June 27, 1933. H. E. MILLER 1,915,435

CUTTING DEVICE

Filed Dec. 29, 1931

Fig. 1.

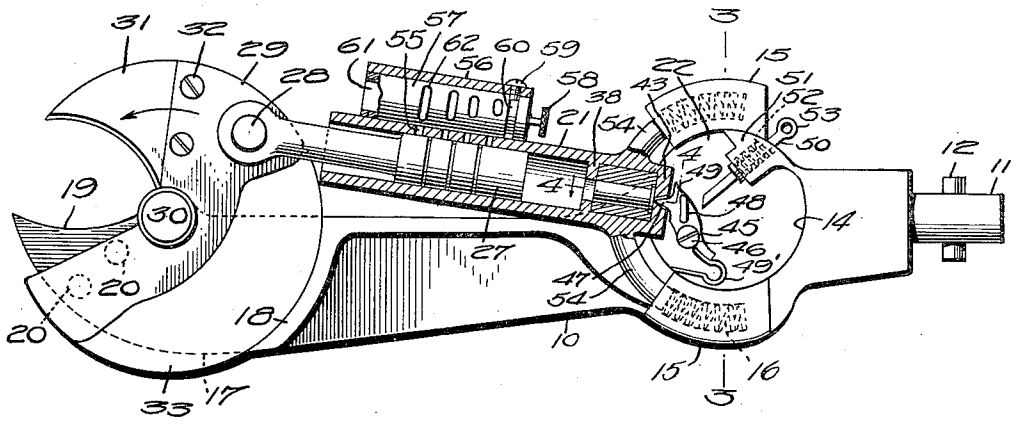


Fig. 2.

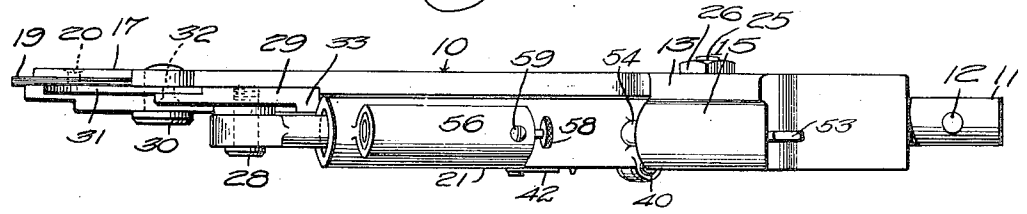
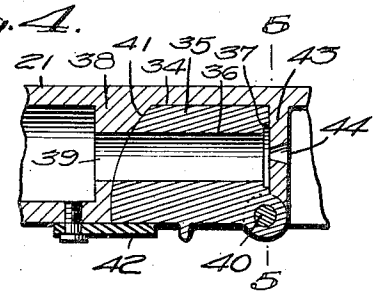


Fig. 4.



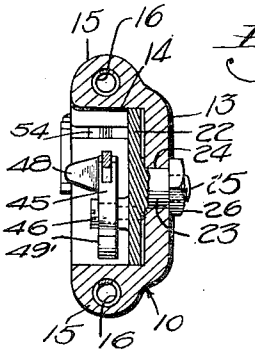


Fig. 3.

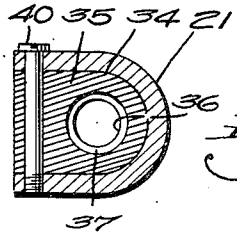


Fig. 5.

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UNITED STATES PATENT OFFICE

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CUTTING DEVICE

Application filed December 29, 1931. Serial No. 583,744.

This invention relates to cutting devices, and more particularly to a device adapted for use by linemen for cutting electrical conductors, trimming trees where necessary in running electric lines, etc.

It is the common practice to provide linemen with cutting devices for use when necessary in cutting charged or uncharged conductors, for trimming trees, as is frequently necessary when running electric lines such as telegraph, telephone and power lines, and for similar uses. The devices commonly in use are disadvantageous for several reasons. In the first place, such devices are relatively heavy and consequently burdensome to use, and this is particularly true when the devices are used on relatively long poles, as is necessary in cutting conductors which are a substantial distance beyond the reach of the lineman. Moreover, such devices usually are quite cumbersome to use and are slow in operation, and this fact, together with the weight of the usual cutting device, demands that the devices be operated by relatively powerful men who commonly complain about the difficulty of operation of the devices.

