May 2, 1967 E. C. HERKNER 3,316,780

BROKEN RIFLE SHELL EXTRACTOR

Filed Jan. 14, 1966

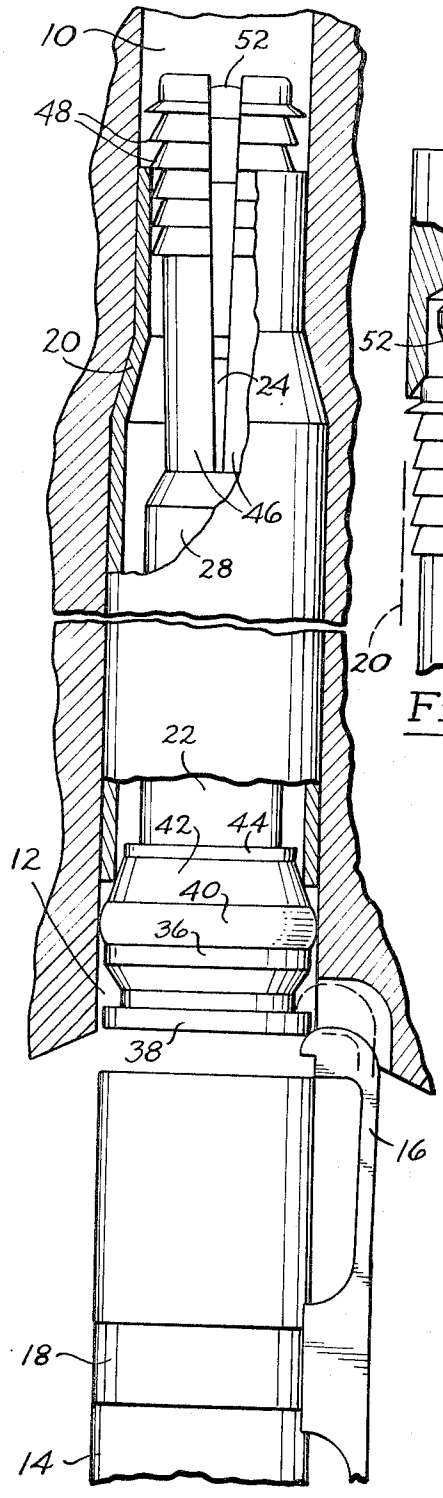


Fig. 4.

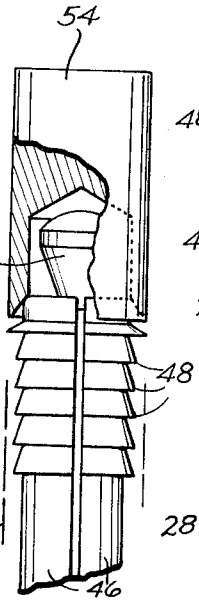


Fig. 5.

Fig. 1.

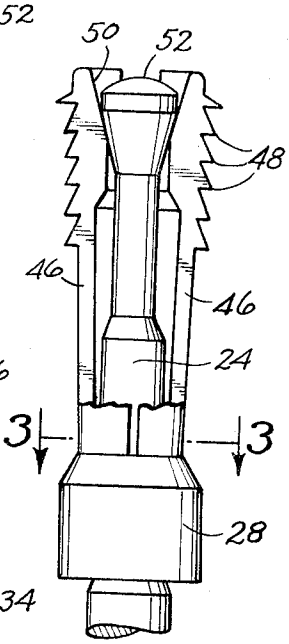


Fig. 2.

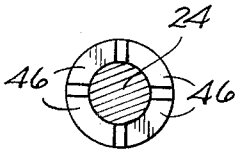


Fig. 3.

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BROKEN RIFLE SHELL EXTRACTOR

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This invention relates to an exterior for removing from a rifle chamber the broken forward end of a discharged shell which has become lodged in the chamber.

The extractor of the invention is adapted for use particularly in conjunction with a rifle of the class provided with a bolt reciprocatable between retracted and advanced positions and provided with a forwardly extending latching finger. In the normal use of the rifle, upon advancement of the bolt the finger snaps over the annular rim of the bullet contained in the chamber. After the bullet has been fired, the bolt is withdrawn. Thereupon the finger acts to withdraw the empty shell from the chamber, preliminary to introducing a second bullet into the chamber.

Not uncommonly during the sequence the shell fractures, with the result that upon retraction of the bolt the head only of the shell is removed, leaving the forward portion of the shell firmly lodged in the forward portion of the chamber.

It is the general purpose of the present invention to provide an extractor for use in such a contingency, the extractor engaging the lodged forward portion of the shell and withdrawing it from the chamber.

It is another object of the present invention to provide a broken shell extractor which may be inserted inside the broken shell fragment and thereafter positively engaged by the latching finger of the rifle bolt so that the shell fragment may be removed quickly and efficiently.

