Jan. 6, 1953

P. LAZAREVICH

2,624,112

BOLT CUTTER

Filed May 11, 1951

2 SHEETS—SHEET 1

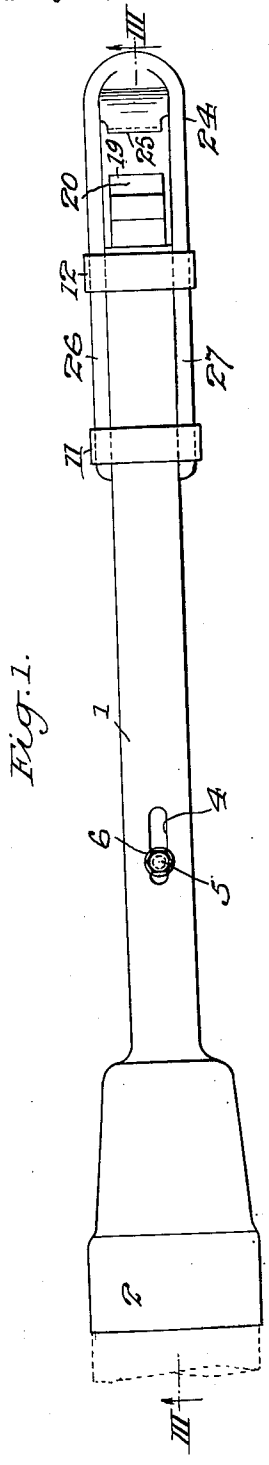

Fig. 1.

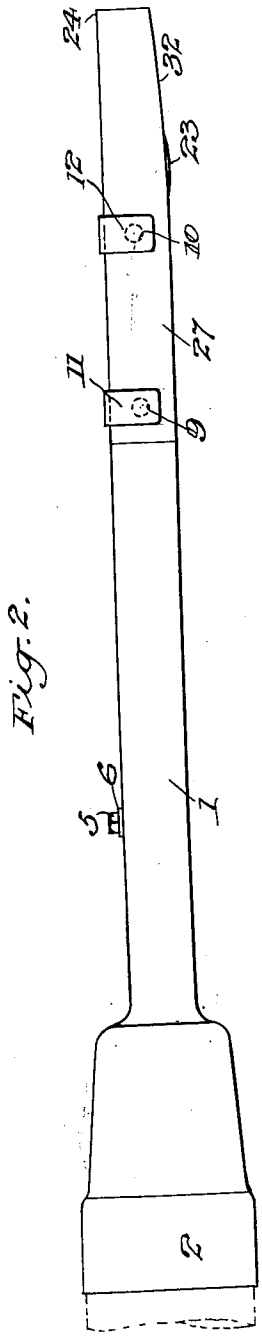

Fig. 2.

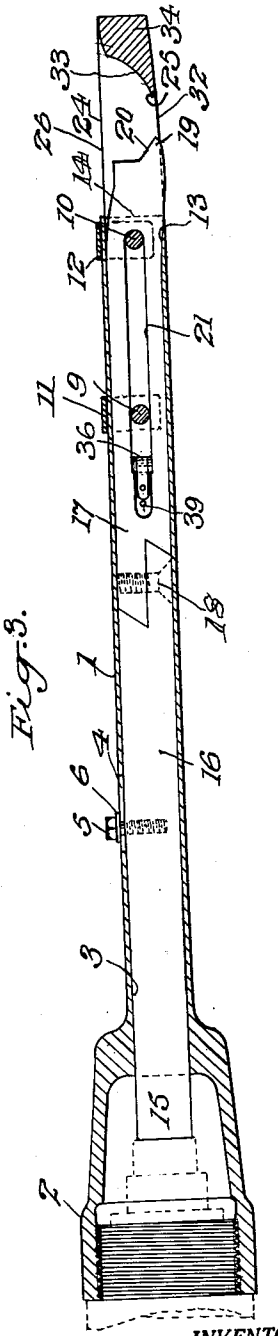

Fig. 3.