An important object of the present invention is to provide a cutting device which is efficient in operation for cutting electrical conductors or similar elements and which is quite light in weight, thus rendering its operation easily performed by linemen.

A further object is to provide a device which is readily adapted to be connected to extension poles for cutting wires or the like beyond the reach of a lineman and wherein the light weight and the mode of operation of the device permits its operation to be readily accomplished by the linemen under ordinarily difficult circumstances.

A further object is to provide a cutting device which is quite easily and readily operable by remote control thus facilitating its use for cutting electrical conductors and the like which are far beyond the reach of the lineman or other operator.

A further object is to provide a cutting device which is adapted to carry a simple and light self-contained source of power for its operation, thus rendering it quite easy for the lineman merely to pull a string or operate a similar remote control means to release the motive power and effect the desired cutting operation.

A further object is to provide a cutting device of the character referred to which is adapted to use an explosive medium, such as a blank revolver cartridge, as its source of power, thus rendering it necessary merely for the operator to load the device with a cartridge, place it in cutting position, and then fire the cartridge by a suitable trigger mechanism operated by remote control, such as a pull cord.

Other objects and advantages of the invention will become apparent during the course of the following description.

In the drawing I have shown one embodiment of the invention. In this showing:

Figure 1 is a side elevation, parts being shown in section,

Figure 2 is a plan view,

Figure 3 is a section on line 3—3 of Figure 1,

Figure 4 is a similar view on line 4—4 of Figure 1, and,

Figure 5 is a similar view on line 5—5 of Figure 4.

Referring to the drawing the numeral 10 designates the main body of the device which is provided at one end with a projection 11 having radially extending lugs 12 whereby the body may be connected to a suitable pole to permit the lineman or other operator to reach an inaccessible wire to be cut. The body is provided at a point spaced from the projection 11 with an enlarged portion 13 having a substantially circular recess 14 formed therein. On opposite sides of the enlarged portions 13, the latter portion of the body is provided with arcuate elongated members 15 internally and arcuately recessed to receive coil springs 16, for a purpose to be described.

From the enlargement 13 the body projects a substantial distance and terminates in a blade carrying head 17, this head terminating

at its inner end in an arcuate guide rib 18. A relatively stationary cutting blade 19 is secured to the head 17 by screws 20.

An operating mechanism is connected to the body 10 and the body of the operating mechanism is in the form of a cylinder or barrel 21. This barrel carries a disk 22 at its inner end fitting in the recess 14 and mounted adjacent the rear wall thereof. A trunnion 23 is carried by the disk and projects through an opening 24 formed in the enlargement 13. The trunnion is provided with a reduced threaded end 25 on which is mounted a nut 26. This arrangement permits the disk to oscillate in the recess 14 concentric thereto. A plunger 27 operates in the cylinder 21 and is pivotally connected at its outer end as at 28 to an oscillating plate 29. This plate is pivoted to the head 17 as at 30 and carries a blade 31, secured thereto as at 32 and adapted to cooperate with the blade 19 to shear the element to be cut. The plate 29 preferably carries a counter weight 33.

The cylinder 21 is formed with a radially opening recess 34 at the inner end thereof and a cartridge holder 35 is adapted to be arranged in this recess as shown in Figures 4 and 5. The cartridge holder is provided with an axial opening 36 for the reception of the body of a cartridge, the rear end of the opening 36 being reamed out as at 37 to receive the bead of the cartridge. Forwardly of the recess 34, the cylinder is provided with a wall 38 having an opening 39 therethrough communicating between the opening 36 and the interior of the cylinder 21. The cartridge holder 35 is pivotally connected as at 40 to the cylinder 21, and the opposite end face of the holder 35 and the adjacent face of the wall 38 are curved as at 41 on an arc concentric to the pivot pin 40. A pivoted latch 42, carried by the cylinder 21, is adapted to retain the holder 35 in operative position.