It is still another object of the present invention to provide a broken shell extractor which by a simple adjustment may be adapted for use with shells having diameters varying over a wide range.

Still a further object of the present invention is the provision of a broken shell extractor which engages the broken shell piece positively, regardles of its diameter or position.

The manner in which the foregoing and other objects of this invention are accomplished will be apparent from the accompanying specification and claims considered together with the drawings, wiherein:

FIG. 1 is a view in elevation, partly in section, illustrating the construction of the presently described rifle shell extractor;

FIG. 2 is a fragmentary view of the extractor of FIG. 1 in its expanded condition;

FIG. 3 is a transverse sectional view taken along line 3—3 of FIG. 2;

FIG. 4 is a fragmentary view, partly in section, of a rifle, illustrating the extractor of the invention inserted in a broken rifle shell lodged in the rifle chamber, preparatory to withdrawing the extractor and shell from the chamber; and

FIG. 5 is a fragmentary view, partly in section, of a cap for use in collapsing the extractor when removing an extracted shell fragment therefrom.

Broadly stated, the rifle shell extractor of my invention comprises a stepped spindle having a rearward segment of enlarged diameter and a forward segment of lesser diameter. A head provided with an annularly flanged rim dimensioned for engagement by the latch finger of the rifle bolt is present on the rearward spindle segment.

A radially arranged resilient ring is seated on the head a spaced distance from the spindle rim. The ring is dimensioned for frictional engagement with the bore of the rifle chamber.

An expandable sleeve is mounted for longitudinal sliding movement on the forward segment of the spindle. The forward end of the sleeve is positioned forwardly of the forward end of the shell fragment and is provided with engagement means for engaging the same.

Wedge means are positioned on the forward end of the forward spindle segment forwardly of the sleeve.

Accordingly the extractor may be inserted in the shell fragment, beyond the innermost end thereof. Upon advancing the rifle bolt, the latching finger thereof engages the rim of the extractor. Upon withdrawing the latching bolt, the finger withdraws the spindle, first drawing the wedging head thereof within the sleeve, expanding the latter and engaging it with the broken shell fragment. Continued withdrawal of the bolt then withdraws both the extractor and the shell fragment from the rifle chamber.

Considering the foregoing in greater detail and with particular reference to the drawings:

As illustrated in FIG. 1, the presently described extractor is adapted for use with a rifle having a barrel **10**, a bullet chamber **12**, a bolt **14** and a forwardly-extending, resilient, latching finger **16** mounted on the bolt by means of band **18**. The rifle is illustrated in fragmentary fashion after having been fired. Operation of the bolt has removed the head only of the discharged shell, leaving wedged in chamber **12** a shell or cartridge fragment **20**.

As seen particularly in FIGS. 1, 2 and 3, the basic components of the presently described shell fragment extractor are a spindle divided longitudinally into a rearward segment **22** of relatively large diameter and a forward segment **24** of relatively restricted diameter, and a split sleeve **28** mounted for sliding longitudinal movement on forward segment **24** of the spindle. The entire assembly is dimensioned for insertion into the rifle chamber with the forward end of the assembly penetrating completely the lodge shell fragment.

Rearward segment **22** of the spindle is drilled longitudinally and tapped to provide a threaded bore **30** which receives the threaded rearward end **32** of spindle segment **24**. The two segments thus may be adjusted to any desired length, within the limits of the threads, and maintained in this position of adjustment by means of a lock nut **34** also threaded on portion **32** of segment **24**.

Rearward segment **22** of the spindle is provided with a head **36** of enlarged diameter. Head **36** in turn is formed with an integral, annularly flanged rim **38** dimensioned for engagement with latching finger **16** of the rifle bolt in the same manner as the head of the rifle shell is engaged thereby.

Means are provided on head **36** for engaging the head with the bore of the rifle chamber to permit positive latching of finger **16** over flanged rim **38**.

As viewed in the drawings, the means employed for this purpose comprise a ring **40** seated centrally of the head and arranged radially thereof. Ring **40** is secured in place by means of a spacer **42** and lock washer **44**.

Ring **40** has an outside diameter which is greater than the outside diameter of any other component of the extractor assembly. Its outside diameter in fact is somewhat larger than the internal diameter of rifle chamber **12**. Accordingly it is fabricated from wear resistant material such as resilient natural or synthetic rubber, or a resilient synthetic fibre such as superpolyamide (nylon). If desired, however, it can be made of a coil spring or resiliently formed metal parts.

Resilient ring **40** insures gripping of the extractor head with the bore of the rifle chamber upon being pressed into the chamber. Means also are provided for insuring that

split sleeve **28** positively grips the forward end of the broken shell.

To this end, sleeve **28** is provided with a plurality of resilient leaves **46**, each comprising a quarter of a circle, as shown in FIG. 3. The leaves are rigid to sleeve **28** at their inner extremities. At their outer extremities they are formed with a plurality of radial serrations **48**, any one of which is adapted to abut against the inner end surface of the broken shell when engaged therewith. The forward, inner surfaces of leaves **46** are outwardly flared to form cooperating wedging surfaces **50**.

