



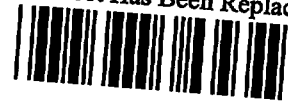
## Device for Fastening a Cartridge Case to a Projectile

The invention relates to a device for fastening a cartridge case to a projectile, in particular a sub-caliber projectile, wherein at least one circumferential groove is provided on an adapter base and the cartridge case can be connected to the adapter base of the projectile by notches on the circumferential groove.

In sub-caliber projectiles, also called adapter base projectiles, the actual projectile body is encased by a so-called adapter base, which is jettisoned shortly after firing. European Patent Application 0 624 774, for example, discloses an adapter base for a fin-stabilized sub-caliber projectile which is composed of an adapter base body and an adapter base shell. For the purpose of fastening the cartridge case, also called equipping with a cartridge, a circumferential groove is provided on the adapter base body; the cartridge case can be connected to the adapter base which supports the projectile by being notched at this point. A connection of this kind must be sealed so that upon ignition, the required high explosive pressure can build up and so that the powder in the cartridge case is protected against the penetration of fluids.

With conventional methods for notching cartridge cases, especially those comprised of sheet steel, devices with radially movable segments are used because of the relatively high forces required. In this case, though, leaky spots can be produced so that the above-described requirements which are placed on a connection of this kind can only be met with additional sealing means.

The object of the invention, therefore, is to propose a device of the kind mentioned at the beginning, by means

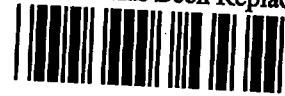


of which a sealed connection can be produced between projectiles and cartridge cases comprised of sheet steel while avoiding the above-mentioned disadvantages.

This object is attained by the invention disclosed in claim 1. To receive the projectile, a thrust piece is provided here, which has a cylindrical extension which protrudes into a bore of a matrix. An elastic ring is disposed in the bore in the region of the circumferential groove and of a shell mouth of the cartridge case. One end face of this elastic ring is oriented toward the cylindrical extension of the thrust piece and its other end face rests, by means of a sealing disk, against two sliders which are guided in the matrix perpendicular to the longitudinal axis of the cartridge. During notching, the matrix with the sliders is pushed against the thrust piece, wherein the elastic ring is compressed over the sealing disk and deformed inward in the radial direction so that the shell mouth is pressed into the circumferential groove.

According to a particular embodiment, the elastic ring is comprised of vulcolan of the adiprene type. The sealing disk is comprised, for example, of hardened spring steel of a thickness of 0.3 mm, wherein the edge of the inner diameter of the sealing disk oriented toward the elastic ring is rounded.

The advantages achieved with the invention are that homogeneous, sealed connections between projectiles and cartridge cases comprised of sheet steel can be produced, with the elastic ring having a long service life. The sealing disk protects the elastic ring from the movements of the sliders and, because of the modest thickness of the sealing disk and the rounded edge, the wear and tear of the elastic ring is very slight during the small movement



toward the sliders. As experiments confirm, in spite of the high forces which occur, at least 5000 cartridge equipping cycles can be achieved without abrasion of any consequence being detectable on the elastic ring.

Further advantages reside in that, because of the long service life, expensive tool changing costs are reduced. The very low abrasion furthermore does not cause the extraction resistance to impair the function of the cartridge.

In the following, the invention will be explained in detail in conjunction with an exemplary embodiment in connection with the drawings. Shown are in:

Fig. 1, a longitudinal section through the device according to the invention,

Fig. 2, a partial section through the device with a closed slider in a position of repose, in a scale which is enlarged in comparison to Fig. 1, and

Fig. 3, a partial section through the device in an operating position, in a scale which is enlarged in comparison to Fig. 1.

In Figs. 1 to 3 a receiving bushing is identified by 1, in which a thrust piece 2 is disposed, which is held in the receiving bushing 1 by a securing ring 3. The thrust piece 2 has a cylindrical extension 4, which protrudes into a bore 5 of a matrix 6, which is likewise disposed in the receiving bushing 1. During the cartridge equipping, which is described in detail below, the thrust piece 2 receives the projectile of a cartridge 7, wherein the projectile tip 8 is guided in a centering piece 9 and a conical part of



the cartridge case 10 is received in the matrix 6. An elastic ring 14, which is comprised for example of vulcolan of the adiprene type, is disposed in the bore 5, in the region of a shell mouth 11 of the cartridge case 10 and circumferential groove 13, which is provided on an adapter base 12 of the of the projectile. The outer diameter of the elastic ring 14 corresponds to the diameter of the bore 5, while its inner diameter is greater than the diameter of the shell mouth 11 or the projectile. The one end face of the elastic ring 14 is the oriented toward the end face of the cylindrical extension 4, while the other end face rests against two sliders 16 via a sealing disk 15. The sliders 16 are guided in the matrix 6, perpendicular to the longitudinal axis 17 of the cartridge 7 and can be moved by means of double-acting cylinders 18, which are fastened to carriers 18.1 and can be pneumatically actuated, for example. The sealing disk 15 is for example comprised of hardened spring steel and has a thickness of 0.3 mm. The outer diameter of the sealing disk 15 corresponds to the diameter of the bore 5, while its inner diameter is greater than the diameter of the shell mouth 11 or the projectile by a small amount of play.

