

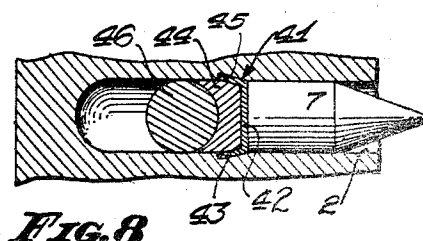
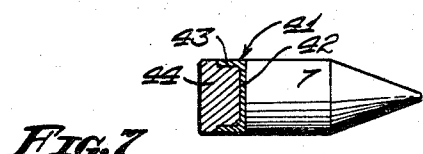
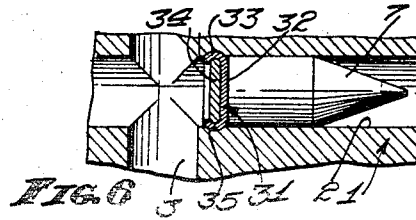
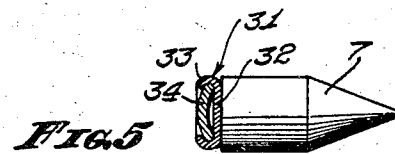
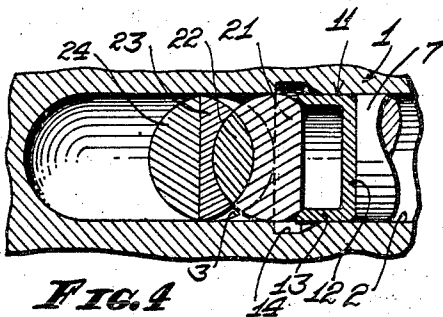
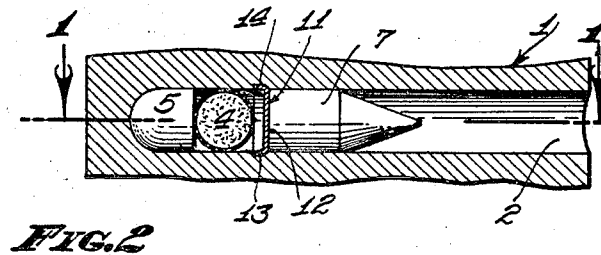
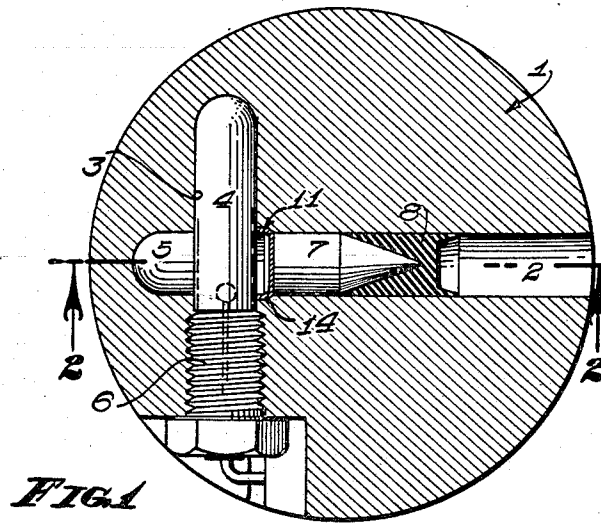
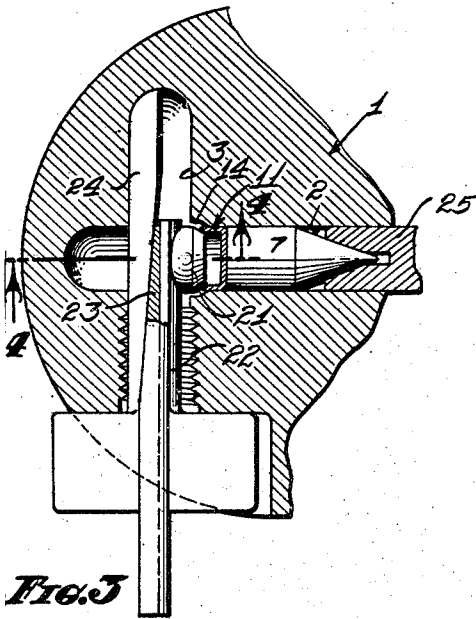
Sept. 29, 1942.