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2 SHEETS—SHEET 2

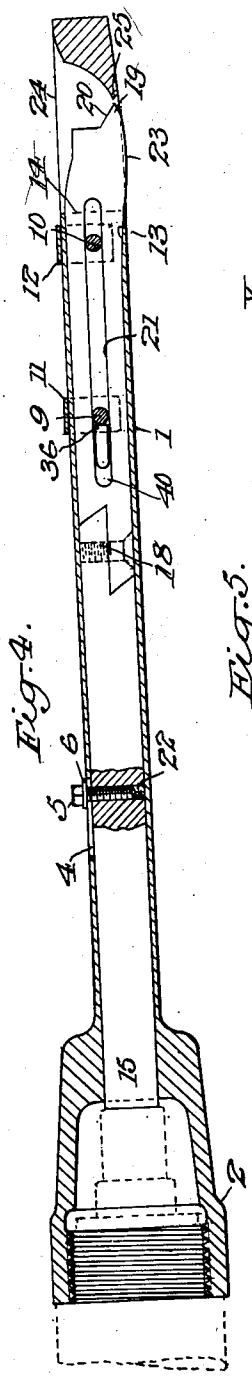

Fig. 4.

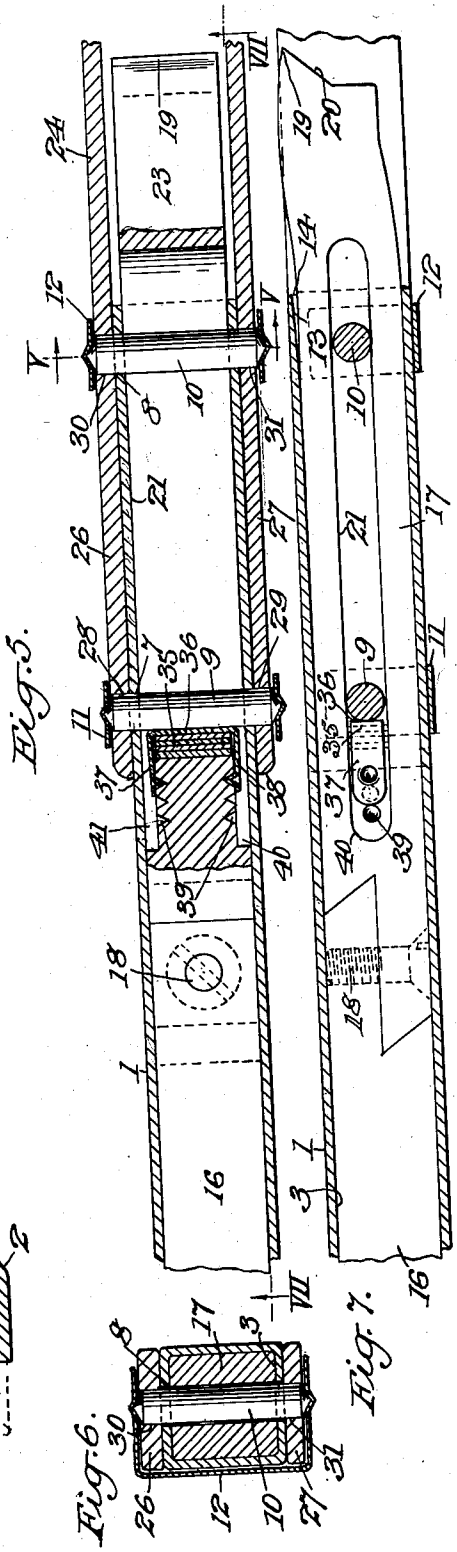

Fig. 5.

Fig. 6.

Fig. 7.

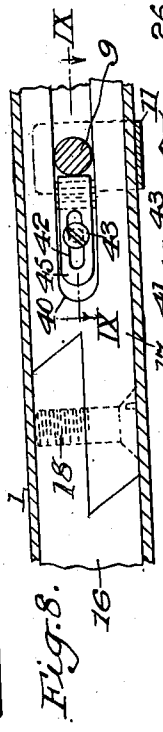

Fig. 8.