The cylinder 21 is provided with an inner end wall 43 forming a breech block engageable against the base of a cartridge in the holder 35. The breech block is provided with a small opening 44 to receive a firing pin to be described. A hammer 45 is pivoted to the disk 22 as at 46 and is provided with a firing pin 47 adapted to enter the opening 44 to fire the percussion cap of the cartridge. The hammer is adapted to be cocked by moving a finger piece 48 rearwardly, and a spring 49′ constantly tends to move the hammer to firing position. The hammer carries a projection 49 engageable by the inner end of a trigger pin 50, shown in Figure 1. The trigger pin projects through a suitable opening in a boss 51 in which is mounted a spring 52 tending to move the trigger to operative position. An eye 53 is provided in the upper end of the trigger pin for the reception of one end of a pull cord by means of which the trigger may be operated.

The cylinder 21 is provided with arcuate projections 54 on opposite sides thereof formed concentric with the trunnion 23. Each projection 54 enters the opening in one of the spring carriers 15 to engage against the ends of the springs 16 arranged therein. These springs tend to absorb shocks in a manner to be described, and they further tend to maintain the parts of the device in the normal position shown in Figure 1.

The cylinder 21 is provided in one side thereof with a series of openings 55 communicating with a valve chest 56 preferably formed integral with the cylinder 21. A cylindrical valve 57 is retained in the valve chest 56 and is provided with a knurled operating knob 58 at one end thereof. A screw 59 extends through one side of the valve chest 56 and operates in an annular groove 60 in the valve 57 to prevent longitudinal movement thereof. The valve is open at one end as at 61 and is provided intermediate its ends with a plurality of openings 62 each arranged in the transverse plane of one of the openings 55. The openings 62 are of progressively increasing lengths having one end arranged in longitudinal alinement. Accordingly it will be apparent that rotation of the valve 57 progressively brings the openings 62 into registration with the openings 55. Suitable markings may be provided on the end of the valve adjacent the knob 58 to indicate the position of the valve.

The operation of the device is as follows:

When it is desired to cut an electrical conductor or other element, the latch 42 is swung about its pivot and the holder 35 swung outwardly by means of any convenient finger piece, such as is shown in Figure 4. The holder 35 may be swung substantially through 180 degrees to provide access to the breech end thereof, whereupon the cartridge is placed in the opening 36. In practice, it is preferred to employ ordinary blank cartridges such as those which fit the usual types of revolvers and pistols. The holder 35 is then swung back to operative position and the latch 42 closed, whereupon the hammer is cocked by pressing the finger against the finger piece 48 and moving the hammer rearwardly until the inner end of the trigger pin engages over the projection 49.

As previously stated, the device is mounted on the end of a suitable pole to permit inaccessible wires to be reached, and when the device is prepared for operation in the manner referred to, the operator reaches upwardly with the pole to place the blades 19 and 31 in position on opposite sides of the conductor or other element to be cut. One end of the string is connected to the eye 53, as previously stated, and the device may be operated merely by pulling the other end of this string. This action releases the trigger pin 51 whereupon the leaf spring 49′ snaps

the hammer to operative position and the percussion cap will be exploded by the firing pin 47. Explosion of the cap obviously fires the powder in the cartridge, thus creating considerable pressure in the cylinder 21 to move the plunger 27 outwardly. This action in turn drives the pivot pin 28 outwardly and revolves the plate 29 about the pivot 30, and accordingly the blades 19 and 31 will be moved relatively across each other in a shearing action to sever the element to be cut. After the pivot pin 28 passes around the plane of the pivot axes 23 and 30, the plunger 27 will start to move inwardly against the compression of any gases remaining in the cylinder 21. If the explosive force has been sufficient, the pivot pin 28 will make a complete revolution around the pivot pin 30, otherwise the springs 16 will return the pin 28 to normal position without making a complete revolution. If a complete revolution is made, the springs 16 will operate to return the parts to normal position regardless of the revolving movement. The springs referred to also tend to absorb shocks incident to the oscillation of the cylinder 21.