A. J. ZSCHOKKE

2,296,971

BULLET RETAINER FOR GUN PERFORATORS

Filed Feb. 14, 1941



ARTHUR J. ZSCHOKKE
INVENTOR
BY *Clarence Spencer*
ATTORNEY

UNITED STATES PATENT OFFICE

2,296,971

BULLET RETAINER FOR GUN PERFORATORS

Arthur J. Zachokke, Huntington Park, Calif., assigner to Lane-Wells Company, Los Angeles, Calif., a corporation of Delaware

Application February 14, 1941, Serial No. 378,891

8 Claims. (Cl. 164—9.5)

My invention relates to bullet retainers for gun perforators, and among the objects of my invention are:

First, to provide a bullet retainer which is particularly designed for use in a gun perforator of the type shown in the Turechek Patent No. 2,216,145 and in the Barmum Patent No. 2,216,151;

Second, to provide a bullet retaining means which serves both to hold the bullet against inward movement by reason of hydrostatic pressure exerted by liquid in which the gun is immersed and to resist momentarily internal pressures when the gun cartridge is fired, which has the effect of increasing acceleration of the bullet and, consequently, its penetrating power;

Third, to provide a bullet retainer which is secured to the bullet and inserted therewith, and then expanded radially to secure the bullet;

Fourth, to provide a bullet retainer and novel means of expanding the retainer after the bullet has been inserted; and

Fifth, to provide a bullet retainer which tends to form a sealing ring around the base end of the bullet during discharge of the bullet so as to minimize the flow of the explosive gases past the sides of the bullet.

With the above and other objects in view, as may appear hereinafter, reference is directed to the accompanying drawing, in which:

Figure 1 is a transverse sectional view through 1—1 of Figure 2 of a gun perforator body of the type shown in the hereinbefore mentioned patents and which incorporates my invention;

Figure 2 is a fragmentary longitudinal sectional view thereof, through 2—2 of Figure 1;

Figure 3 is a fragmentary transverse sectional view similar to Figure 1, showing the manner in which the bullet retainer is expanded into position;

Figure 4 is an enlarged fragmentary sectional view through 4—4 of Figure 3;

Figure 5 is a sectional view of a modified form of bullet retainer, with the bullet shown in elevation;

Figure 6 is a similar view thereof but showing the retainer in its expanded position within a gun bore;

Figure 7 is a transverse sectional view through a further modified form of bullet retainer, the bullet being shown in elevation; and

Figure 8 is a similar sectional view thereof showing the bullet in position in the gun body and indicating also the anvil employed to deform the retainer.

With reference first to the construction shown

in Figures 1, 2, 3 and 4, the gun perforator which incorporates my invention comprises a gun body 1 of cylindrical form in which are drilled laterally a plurality of gun bores 2. Each gun bore is intersected near its inner end by a cartridge bore 3 which receives a main cartridge 4. The inner end of the gun bore receives an auxiliary or secondary cartridge 5. The outer end of the cartridge bore 3 is threaded and receives a plug 6. A bullet 7 fits each gun bore. The outer end of the bullet is covered by a sealing member 8 formed of rubber or similar material.

My invention concerns retaining means secured to the inner end of the bullet. In Figures 1 through 4 this takes the form of a bullet retainer 11 stamped from sheet material to form a base 12 which is spotwelded or otherwise secured to the bullet and a skirt 13 which initially has a diameter equal to that of the bullet, so that the bullet may be inserted through the gun bore. Adjacent the cartridge bore 3 the gun bore 2 is counterbored to form a rudimentary groove 14, into which the skirt 13 of the retainer may be expanded. This is accomplished, as shown in Figures 3 and 4, by means of a forming anvil 21 which is adapted to be inserted through the cartridge bore 3. The forming anvil is equal in diameter to the cartridge bore and provided with a conical end for coaction with the skirt 13 of the bullet retainer. The anvil is so shaped that it may be inserted and removed from the cartridge bore and may be provided with a suitable handle 22. The anvil is backed by a pair of coacting wedge members 23 and 24, one of which is stationary and the other may be driven into the cartridge bore for forcing the forming anvil forward into the gun bore to expand the skirt 13. A driving bar 25 is adapted to be inserted in the gun bore and forced or struck with a hammer to drive the retainer over the anvil.

By driving inwardly on the drive bar and bullet, while the forming anvil is in the position shown in Figures 3 and 4, the rear extremity of the skirt may be caused to expand initially into the counterbore 14, whereupon the anvil may be driven forwardly while the skirt is held to further shape the skirt into conformity with the counterbore 14 until it assumes the position shown in Figures 1 and 2.

The retainer when deformed into the counterbore bears against the shoulders which define the counterbore and holds the bullet against either inward or outward movement and is sufficiently strong to prevent inward movement of the bullet by reason of the hydrostatic pressure of the liquid

in which the gun perforator may be submerged. In this connection, it should be noted that a gun perforator may be submerged to depths greater than 10,000 feet and, therefore, subjected to a hydrostatic pressure of several thousand pounds per square inch.

When the cartridge is ignited the retainer resists the initial pressures to give time for more complete combustion, with the result that when the retainer does give way greater acceleration is imparted to the bullet. This is particularly desirable for the reason that the gun barrel length is necessarily limited so that the acceleration of the bullet must be as rapid as possible.

