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EXPLOSIVE CUTTING TOOL FOR CABLE AND THE LIKE

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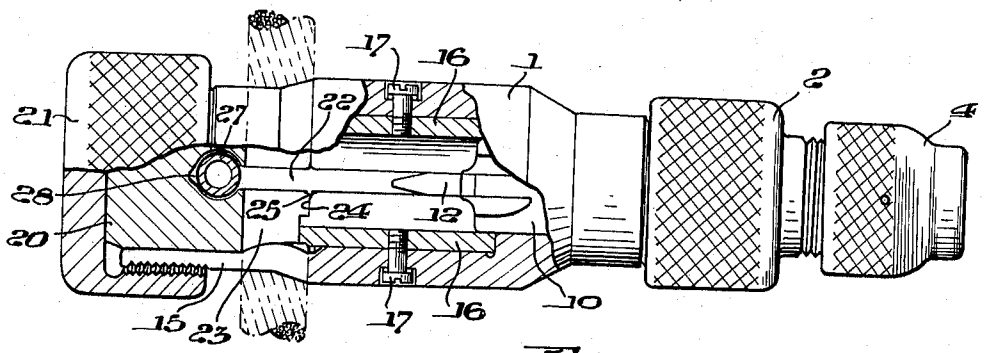



Fig. 1.

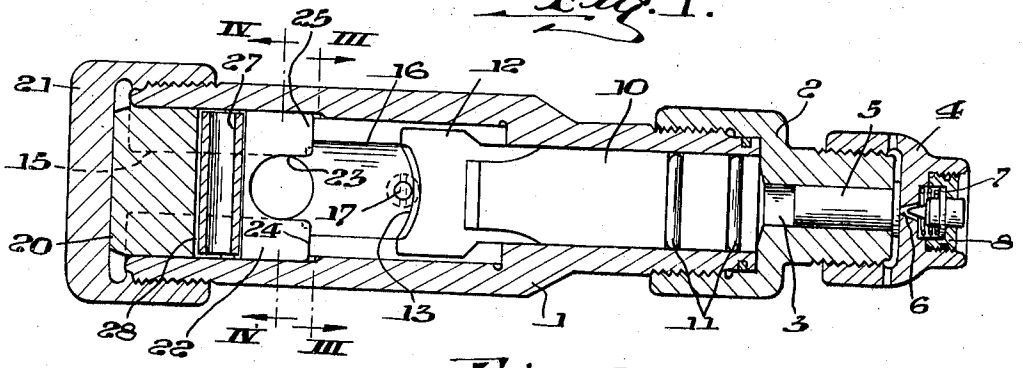



Fig. 2.

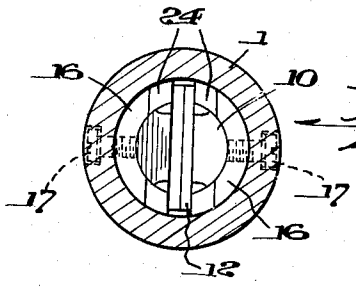



Fig. 3.

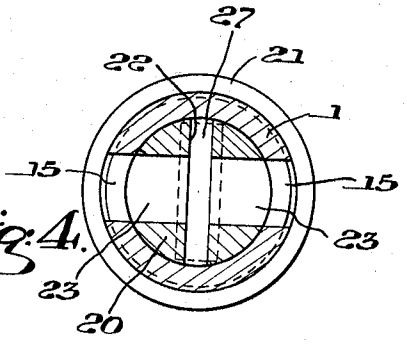



Fig. 4.

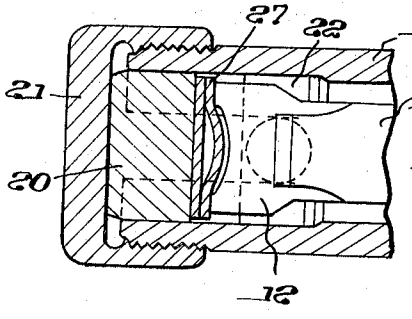



Fig. 5.

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# EXPLOSIVE CUTTING TOOL FOR CABLE AND THE LIKE

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This invention relates to tools for cutting heavy cables, and more particularly to the kind in which the cutting element is actuated by an explosive charge.

It is among the objects of this invention to provide a cable cutting tool which is suitable for heavy duty, which is compact and simple in construction, which does not require a sharp cutting blade, and in which the blade has a long life without requiring sharpening.