Engagement of radial serrations **48** with the broken shell is achieved by expanding the leaves to an enlarged diameter, i.e. from the position of FIG. 1 to the position of FIG. 2. This result is obtained by providing a wedge **52** on the forward end of spindle segment **24**. When the spindle is drawn inwardly relative to the sleeve, wedge **52**, acting on internal wedging surfaces **50** of leaves **46**, expands the leaves to the expanded condition of FIG. 2.

Advantage is taken of the expansion capacity of the leaves to engage and remove broken shell **20** from the rifle chamber. The manner in which this is accomplished is shown in FIGS. 4 and 5.

After the rifle has been fired and the broken head of the discharged shell removed, the breech of the rifle is opened and the presently described extractor inserted in the chamber until the forward end of the extractor extends beyond the forward end of the broken shell.

It will be noted that when the extractor has been threaded into the shell, resilient ring **40** on head **38** of the extractor is compressed and firmly engages the side walls of the rifle chamber. As a consequence, when bolt **44** is advanced, the extractor remains securely in place while resilient finger **16** snaps over flanged rim **38**. In the absence of this provision, finger **16** would tend to push the entire extractor forwardly, without engaging the flange.

With finger **16** securely latched over flange **38**, the bolt now is withdrawn. This draws wedge **52** within expanding leaves **46** of sleeve **28**. The resulting wedging action expands the leaves to the positions of FIGS. 2 and 4 wherein serrations **48** engage the forward end of shell fragment **20**.

It is to be observed particularly that during the wedging action the substantial duration of wedge surfaces **50** insures that the serrations will engage the end of shell over a substantial range of shell diameters. This is of considerable importance since it is not an uncommon occurrence to find a shell which is oversize or undersize.

It also is to be noted particularly that by the simple expedient of supplying the spindle segments in a range of sizes, two segments of selected size may be coupled together as required to adapt the tool to any shell size.

After expansion of serrated leaves **46** by the action of wedge **52**, bolt **14** is withdrawn in the usual manner. This withdraws also the entire extractor assembly, as well as shell fragment **20**, thus clearing the rifle chamber of the shell fragment.

Resilient leaves **46** of sleeve **28** then are collapsed, using wedging cap piece **54** (FIG. 5) for this purpose, after which the extractor is removed from the shell fragment. This completes the cycle and prepares the extractor for a subsequent use.

It is to be understood that the form of my invention herein shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to without

departing from the spirit of my invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. For use in extracting a rimless, discharged shell fragment from the chamber of a riffle fitted with a bolt reciprocatable between retracted and advanced positions and provided with a forwardly extending latching finger normally engageable in the advanced position of the bolt with the annularly flanged rim of an unbroken discharged shell for withdrawing the same from the rifle chamber, an extractor insertable into the chamber and comprising:

(a) a stepped spindle having a rearward segment of enlarged diameter and a forward segment of lesser diameter and on the rearward segment a head provided with an annularly flanged rim dimensioned for engagement by the latching finger of the riffle bolt,

(b) a radially arranged resilient ring seated on the head a spaced distance from the spindle rim,

(c) the ring being dimensioned for frictional engagement with the bore of the rifle chamber,

(d) an expandable sleeve mounted for longitudinal sliding movement on the forward segment of the spindle,

(d) the forward end of the sleeve being provided with engaging means for engaging the fragment,

(f) and wedge means positioned on the forward end of the forward spindle segment forwardly of the sleeve for wedging engagement with the sleeve upon relative longitudinal movement of the spindle and sleeve induced by shifting the bolt to its retracted position, thereby expanding the sleeve into gripping engagement with the shell fragment and withdrawing the fragment from the rifle chamber upon withdrawal of the extractor therefrom.

2. The extractor of claim **1** wherein the resilient ring comprises a ring of compressible plastic material.

3. The extractor of claim **1** wherein the resilient ring comprises superpolyamide resin.

4. The extractor of claim **1** wherein the resilient ring comprises a rubber material.

5. The extractor of claim **1** wherein the spindle is formed in two telescoping parts threaded one into the other for longitudinal adjustment.

6. The extractor of claim **1** wherein the spindle is formed in two telescoping parts threaded one into the other for longitudinal adjustment and including lock nut means threaded onto one of the spindle parts for locking the parts in the predetermined position of adjustment.

7. The extractor of claim **1** wherein the engaging means on the forward end of the sleeve for engaging the shell case comprises a plurality of longitudinally extending serrated leaves.

8. The extractor of claim **1** wherein the wedge means comprises an end of the spindle segment formed with a slow taper predetermined to expand the sleeve over a wide range of diameters, thereby fitting the extractor for the removal of shell fragments having a corresponding range of diameters.

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