Reference is now directed to Figures 5 and 6: the retainer 31 serves the same purpose as the first described retainer. The modified construction comprises a base 32, spotwelded or otherwise secured to the bullet 7, and a partially curved or rolled rim 33. Fitted within the rim 33 is an expander disk 34 which is initially cupped, with its margins held by the rim 33 and its central portion extending outwardly from the bullet. The initial diameter of the retainer 31 is equal to that of the bullet so that it may be inserted into the gun bore. At the inner end of the gun bore there is provided a rounded rudimentary groove 35 into which the rim 33 is expanded when the expander disk 34 is pressed flat, as shown in Figure 6. This may be accomplished by an anvil arrangement (not shown) similar to that shown in Figures 2 and 3. It will be observed that only a rudimentary groove is required. However, a material amount of the metal comprising the retainer must be sheared before the bullet is released, for the internal pressure of the ignited cartridge tends to maintain the expander disk flat and the pressure within the rim tends to expand it further into the groove.

Reference is now directed to Figures 7 and 8: the construction here shown comprises a retainer 41 having a base 42 and a rim or skirt 43 having an initial diameter equal to that of the bullet. This rim or skirt is similar to that shown in the first described structure. The retainer is filled, however, with an expander plug 44 formed of lead or other comparatively soft material. The plug extends beyond the rim 43. The rim 43 is expanded into a counterbore 45 by driving the bullet inwardly so that the expander plug 44 engages an anvil 46 inserted through the cartridge bore. The anvil in this case may be merely a cylindrical rod. The expander plug 44 is deformed in forcing the rim 43 radially, the inner end of the expander plug conforming to the surface of the anvil, as shown best in Figure 8.

In the several constructions shown, it is intended that the secondary cartridge 5, if such is provided, be inserted through the cartridge bore 3 after the bullet has been positioned. However, it is possible to insert the cartridge first, providing an explosive which is not readily detonated by shock is employed.

Various changes and alternate arrangements may be made within the scope of the appended claims, in which it is my intention to claim all novelty inherent in the invention as broadly as the prior art permits.

I claim:

1. The combination with a gun perforator having a gun bore in which is formed a counterbore, and a gun perforator bullet, of a retainer comprising: a cup-shaped disk secured to the base

end of said bullet, and having an integral annular skirt, said skirt having initially a diameter equal to the bullet whereby the bullet may be inserted through said gun bore and said skirt adapted to be deformed radially into said counterbore to secure said bullet in the gun bore.

2. The combination with a gun perforator having a gun bore in which is formed a counterbore, and a gun perforator bullet, of a retainer comprising: a cup-shaped disk secured to said bullet, and having an integral skirt fitting said counterbore.

3. The combination with a gun perforator having a gun bore and a traversing crossbore, and a bullet fitting said gun bore, of a bullet retainer comprising: means defining a counterbore adjacent said cross bore; and a retainer member secured to said bullet and having an integral marginal skirt deformed into said counterbore.

4. The combination with a gun perforator having a gun bore and a cartridge chamber in communication therewith, and a bullet, of a bullet retainer comprising: means defining a counterbore near the inner end of said gun bore; and a retainer member secured to said bullet and having a marginal portion deformed into said counterbore.

5. The combination with a gun perforator having a gun bore and a cartridge chamber in communication therewith, and a bullet, of a bullet retainer comprising: means defining a counterbore near the inner end of said gun bore; a retainer secured to said bullet and having an initial diameter fitting the normal diameter of said gun bore; and means for deforming said retainer into locking engagement with the walls of said counterbore.

6. The combination with a gun perforator having a gun bore and a cartridge chamber in communication therewith, and a bullet, of a bullet retainer comprising: means defining a counterbore near the inner end of said gun bore; a cup-shaped retainer secured to the bullet and having an initial diameter permitting passage through said gun bore; and an expander carried by said retainer for urging the margins of said retainer into said counterbore.

7. The combination with a gun perforator having a gun bore and a cartridge chamber in communication therewith, and a bullet, of a bullet retainer comprising: means defining a counterbore near the inner end of said gun bore; a cup-shaped retainer secured to the bullet and having an initial diameter permitting passage through said gun bore; an expander carried by said retainer for urging the margins of said retainer into said counterbore; said expander being a deformable plug of relatively soft material.

8. The combination with a gun perforator having a gun bore and a cartridge chamber in communication therewith, and a bullet, of a bullet retainer comprising: means defining a counterbore near the inner end of said gun bore; a cup-shaped retainer secured to the bullet and having an initial diameter permitting passage through said gun bore; an expander carried by said retainer for urging the margins of said retainer into said counterbore; said expander being initially in the form of a convex disk fitting within said retainer and adapted when flattened to expand said retainer radially.

ARTHUR J. ZSCHOKKE.