June 14, 1949. J. D. HOWELL 2,473,373 (E-1029)

BOLT HEAD AND EXTRACTOR FOR FIREARMS

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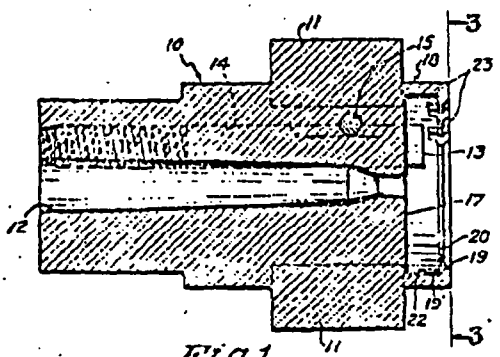

Fig. 1

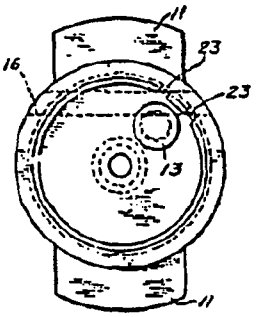

Fig. 2

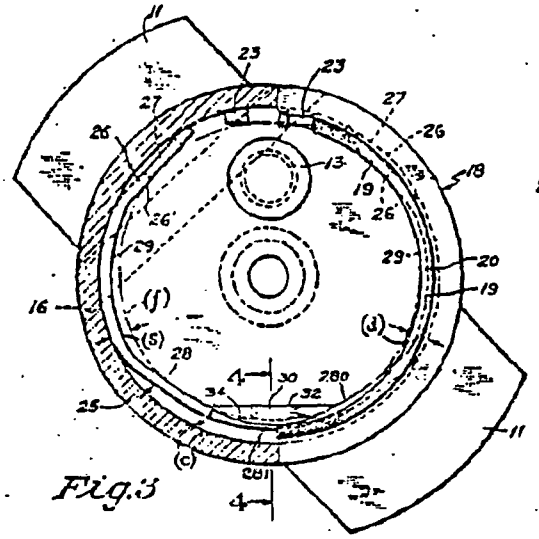

Fig. 3

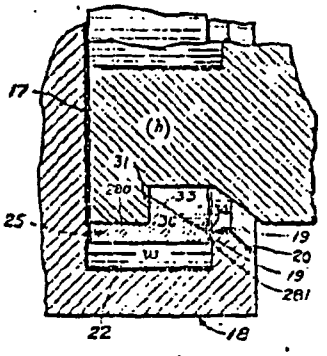

Fig. 4

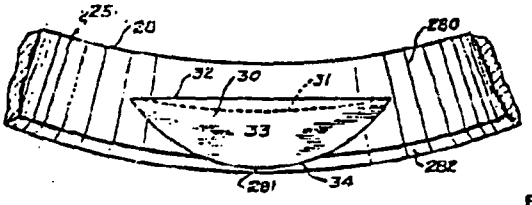

Fig. 5

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BOLT HEAD AND EXTRACTOR FOR FIREARMS

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7 Claims. (Cl. 42—25)

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The present invention relates, in general, to firearms, and, more especially, to an improved ring extractor applicable to breech loading bolt action guns.

An object of the invention is the provision of an improved extractor of simple and inexpensive construction. A further object is to provide an improved extractor adapted to be readily assembled and secured on the face of the bolt of a bolt action firearm. A still further object is to provide an improved ring extractor for assembly in a groove in the face of a breech bolt, the construction and arrangement of the ring and groove being such as to preclude excessive tolerance build-up. A still further object is to provide an improved ring extractor having an extracting claw arranged to have transverse movement only.

These and other objects, features and advantages of the invention will be more particularly described hereinafter, reference being made to the accompanying drawing, in which:

Fig. 1 is a side elevation in section of a bolt head having a ring extractor groove formed on its face.

Fig. 2 is a front elevation of the bolt head shown in Fig. 1.

