

Nov. 28, 1967

M. RAMSAY

3,354,780

BREECH SEAL FOR FIREARMS UTILIZING CASELESS AMMUNITION

Filed March 28, 1966

FIG-1

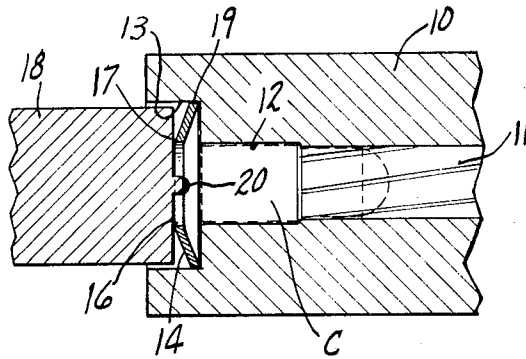


FIG-2

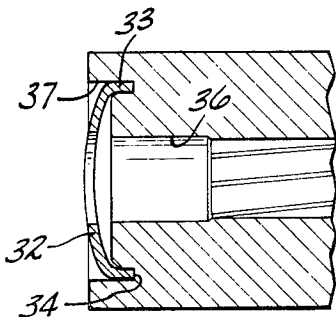
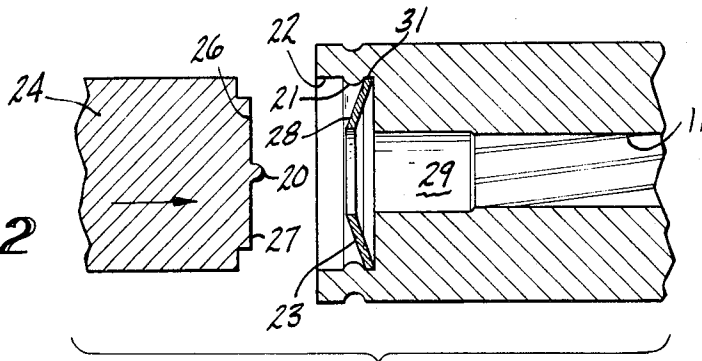


FIG-3

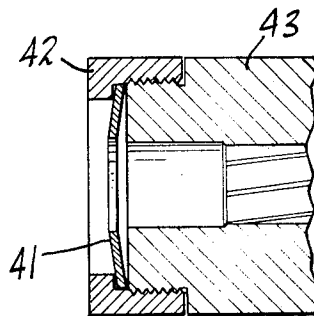


FIG-4

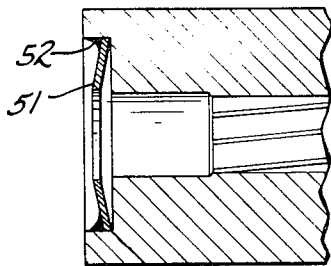


FIG-5

INVENTOR:
MARCUS RAMSAY

BY

R.S. Strickler

ATTORNEY

1

3,354,780

BREECH SEAL FOR FIREARMS UTILIZING CASELESS AMMUNITION

Marcus Ramsay, New Haven, Conn., assignor to Olin Mathieson Chemical Corporation, a corporation of Virginia

Filed Mar. 28, 1966, Ser. No. 538,078
5 Claims. (Cl. 89—26)

ABSTRACT OF THE DISCLOSURE

A breech gas seal for a firearm of the type utilizing caseless ammunition. The gas seal comprises a Belleville type washer sandwiched between the breech bolt and the bore for receiving a round of caseless ammunition so that when the breech bolt is moved towards a chamber closing position the washer is deflected.

The present invention relates to firearms and relates in particular to firearms utilizing caseless ammunition.

The language "caseless" ammunition is intended to designate ammunition where the propellant charge is not included within a brass or paper container or package of the type which is referred to in the art as cased ammunition.

A particular feature of the invention is the provision of a gas seal device for a firearm of the above class.

A particular feature of the invention is the provision of a gas seal device at the junction of the firearm chamber and the face of the breech or bolt which closes the chamber during firing.

An embodiment of the invention embracing certain principles thereof may comprise in combination a barrel having a bore terminating at one end in a chamber, a cooperating breech bolt having a face operative to close the bore, and a Belleville type washer sandwiched between the breech bolt face and the bore, said breech bolt, in the closed position, generating sufficient chamber closing pressure to bring about deflection of the washer.

A Belleville washer is intended to define a circular metallic element having a central aperture wherein the washer has a convex and a concave surface. See Kent's Mechanical Engineering Handbook, 12th edition, Section 11-32.

The present invention is an improvement over the structure disclosed in U.S. Patent 3,114,290, issued Dec. 17, 1963 to Harvey et al.

Other features and advantages of the invention will become more apparent from a study of the succeeding specification when read in conjunction with the appended drawings, in which:

FIG. 1 is a schematic view of a barrel and breech bolt assembly illustrating the principles of the invention;

FIG. 2 is a modification of the arrangement of FIG. 1;

FIG. 3 is a still further modification;

FIG. 4 shows a still further modification; and

FIG. 5 shows a fourth modification.