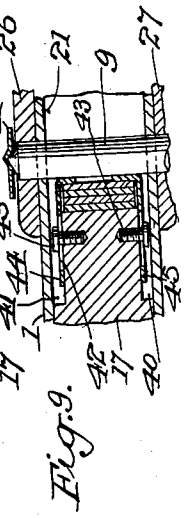

Fig. 9.

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Patented Jan. 6, 1953 2,624,112

UNITED STATES PATENT OFFICE

2,624,112

BOLT CUTTER

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Application May 11, 1951, Serial No. 225,831

10 Claims. (Cl. 30—182)

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This invention relates to bolt cutters, and, particularly, to a cutter which has no handles and includes a fixed blade and a movable blade to engage the bolt or other article to be cut.

The location of certain bolts in autos, trucks, tractors, bull dozers, engine and radiator mountings, frames, angle irons, supports, etc., precludes the use of ordinary handle operated cutters, or renders their use awkward and impractical. Either the handles cannot be manipulated or the space is so cramped at the bolt location that the nose of the shears blades cannot be opened sufficiently to take the bolt to be cut. Also, in many cases the metal in the immediate vicinity is of such a gauge that it will be damaged in the attempt to cut a relatively inaccessible bolt with the handle operated cutters now in general use.

I have, in a large measure, solved these problems by my invention, which has as its object the provision of a bolt cutter of novel design, in which a slidable piston urges a blade toward a fixed blade to sever a bolt therebetween, the cutter having no handles.

Another object of my invention is to provide a cutter of this type which is designed to utilize hydraulic energy to actuate a slidable blade carrying piston in a sleeve or casing, the latter being provided with a removable head carrying a fixed blade at one end, said end being of novel design for purposes hereinafter described.

Another object of my invention is to provide a tool of this type in which means are provided for controlling, adjusting and limiting the longitudinal travel of the slidable piston or member.

Another object is to provide a cutter of the character described which is designed to engage a bolt appreciably closer to its head, or nut contacting surface than cutters now in use, whereby the shank to be cut is quickly and easily engaged by both blades and is cut with a minimum of lateral distortion thereby facilitating removal of the cut bolt and substantially eliminating scarring or enlargement of the bolt containing bore.

Another object is to provide a bolt cutter in which the head carrying the fixed blade is removable, interchangeable, curved, and tapered to permit its use in the cramped spaces referred to above (and others) with a facility and efficiency not possible with cutters presently available.

A further object is to provide a cutter of this type in which the movable knife is replaceable due to the construction of the piston carrying same and in which all the parts readily lend themselves to production in quantity while being of rugged but exact construction.

Practical embodiments of my invention are illustrated in the accompanying drawings in which:

Fig. 1 represents a top plan view of a cutter according to my invention;

Fig. 2 represents a side elevation of the form shown in Fig. 1;

Fig. 3 represents a vertical longitudinal section

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taken on the line III—III of Fig. 1 and looking in the direction of the arrows;

Fig. 4 is a view similar to Fig. 3 but with the parts shown in cutting position;

Fig. 5 represents a detail horizontal section on an enlarged scale of the parts in the position illustrated by Fig. 4;

Fig. 6 is a vertical section taken on the line V—V of Fig. 5 and looking in the direction of the arrows;

Fig. 7 is a horizontal section taken on the line VII—VII of Fig. 5 and looking in the direction of the arrows;

Fig. 8 represents a detail on an enlarged scale of a modified form of limiting device carried by the slidable member; and

Fig. 9 represents a longitudinal detail section taken on the line IX—IX of Fig. 8 looking in the direction of the arrows.