In accordance with this invention the tool has a barrel, the front end of which is provided with a pair of diametrically opposite slots that extend inwardly to fit over a cable extending transversely of the barrel. Removably mounted in the front end of the barrel is an anvil for confining a cable in the slots. Opposed to the anvil there is a forwardly movable cutting blade, behind which a piston is slidably mounted in the barrel. The piston and blade normally are retained in a retracted position behind the barrel slots. A cartridge chamber communicates with the inside of the barrel behind the piston for receiving an explosive cartridge that can be fired by suitable means. The anvil is provided with a transverse slot for receiving the blade after it has passed through a cable in the barrel slots. Disposed in this anvil slot is a replaceable shock absorber, preferably a tubular metal element, which will be struck and deformed by the blade to cushion the blade and stop its forward movement. Preferably, the anvil is slidably mounted in the barrel where it is retained by a manually removable cap mounted on the front end of the barrel. The anvil slot and the blade are always held in proper alignment.

The preferred embodiment of the invention is illustrated in the accompanying drawing, in which:

FIG. 1 is a side view of the tool with parts broken away in section;

FIG. 2 is a longitudinal section with the tool rotated on its axis 90° from its position in FIG. 1;

FIGS. 3 and 4 are cross sections taken on the lines III—III and IV—IV, respectively, of FIG. 2; and

FIG. 5 is a fragmentary longitudinal section, similar to FIG. 2, but showing the tool after it has been fired.

Referring to FIGS. 1 and 2 of the drawings, an elongated barrel **1** with a cylindrical axial passage through it is externally threaded at its rear end for receiving the internally threaded front end of a cartridge holder **2** provided behind the barrel with a cylindrical cartridge chamber **3**. The rear end of the holder is externally threaded for receiving a breechblock **4** that is screwed onto it to clamp the flange of a cartridge **5** between the two members. The breechblock also has an axial passage **6**, in which a firing pin normally is held retracted by a small coil spring **7**. The enlarged rear end of the pin projects out through a nut **8** screwed into the rear end of the breechblock so that the pin can be struck by a hammer in order to drive it against the cartridge.

Slidably mounted in the rear half of the barrel is a piston **10** that is encircled by one or more O-rings **11** that help seal the space between it and the barrel and furnish the friction for also normally holding it in its rear position against the front end of the cartridge holder. At the front end of the piston there is a cutting blade **12**, preferably integral therewith. This blade has parallel flat sides with forwardly converging areas that terminate in a leading or cutting edge. The central portion of the leading edge of the blade preferably is concave, as at **13**. No attempt is made to provide the blade with a sharp cutting edge, because in this tool that is not necessary. Therefore, since the blade is relatively dull from the start, it does not become dull in use and require frequent sharpening.



The front end of the barrel is provided with a pair of diametrically opposite slots **15** that extend inwardly part way back to the blade in its retracted position. These slots allow the front end of the barrel to be fitted over a cable that is to be cut. The inner ends of the slots are curved to fit half way around such a cable. To make certain that the blade will always be at right angles to the cable, the blade is prevented from rotating in the barrel. Most suitably, this is done by mounting two segments **16** of a cylinder in an enlarged central portion of the barrel at opposite sides of the blade. The adjacent edges of the segments are spaced apart the thickness of the blade to form parallel channels slidingly receiving opposite edges of the blade. Each segment can be held in place by a countersunk screw **17** extending through the wall of the barrel and threaded in the center of the segment.

In order to back up the cable while it is being cut so that it will not be moved forward in barrel slots **15** by the blade, a cylindrical anvil **20** is slidably mounted in the front end of the barrel, where it is held by a removable cap **21** screwed onto the barrel. The anvil confines the cable in the inner ends of the barrel slots. Since the blade should pass completely through the cable in order to cut it, the anvil is provided with a rearwardly opening transverse slot **22** for receiving the blade. Preferably, the anvil is made long enough to engage the front ends of segments **16**, and therefore, is provided with rearwardly opening recesses **23** at opposite sides of its slot so that the anvil can straddle the cable. To hold the anvil in proper position, with its recesses registering with the barrel slots and with its slot **22** in line with the cutting blade, the adjoining ends of the anvil and cylinder segments are provided with interengaging projections and notches that prevent the anvil from turning in the barrel. Preferably, the front ends of the segments are provided with notches **24** beside their side edges, and the inner end of the anvil is provided at opposite sides of its slot with projections **25** that fit in those notches.