Fig. 3 is an enlarged fragmentary view partly in section in the direction of arrows 3—3 of Fig. 1, including the novel ring extractor of this invention. The circumference of a cartridge head is indicated by the broken line *f*.

Fig. 4 is a fragmentary section on line 4—4 of Fig. 3, including a fragmentary cartridge case head.

Fig. 5 is a fragmentary perspective view of the extractor ring showing the extracting claw.

Referring to Fig. 1, 10 is a head of a bolt, and, in this exemplary embodiment, is separable from the body portion of the bolt (not shown). It will be understood, however, that the invention is applicable to either a single part or two part bolt and irrespective of whether the bolt is formed with locking projections at its front end or elsewhere. The bolt head, shown in Fig. 1, has diametrically opposite locking lugs 11, 11 and a longitudinal axial aperture 12 for a firing pin (not shown). A conventional spring loaded ejector 13 is adapted to be mounted in an aperture 14 in the bolt head substantially parallel to the longitudinal axis thereof, the ejector being secured in its aperture 14 with capacity for limited rectilinear movement by a pin 15 or other fastening means mounted in a transverse aperture 16.

Formed integrally with and projecting forwardly from the face 17 of the bolt and concentric with the longitudinal axis thereof is a cylindrical collar indicated generally at 18, the outside diameter of which corresponds substantially to the major diameter of the bolt head 10. The wall of the collar is of substantial uniform thickness and is provided at its forward end with an integral circumferential lip 19 which is disposed at substantially right angles to the collar wall. The diameter of the periphery of the lip 19 is shown only slightly greater than the diameter of the flange of a cartridge case (Fig. 3) so as to enable the latter to pass freely into the collar 18, and to be substantially enclosed by the lip when the head of the case is fully seated against the face 17 of the bolt. The outer corner of the lip 19 is shown relieved by an annular bevel 20. The circumferential wall of the collar 18 and the inner transverse wall 19' of the lip 19 form, in conjunction with the face 17 of the bolt, an annular groove or recess 22 substantially rectangular in cross section, the diameter of the groove being substantially equal to the outside diameter of the collar 18 less twice its wall thickness.

As shown in Fig. 3, the diameter of the circumferential wall of the groove is sufficiently greater than the diameter of the flange of a cartridge (indicated by broken line *f*) so as to provide an appreciable annular space *s* therebetween while the width *w* of the groove 22 corresponds substantially to the distance from the head *h* of the cartridge to a point adjacent the shoulder of the case, as shown clearly in Fig. 4. Thus, when the head of a cartridge is seated against the face 17 of the bolt, the cartridge head is completely encased within the collar 18, there being no slots or openings in the bolt or barrel around the cartridge head. Adjacent the ejector 13 and located symmetrically on opposite sides of a radial line through the center of the ejector are a pair of protuberances 23 which in the present embodiment constitute staked indents in the lip 19 of the collar projecting inwardly into the groove or recess 22.

The extractor ring is shown generally at 25 in Figs. 3 and 4 seated in the groove 22 of the bolt face 17 and comprises a strip of metal capable of being hardened and made resilient by heat treatment and is of substantially rectangular cross section. The width of the strip is substantially equal to the width *w* of the groove 22, its thickness being considerably less than the depth *d* of the groove. The extractor ring is open on one side, a short portion 26 of the ring at each of its free ends being straight or flat and provided with

operation, 27 adapted to accommodate an extraction tool for removing the extractor ring from and inserting it into the groove 22. The end of each flat portion 26 is adapted to be arranged in proximity to the adjacent protuberance 23 in the groove 22 so as to preclude rotation of the extractor ring in the groove.

As shown in Fig. 3, the inner face 26' of the midportion of each flat section 26 is substantially flush with the edge of the lip 19 so as to prevent the flange of a cartridge from engaging behind the shoulder 19' of the lip.