Referring to the accompanying drawings, an elongated outer casing 1 is provided at one end with an internally threaded socket 2 which is adapted to receive the output connection of any well known or approved hydraulic unit, preferably attached by flexible connection to its source of power. (The hydraulic unit connections are shown in dotted lines in Figs. 1, 2, 3 and 4.) The socket 2 tapers into the longitudinal bore 3 of casing 1 which extends therethrough to its outer end. In the present instance, both the bore and outer shape of casing 1 are quadrilateral from the socket 2 to the opposite end. Although this shape is preferable, variations in shape, size, length and contour are deemed feasible. The upper surface of casing 1 has a short slot 4 about six inches from the socket end of the casing to accommodate the shank of a set screw 5, the head of which screw surmounts a washer 6 spanning slot 4. At its outer end, casing 1 is transversely bored completely through at 7 and 8, said bores taking hardened steel pins 9 and 10 which are held against lateral displacement by resilient U-shaped clips 11 and 12, as will be more fully set forth. Casing 1 is tapered internally at the bottom of its outer end at 13 and cut away at 14 to permit partial retraction of the slidable piston 15, now to be described.

The slidable blade carrying piston 15 is shown as comprising two parts 16 and 17 having complementary overlapping joints secured to each other by a countersunk set screw 18. The outer end of the piston 15, the piston being quadrilateral in shape, is formed into a cutting edge or blade 19 which is tapered back at 20 to take a bolt head and assist in the severing operation to be described below. A short distance from the blade end, piston 15 has a single lateral slot 21 although other, or a plurality of, slots could be used. Toward the other end of piston 15, on the top side thereof, a threaded tap 22 is provided to take the end of set screw 5 mentioned above. Piston 15 is externally shaped to slidably fit the bore 3 of casing 1 and I have found that making

both square throughout a substantial portion of their lengths (which are not critical) prevents the blade 18 from turning within the casing 1 during the cutting operation, thus minimizing the chances of damage to the cutting edge. The blade or outer end of the piston 15 is offset or bulged at 23 to enable the two blades to coact on a plane horizontal with and closely adjacent to the surface contacted by the bolt head or nut (not shown). Any possible interference with the location of the cutting plane, which should be as close to the bolt head (or nut) contacting surface as possible, which might be due to the thickness of casing 1 is overcome by this offset 23, taper 13 and the construction of removable head 24.

Head 24 carrying a fixed blade 25 in the arc of its outer extremity is U-shaped and has two flat arms 26 and 27 provided with holes 28, 29, 30 and 31 of a size to take pins 9 and 10, said arms corresponding in width to the sides of casing 1 embraced thereby and registering holes 28 and 30 with 7, and 29 and 31 with 8. The cutting edge of blade 25 is parallel to and alined with the tapered section 32 of head 24 and said blade is beveled at 33 to throw the strain inwardly during the cutting operation. Substantial material to resist this force is provided at 34 which may be braised in with the blade 25. It will be noted that the thickness of the head, its outer configuration, and the length of the blade 25 determine (longitudinally) how close to an obstruction a bolt may be cut since the fixed blade must be placed "behind" the bolt head. It will also be noted that the angle of the taper or bevel 32 of the head 24 corresponds to that at 13 of casing 1 when the parts are assembled for use. This taper permits a very low cutting plane with relation to the bolt supporting surface and permits variation in the angle at which the tool is operated. The flat arms of the head 24 in contact with the sides of casing 1 assist in preventing the blade 24 from turning during the cutting operations.

Means for limiting the longitudinal throw of piston 15 are located in the end of slot 21 and comprise a plurality of shims 35 held in place by a resilient clip 36 having counterpunched arms 37 and 38 engaging dents 39 in shallow recesses 40 and 41, which extend beyond slot 21 at one end to accommodate the clip arms. Clip 36 is so located as to abut pin 8 during the cutting operation explained below. A modified form of stop is shown in Figs. 8 and 9, in which clip arms 44 and 45 may be slotted at 42 to take screws 43 seated in a tap in the shallow recesses 40, 41 of piston 15, and is thus adjustable by loosening the screw, sliding the clip and inserting or removing shims as desired.

As a matter of fact, the stop may be dispensed with entirely and slot 21 so dimensioned as to have one end contact pin 8 at the desired outward limit of its travel with piston 15, thereby stopping blade 19 before it can contact blade 25.