It is a feature of this invention that after the blade has passed through the cable it does not strike the hard anvil directly, which would be likely to cause the blade to break. Instead, it strikes a shock absorber which cushions the blade and stops its forward movement without damage. This shock absorber is a crushable element that is removably mounted in the front end of anvil slot **22**. Preferably, the shock absorber is a tubular element **27** that is made of softer metal than the anvil and is loosely disposed in the front end of the slot, which is enlarged to receive it. When the blade strikes this hollow element it crushes or collapses it as shown in FIG. 5, the energy consumed in doing so being absorbed and bringing the blade to rest without damaging the blade. To further improve the cushioning effect, it is desirable to provide the front wall of the slot with a narrow groove **28** running along it to permit the adjoining portion of the tubular element to be deformed into it.

After the tool has been fired, the cap **21** and the anvil are removed from the barrel and then the collapsed shock absorbing member **27** is removed from the anvil slot and replaced by a new one for the next shot.

We claim:

**1.** An explosive cutting tool comprising a barrel having front and rear ends and provided with a pair of diametrically opposite slots extending inwardly from its front

:nd to fit over a cable extending transversely of the barrel, an anvil removably mounted in the front end of the barrel for confining a cable in said slots, a forwardly movable cutting blade in the barrel opposed to the anvil, a piston slidably mounted in the barrel behind said blade, means normally retaining said piston and blade retracted behind said barrel slots, a cartridge chamber communicating with the inside of the barrel behind the piston for receiving an explosive cartridge, cartridge-firing means, the anvil being provided with a transverse slot for receiving said blade after it has passed through a cable in the barrel slots, and a replaceable shock absorber in said anvil slot in the form of a crushable tubular metal element in the path of the blade and adapted to be struck thereby and deformed to cushion the blade and stop its forward movement.

2. An explosive cutting tool according to claim 1, in which the outer end portion of said anvil slot is wider than the remainder of the slot, and the width of said shock absorber is greater than the width of said slot remainder.

3. An explosive cutting tool according to claim 1, in which a narrow groove extends along the front wall of said anvil slot.

4. An explosive cutting tool according to claim 1, in which the inner end of the anvil is provided with rearwardly opening cable-receiving recesses at opposite sides of said anvil slot.

5. An explosive cutting tool according to claim 1, in which said anvil is slidably mounted in the barrel, and a manually removable cap is mounted on the front end of the barrel to hold the anvil in place.

6. An explosive cutting tool comprising a barrel having front and rear ends and provided with a pair of diametrically opposite slots extending inwardly from its front end to fit over a cable extending transversely of the barrel, an anvil removably mounted in the front end of the barrel for confining a cable in said slots, a forwardly movable cutting blade in the barrel opposed to the anvil, a pair of laterally spaced cylinder segments mounted in the barrel at opposite sides of the blade for holding the blade against rotation therein, a piston slidably mounted in the barrel behind said blade, means normally retaining said piston and blade retracted behind said barrel slots, a cartridge chamber communicating with the inside of the barrel behind the piston for receiving an explosive cartridge, cartridge-firing means, the anvil being provided with a transverse slot for receiving said blade after it has passed through a cable in the barrel slots, means positively positioning the anvil with its slot in the path of the blade, and a replaceable shock absorber in said anvil slot in the path of the blade and adapted to be struck thereby and deformed to cushion the blade and stop its forward movement.



7. An explosive cutting tool according to claim 6, in which said anvil-positioning means include interengaging projections and notches at the adjoining ends of the anvil and said cylinder segments.


**References Cited by the Examiner**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 2,017,329 | 11/1935 | Temple | 30—277 X |
| 2,248,642 | 7/1941 | Phillips | 30—180 |
| 2,755,550 | 7/1956 | Benjamin | 30—180 |
| 3,003,235 | 11/1961 | Temple et al. | 30—180 |
| 3,074,163 | 1/1963 | Wohler et al. | 30—228 X |
| 3,175,289 | 3/1965 | Wilterdink et al. | 30—180 |

FOREIGN PATENTS

| | | |
|---|---|---|
| 844,149 | 10/1960 | Great Britain. |



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