Referring now to the drawings, reference numeral 10 designates a barrel having a rifled bore 11 terminating at the left end in a chamber 12 operative to receive a round of caseless ammunition, the outline of which is represented by dotted lines and is indicated by the letter C.

The barrel 10 is further formed with a counterbore 13 providing a seat for a Belleville washer 14. The Belleville washer 14, formed with a circular opening 16 having a diameter equal to or greater than the diameter of the chamber 12, is positioned so that its convex face contacts the breech face 17 of a breech bolt 18.

2

The assembly shown in FIG. 1 represents a ready-to-fire position; upon firing the breech bolt 18 is urged towards the chamber 12 to effect deflection of the Belleville washer 14 with the result that the periphery of the washer as at 19 effects a gas tight seal at the junction of the washer and the counterbore 13, while the inner margin of the washer immediately surrounding the opening 16 deflects to bring this margin into areal contact with breech face 17 to effect a gas seal at the inner faces of the breech face and the washer. The projection 20 acts as a firing pin when it impacts with the round of ammunition.

The peripheral seal develops because the outer diameter of the washer increases as the washer deflects.

If desired, the arrangement of FIG. 1 can be so dimensioned that the Belleville washer 14 makes a light press fit with the counterbore 13 to retain the washer fixed in the counterbore 13 when breech bolt 18 is in the open position.

The modification of the invention shown in FIG. 2 includes a plurality of inwardly projecting protuberances or a continuous inwardly projecting bead 21 formed in the counterbore 22 utilized to retain Belleville washer 23 in position in the counterbore.

In this arrangement, the outside diameter of the Belleville washer may be dimensioned so as to provide a running fit with respect to the internal diameter of the counterbore 22 in that the protuberance 21, which is formed after insertion of the Belleville washer, is sufficient to retain the washer in position.

A further modification embraces the breech bolt 24 which is formed with a raised head 26 (FIG. 2) defining an annular flat surface 27 operative to engage and deflect a corresponding surface indicated by the reference numeral 28 on the convex face of washer 23.

Thus, as described in connection with the FIG. 1 embodiment, the breech bolt 24 moves to the right to close chamber 29; surfaces 27 and 28 make areal contact to effect a gas seal at their inner surface. Correspondingly, the outer diameter of the washer increases to make a gas seal with counterbore 22 as indicated by the reference numeral 31.

The FIG. 3 embodiment of the invention discloses a different method for adapting the Belleville washer to the barrel wherein the washer at its outer diameter is formed with a curved lip defining a circular rim or skirt 33. This skirt is received in a mating annular undercut indicated by the reference numeral 34.

Upon deflection of the Belleville washer 32 of FIG. 3 by the action of a breech bolt when its face is moved into contact with the washer to close the chamber 36, the washer tends to urge circular skirt 33 into areal contact with circular side wall 37 of undercut 34 so that upon firing a caseless round in chamber 36 gas pressure generated tends to urge the inner margin of the washer into areal contact with the face of the breech bolt, and also urges the outer surface of the skirt 33 into areal contact with the annular side wall 37.

The significance of the FIG. 3 embodiment of the invention is that by providing the circular skirt 33 it is possible to develop areal contact between the barrel and the washer and the breech bolt and the washer.

Note that the gas seal effected by the FIG. 1 and FIG. 2 embodiments effects areal contact at the breech face but only line contact at the junction of the washer and the counterbore.

In the FIG. 4 embodiment of the invention, the Belleville washer 41 is secured by a cap 42 which makes a forced, swaged or threaded sleeve with the barrel 43.

In the FIG. 5 embodiment, the Belleville washer 51 is secured by a weld 52.

It is anticipated that the caseless round C can be activated by use of compressed air thereby eliminating the need for the projection 20 on the breech bolt 18.

It is anticipated that a number of modifications and design changes may be devised in the present invention without departing from the spirit and scope thereof.

What is claimed is:

1. In a firearm of the type utilizing caseless ammunition, a breech gas seal device comprising in combination a barrel having a bore for receiving and chambering a round of caseless ammunition, a cooperating breech bolt operative to close the bore, and a Belleville type washer sandwiched between the breech bolt and the bore so that when the breech bolt is moved towards a chamber closing position the washer is deflected.

2. The seal device of claim 1 wherein the Belleville washer is disposed in a counterbore and is formed with a central opening at least as large as said barrel bore and disposed concentrically therewith.

3. The device of claim 1 wherein the Belleville washer is positioned in a counterbore formed in the barrel and a convex face of the washer is operative to make face to face contact with the face of the breech bolt.

4. The device of claim 1 wherein the Belleville washer is disposed in a counterbore formed in the chamber end of the barrel and the counterbore is formed with an annular array of inwardly projecting protuberance means effective to retain the Belleville washer within the counterbore.

5. The device of claim 1 wherein the barrel is formed with a circular undercut or groove concentric with and radially spaced from the bore and said Belleville washer is formed with a skirt operative to be received in said groove.

No references cited.

BENJAMIN A. BORCHELT, *Primary Examiner.*