The cutter may be assembled as follows:

Piston 15, with or without stop as above described, is slid into bore 3 of casing 1 until tap 22 is available through slot 4. Set screw 5 is inserted through washer 6, slot 4, and into tap 22 and set up to hold the piston 15 in the casing. Head 24 is fitted over casing 1 so that holes 28, 29, 30 and 31 register with holes 7 and 8 respectively and with slot 21 in piston 15, and blade 25 is opposed to blade 19. Pins 9 and 10 are fitted into holes 28, 30 and 7, and holes 29, 31, and 8 respectively, both pins passing through

slot 21 also, their ends resting in the arms of head 24. U-shaped clips 11 and 12, designed to take the pin extremities, are snapped over same and preferably embrace the top of casing 1, and arms 26, 27 of head 24 thereby retaining the pins against lateral displacement.

To operate the cutter, the output connection (shown in dotted lines as above set forth) or any well known or approved hydraulic unit is threaded into socket 2 of casing 1. The tapered bottom of head 24 is placed over the head (or nut) of the bolt to be cut and the piston 15 is moved longitudinally by means of screw 5 until blade 19 contacts the object to be cut opposite fixed blade 25, the screw 5 remaining backed off at this point. If the cutter is to be used in a substantially vertical position (head 24 pointing downwardly) the screw 5 may be tightened until the head 24 is placed over the bolt to be cut and then loosened to move piston 15 to carry blade 19 into contact with the bolt opposite blade 25. The most effective position of the cutting blades is obtained and assured by the offset 23, taper 32 and the angles of the two blades which permit a plane of cutting movement close to the head or nut contacting surface of the bolts and closely parallel to said surface. Power is applied to piston 15, thus moving blade 19 longitudinally to perform the cut or severance of the bolt against blade 25. The head (or nut) of the bolt will tend to ride upwardly on the blade bevels, thereby tensioning the bolt and assisting in the severance by stretching the bolt. As the latter is cut or "pinched off" the blades 19 and 25 are prevented from contacting each other by the contact of pin 8 with clip 36 backed up by shims 35 in slot 21.

If blade 19 is in some way damaged, the head 24 can be removed, the piston removed and its blade reground, and enough shims removed to compensate for the difference in length, before the piston is replaced.

It will be understood that pins 9 and 10 are preferably of hard steel and machined to fit holes 28, 30, and 7, and 29, 31 and 8 respectively, as well as the interior of groove 21 in piston 15. In addition to assisting in the limitation of longitudinal travel of piston 15 by pin 8 contacting the end of slot 21 or the stop located therein, the said pins also assist in resisting any twist which may be imparted to the piston 15 during the cutting operation and may also serve as roller bearings under such conditions.

It should also be understood that, if the latter function was not desired, the pins could be square or oblong, each could have its own slot and/or a single oblong shaped composite pin could be used which would have removable parts to compensate for any shortening of the blades, thereby eliminating the necessity for having a stop in slot 21.

Also, bolts and nuts could be used in place of said pins to retain head 24 in position on casing 1 though use of same is not as efficient as the clips described above in either the assembly or substitution of parts. Further, the tendency of bolts and nuts to "hang up" in close quarters on surrounding material is aggravating and undesirable.

It will thus be seen that I have provided a novel bolt cutter of simple design capable of use in places heretofore inaccessible to the handle operated cutters.

Since it is evident that various changes may be made in the construction, form and arrange-

ment of the several parts without departing from the spirit and scope of my invention, I do not intend to be limited to the specific embodiments herein shown and described except as set forth in the following claims.

What I claim is:

1. A bolt cutter comprising an outer casing, an internal bevel at one end of said casing, a longitudinal bore through the casing, a piston slidable in the bore, means for manually moving said piston and projecting therefrom, a blade on the piston, an overlapping head fixed to said casing, and a blade fixed in said head, the parts being so constructed and arranged that the piston blade cooperates with and is opposed to the fixed blade in cutting operation and the piston may be partially retracted by said first named means.