Substantially opposite the open side of the ring is a relatively flat arc portion 28 and between each flat portion 26 and the corresponding end of the flat arc 28 is an arcuate bearing surface 29. The major diameter of the resilient extractor ring in its free state, which corresponds to a diameter through the arcuate bearing surface 29, is greater than the inside diameter of the groove 22 with the result that when the extractor ring is forced into the groove 22, the bearing surfaces 29 will frictionally engage the adjacent circumferential wall portions of the groove 22 behind the shoulder 19' of the lip. The flat arc 28 will bridge from these bearing surfaces 29, thus providing an arcuate clearance space c between the periphery of the extractor ring and the adjacent circumferential wall of the groove 22 so as to permit the flat arc portion 28 to be deflected radially or transversely into the clearance space c.

In its normal assembled position, the inner face 280 of a major portion of the flat arc 28 extends slightly above the lip 19, although the lower front edge portion 281 of the flat arc retains a firm purchase against the shoulder 19', as clearly shown in Fig. 4.

An extractor claw 30 is shown on the extractor ring diametrically opposite the opening thereof and is formed as an integral part of the ring by a swaging or cold forming process and is preferably heat treated to have an extremely high degree of hardness. The process of forming the claw integral with the extractor ring is not, however, a part of the present invention. The claw comprises a rigid, nonresilient protuberance which projects upwardly radially from the inner face 280 of the flat arc portion 28 of the extractor ring being joined integrally therewith by a relatively wide base and having a substantially square shoulder 31, see Fig. 4, the upper edge 32 of which extends as a cord across the arcuate inner surface 280 of the flat arc 28. The maximum height of the shoulder 31 is at a point midway between the opposite ends of the cord 32 and is only slightly less than the depth of the extractor groove of a cartridge case so as to afford a firm purchase against the flange of a case. The height of the shoulder 31 gradually decreases toward the outer ends of the cord where it is blended into the inner surface 280 of the flat arc 28. The front face 33 of the claw is a planar beveled surface or ramp which slopes forwardly and downwardly from the upper edge 32 of the claw, the angle of the slope being such that the lower edge 34 of the ramp 33 intersects the lower central portion of the front edge 282 of the extractor ring in an arcuate line which normally is substantially even with the edge of the lip 19 and which comprises a radius blended into the lower front edge portion 281 of the ring. As shown, the claw 30 is substantially diametrically opposite the ejector 13 and acts as a pivot about which an extracted cartridge may be rotated by the action of the ejector to eject the cartridge.

It will be further noted that the claw is on the inner periphery of the extractor ring as a consequence of which any force couples acting on the claw during extraction and tending to rotate the claw forwardly are effectively resisted both by engagement of the front and rear edges of the ring with the corresponding transverse walls 17 and 19' of the groove throughout substantially the entire circumference of the ring, and by engagement of the arcuate bearing surfaces 29 with the circumferential wall of the groove.

As the bolt is moved into breech closing position, the flange of a cartridge being chambered will ride up on the ramp 33 of the extractor claw simultaneously displacing the claw 30 downwardly radially until the cartridge flange snaps behind the shoulder 31 of the claw as shown in Fig. 4. Since the ring is held against rotational movement by the staked indents 23 and against bodily displacement in the groove 22 by frictional engagement of the arcuate bearing surfaces 29 with the circumferential wall of the groove 22, the displacement of the claw is characterized by a transverse or radial movement of the flat arc portion 28 only of the extractor ring. Consequently, the ring may have a relatively light spring or detent force, which enables the claw to be easily displaced by the flange of a cartridge being chambered by the bolt. A further advantage resulting from the movement of the claw 30 in a transverse direction only without angular or arcuate deviation is that a minimum of clearance is required for the flange of the cartridge, thus precluding a loose fit between the cartridge flange and the claw and minimizing the amount of slack movement of the bolt between its firing position and its position for initiating primary extraction. When the bolt is drawn back to open the breech, the cartridge case will be drawn rearwardly with the bolt by engagement of the flange of the case with the extractor claw 33 until the case is thrown out by the ejector 13 as described above.

