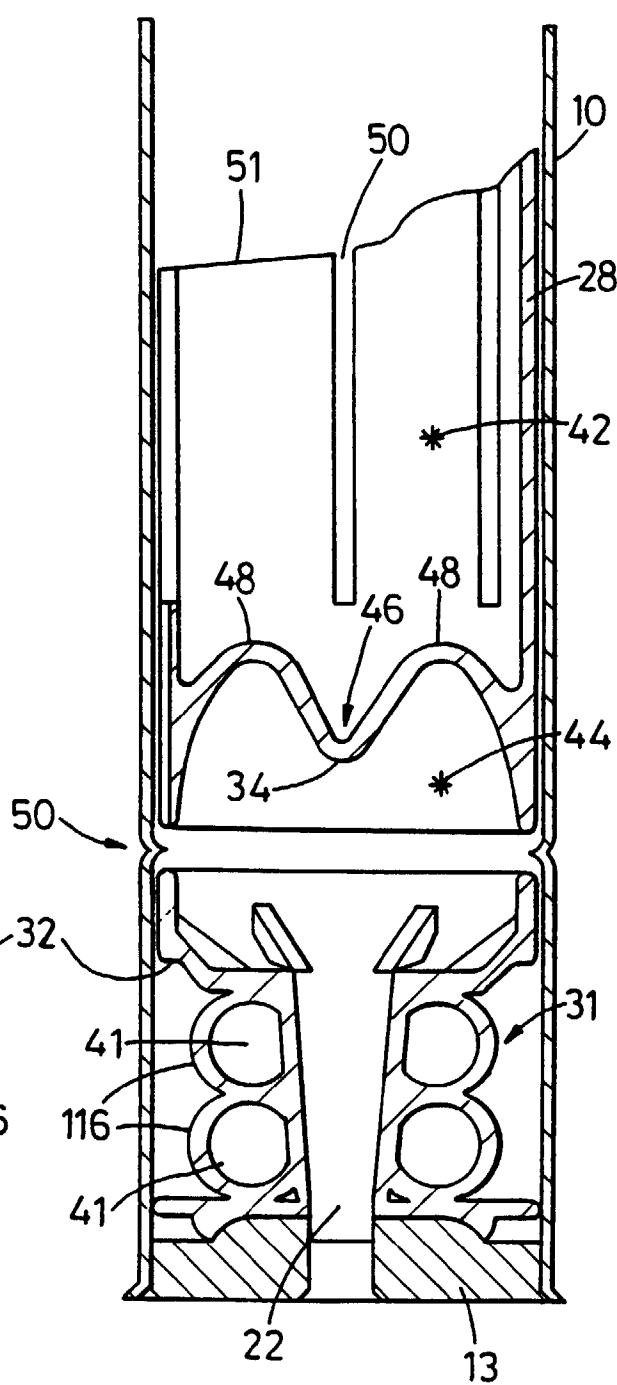


Fig. 12