2. A bolt cutter comprising an outer casing, a slot in said casing, a longitudinal bore through the casing, a piston slidable in the bore, means operable through said slot connected to and for moving said piston, a blade on the piston, an overlapping head fixed to said casing, and a blade fixed in said head, the parts being so constructed and arranged that the piston blade cooperates with and is opposed to the fixed blade in cutting operation.

3. A bolt cutter comprising an outer casing having a longitudinal bore therethrough, a piston slidable in the bore, a horizontal slot in said piston, a limiting stop in one end of said slot, a blade on the piston, a head removably fixed on said casing, and means for retaining said head in operative position, said means passing through said slot, and a blade fixed in said head, the parts being so constructed and arranged that the stop contacts the head retaining means at the limit of longitudinal travel of the piston.

4. A bolt cutter comprising an outer casing having a longitudinal bore therethrough, a piston slidable in the bore, a horizontal slot in said piston, an adjustable limit stop in said piston slot, a blade on the piston, a removable head fixed to said casing including a blade in said head, the parts being so constructed and arranged that the piston blade cooperates with and is opposed to the fixed blade in cutting operation.

5. A bolt cutter comprising an outer casing having a longitudinal bore therethrough, a piston slidable in the bore, an offset portion at one end of said piston formed integral therewith, a blade on the offset portion, a head removably fixed to said casing, and a blade fixed in said head, the parts being so constructed and arranged that the piston blade cooperates with and is opposed to the fixed blade in cutting operation.

6. A bolt cutter comprising, an outer casing having a longitudinal bore therethrough, a piston slidable in the bore, a slot through said piston, a blade on the piston, a head fixed to said casing, a blade fixed in said head, pins passing through said head, casing and piston slot for holding said head to said casing, and resilient clips securing said pins against lateral displacement, the parts being so constructed and arranged that the piston blade cooperates with and is opposed to the fixed blade in cutting operation.

7. A bolt cutter comprising an outer casing having a socket on one end thereof and a cut away portion at the other end with a longitudinal bore through said socket and casing, a piston slidable in the bore, an offset on one end of and formed integral with the piston, a blade formed integral with said offset, the latter entering said cut away portion when the piston is retracted,

and a head including a fixed blade removably attached to said casing, the parts being so constructed and arranged that the piston blade cooperates with the fixed blade in cutting operation when the piston is urged longitudinally from the socket end.

8. In a hydraulic bolt cutter, the combination of an outer casing having a socket at one end and a removable head attached to the other end and being provided with a central longitudinal bore with a piston slidable in the bore, a slot in said piston, a blade formed integral with the piston, a blade fixed in the head opposed to said piston blade, depending arms on said head, and means for holding the head to the casing, said means comprising pins passed through the piston slot, casing and arms, the parts being so constructed and arranged that the piston slot contacts the holdling means before the two blades meet when the piston is urged longitudinally.

9. In a hydraulic bolt cutter, the combination of an outer casing having a socket at one end and a removable head attached to the other end and being provided with a central longitudinal bore with a piston slidable in the bore, a slot in said piston, a blade formed integral with the piston, a blade fixed in the head opposed to said piston blade, depending arms on said head, means connected through the casing to the piston for manually moving same longitudinally, and means for holding the head to the casing, said means comprising pins passed through the piston slot, casing and arms, the parts being so constructed and arranged that the piston slot contacts the holding means before the two blades meet when the piston is urged longitudinally.

10. In a hydraulic bolt cutter, the combination of an outer casing having a socket at one end and a removable head attached to the other end and being provided with a central longitudinal bore with a piston slidable in the bore, said head being provided with arms which contact the sides of the casing substantially throughout their length, a slot in said piston, means connected through the casing to the piston for manually moving same longitudinally, a blade formed integral with the piston, a blade fixed in the head opposed to said piston blade, and means for holding the head to the casing, said means comprising pins passed through the piston slot, casing and arms, the parts being so constructed and arranged that the piston slot contacts the holding means before the two blades meet when the piston is urged longitudinally.

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