It will be noted that the only tolerances involved between the extractor and the bolt are the width of the groove 22, the width of the extractor ring and the position of the shoulder 31 of the claw with respect to the face 17 of the bolt, and since each of these may be readily held to within extremely close limits, there will be little or no likelihood of excessive tolerance build-up between the bolt groove and the ring extractor.

What is claimed is:

1. An extractor for a firearm having a bolt provided with a recessed face adapted to compactly enclose the head of a chambered cartridge, said extractor comprising a ring shaped member of substantial uniform cross section adapted to be received entirely within said recessed face and bent to provide two flats, a relatively flat arc and an arcuate peripheral bearing surface between each flat and said flat arc, said bearing surfaces being adapted to resiliently engage the walls of the recess to secure said ring member therein against bodily displacement; and a claw extending as a chord across said flat arc and adapted to engage the flange of a cartridge.

2. The combination with a breech bolt having a circular cartridge head enclosing recess in its face, said recess being provided with a circumferential lip; of an extractor comprising a resilient ring shaped member bent to provide arcuate peripheral bearing surfaces arranged to engage the walls of said recess at substantially diametrically opposite points only thereof to per-

mit movement of a portion of said ring member in a direction transverse to the depth of said recess, said ring member being held in said recess by said circumferential lip; and a claw on the transversely movable portion of said ring member adapted to engage the flange of a cartridge.

3. The combination with a breech bolt having a circular cartridge head enclosing recess in its face and a circumferential lip on the edge of said recess; of an extractor comprising a resilient ring shaped member bent to provide two flats, a relatively flat arc and an arcuate peripheral bearing surface intermediate each flat and said flat arc, said bearing surfaces being constructed and arranged to engage the walls of the recess at substantially diametrically opposite points only thereof to permit movement of said flat arc only in a direction transverse to the depth of said recess, said ring member being held in said recess by said lip; and a ramp extending as a chord across said transversely movable flat arc and having a shoulder adapted to engage the flange of a cartridge.

4. The combination with a breech bolt having a circular cartridge head enclosing recess in its face, a circumferential inwardly extending lip on the edge of said recess, and a fixed abutment in the wall of said recess; of an extractor comprising a resilient ring shaped member open on one side and bent to provide two flat end portions on opposite sides of the opening, a relatively flat arc portion diametrically opposite said opening and an arcuate peripheral bearing portion intermediate each flat portion and said flat arc, said bearing portions being constructed and arranged to engage the walls of the recess at substantially diametrically opposite points thereof to permit movement of said flat arc only in a direction transverse to the depth of said recess, said ring member being held in said recess by said lip and secured against rotation therein by engagement of the free ends of said ring with said fixed abutment; and a ramp on said transversely movable flat arc having a shoulder extending radially inwardly therefrom adapted to engage the flange of a cartridge.

5. The combination of a firearm breech bolt having a forward face adapted to engage the head of a chambered cartridge and also having an integral portion constructed and arranged to provide a rearwardly facing shelf spaced forwardly from and overlying a selected portion of said forward face with a cartridge extractor engaged with said shelf and provided with a claw adapted to engage the extractor rim of a chambered cartridge at a position to the rear of and slightly radially inward from the position of engagement with said shelf.

6. In a firearm for use with extractible rigidly cased cartridges, the combination of a breech bolt having a forwardly facing cartridge head engaging surface, cartridge extracting and ejecting means mounted in said breech bolt, and a continuous annular collar integral with said breech bolt and extending forwardly therefrom to form a continuous wall circumferentially surrounding said head engaging surface and said extracting and ejecting means.

7. In a firearm for use with extractible rigidly cased cartridges, the combination of a breech bolt, a forwardly extending circumferentially continuous collar of material integral with said bolt defining a recess in the face of said breech bolt, said recess being adapted to receive the head of a chambered cartridge, extractor means provided with a cartridge engaging claw mounted in said bolt and extending into said recess without interrupting the continuity of said collar, and ejector means mounted in said bolt without interrupting the continuity of said collar and arranged for projection into ejecting engagement with a cartridge in said recess.

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