The edge 19 of the inner diameter of the sealing disk 15, which edge is oriented toward the elastic ring 14, is rounded (Figs. 2 and 3). A compression spring 20 is disposed in the receiving bushing 1, which spring rests against a shoulder 21 of the thrust piece 2 on one end and against a shoulder 22 of the matrix 6 on the other end. On its hind end, the cartridge 7 is secured on a base 23, which can be moved along the longitudinal axis 17 of the cartridge 7, by means of a resilient insert 24 and a retainer 25.

The above-described device functions as follows:

The base 23 is lifted by means of a ram cylinder, which can for example be hydraulically actuated and is not shown further, along with the cartridge 7, and the projectile is pushed through the matrix 6 into the thrust piece 2. Then the sliders 16 are pushed inward by means of the two cylinders 18 until they rest against the cartridge case 10. Here, the gap produced by the play between sealing disk 15 and cartridge case 10 is bridged by the sliders 16 (Figs. 2 and 3). Afterward, the receiving bushing 1 and the matrix 6 with the sliders 16 along with it, are lifted by means of a notching cylinder, which for example can likewise be hydraulically actuated and is not shown further, against the stationary thrust piece 2 and the compression spring 20, and the elastic ring 14 is compressed via the sealing disk 15. In this case, the elastic ring 14 is deformed inward in a radial direction and the shell mouth 11 is pressed into the circumferential groove 13 of the adapter base 12 (Fig. 3). In the process, the sealing disk 15 protects the elastic ring 14 against the motion of the sliders 16, wherein during the small movement toward the sliders 16 the abrasion of the elastic ring 14 is very slight because of the rounded edge 19 of the sealing disk 15. After notching, the notching cylinder and then the two cylinders 18 are moved back again so that the receiving bushing 1, the matrix 6, and the two sliders 16 assume the initial position once more. Then the ram cylinder moves back so that the notched cartridge 7 can be removed from the base 23 and a new one can be placed on.

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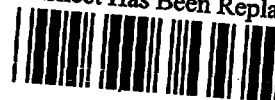
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### Reference Numeral List

- 1 Receiving bushing
- 2 Thrust piece
- 3 Securing ring
- 4 Cylindrical extension
- 5 Bore
- 6 Matrix
- 7 Cartridge
- 8 Projectile tip
- 9 Centering piece
- 10 Cartridge case
- 11 Shell mouth
- 12 Adapter base
- 13 Circumferential groove
- 14 Elastic ring
- 15 Sealing disk
- 16 Slider
- 17 Longitudinal axis
- 18 Double-acting cylinder
- 18.1 Carrier
- 19 Edge
- 20 Compression spring
- 21 Shoulder
- 22 Shoulder
- 23 Base
- 24 Resilient insert
- 25 Retainer

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## Claims



1. A device for fastening a cartridge case to a projectile, in particular a sub-caliber projectile, wherein at least one circumferential groove (13) is provided on an adapter base (12) and the cartridge case (10) can be connected to the adapter base (12) of the projectile by notches in the circumferential groove (13),

characterized in that

- a thrust piece (2), which has a cylindrical extension (4) protruding into a bore (5) of a matrix (6), is provided for receiving the projectile of a cartridge (7),

- an elastic ring (14) is disposed in the bore (5), in the region of a shell mouth (11) of the cartridge case (10) and of the circumferential groove (13),

- the one end face of the elastic ring (14) is oriented toward the end face of the cylindrical extension (4) and the other end face rests against two sliders (16) via a sealing disk (15), which sliders are guided in the matrix (6) perpendicular to the longitudinal axis (17) of the cartridge (7) and

- during notching, the matrix (6) with the sliders (16) is pushed against the thrust piece (2), wherein the elastic ring (14) is compressed via the sealing disk (15) and deformed inward in the radial direction so that the shell mouth (11) is pressed into the circumferential groove (13).

2. The device according to claim 1, characterized in that the elastic ring (14) is comprised of vulcolan of the adiprene type.

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3. The device according to claim 1, characterized in that the sealing disk (15) is comprised of spring steel and the edge (19), oriented toward the elastic ring (14), of the inner diameter of the sealing disk (15), is rounded.

4. The device according to claim 3, characterized in that the sealing disk is comprised of hardened spring steel with a thickness of 0.3 mm.

5. The device according to claim 1, characterized in that the thrust piece (2) and the matrix (6) are disposed in a receiving bushing (1) which, along with the matrix (6) and the sliders (16), is pushed against the stationary thrust piece (2) during notching.

6. The device according to claim 1, characterized in that the cartridge (7) is secured on a base (23), which can be moved along the longitudinal axis (17) of the cartridge (7), by means of a resilient insert (24) and a retainer (25).

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