It is desired that cartridges of uniform size with uniform amounts of explosive be employed to prevent the necessity of making different cartridges. Accordingly as sufficient explosive force is provided to cut the heaviest conductors or other elements, this force is far greater than is necessary for smaller objects, and thus the device will be subjected to unnecessary forces in operation. The valve 57 is provided for overcoming this difficulty. When a relatively heavy member is to be cut, only the longest opening 62 is placed in communication with its corresponding opening 55 to release the more intense pressure generated adjacent the end of the plunger stroke. If a somewhat smaller member is to be cut, the valve 57 is rotated to bring the next opening 62 into registration with its corresponding opening 55 to release a greater amount of pressure. Similarly, additional valve ports are opened as progressively smaller objects are cut.

From the foregoing it will be apparent that the present device is relatively simple and light in construction, thus permitting its operation to be carried out with greater facility than is possible with present devices. Moreover, no substantial force is necessary in operating the device after it is placed in position, since the operator is required only to exert a slight pull on the string attached to the trigger to release the hammer. The cutting operation is instantaneous, and thus it will be apparent that an operator may cut a great number of conductors or other elements in the course of a day without the fatigue usually following the operation of devices of this character.

It is to be understood that the form of the invention herewith 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 the invention or the scope of the subjoined claims.

I claim:

1. A device of the character described comprising a pair of relatively completely revoluble cutting members, a holder for an explosive device, and means for utilizing pressure generated by the explosive device for effecting relative movement of said cutting members.

2. A device of the character described comprising a pair of relatively completely revoluble cutting members, a holder for an explosive device, an expansible chamber device having a movable member operable by pressure generated upon the explosion of the explosive device, and means connecting the movable member to one of said cutting members to effect relative movement thereof.

3. A device of the character described comprising a body, a cutting member secured to said body, a second cutting member revolubly connected to said body and movable in cooperation with the first named cutting member, a holder for an explosive device, and means for utilizing pressure generated by explosion of the explosive device for actuating the second named cutting member.

4. A device of the character described comprising a body, a cutting member secured to said body, a second cutting member revolubly connected to said body and movable in cooperation with the first named cutting member, a holder for an explosive device, and an expansible chamber device having a movable member operable by pressure generated by the explosive device and connected to the second named cutting member.

5. A device of the character described comprising a body, a cutting member secured to said body, a second cutting member pivotally connected to said body and movable in cooperation with the first named cutting member, a holder for an explosive device, a cylinder connected to said holder, and a piston operable in said cylinder under the influence of pressure generated by the explosive device and connected to the second named cutting member.

6. A device of the character described comprising a body, a cutting member secured to said body, a second cutting member pivotally connected to said body and movable in cooperation with the first named cutting member, a holder for an explosive device, a pivoted cylinder carried by said body and provided with a recess for said holder, and a piston operable in said cylinder under the influence of pressure generated by the ex-

plosive device and connected to the second named cutting member.

7. A device of the character described comprising a body, a cutting member secured to said body, a second cutting member pivotally connected to said body and movable in cooperation with the first named cutting member, a holder for an explosive device, a cylinder pivotally connected at one end to said body and provided with a laterally opening recess, said holder being pivoted to said cylinder and movable to operative position in said recess, and a piston operable in the other end of said cylinder and connected to the second named cutting member.

8. A device of the character described comprising an elongated body, a cutting member carried by one end of said body, a cylinder pivotally connected to the body adjacent the other end thereof and provided with a laterally opening recess, a cartridge holder movable to operative position in said recess, a piston reciprocable in said cylinder, a second cutting member pivotally connected to said body and movable in cooperation with the first named cutting member, means pivotally connecting said piston to the second named cutting member at a point eccentric to the first named pivot thereof, and means for firing a cartridge in said holder.

9. A device of the character described comprising an elongated body, a cutting member carried by one end of said body, a cylinder pivotally connected to the body adjacent the other end thereof and provided with a laterally opening recess, a cartridge holder movable to operative position in said recess, a piston reciprocable in said cylinder, a second cutting member pivotally connected to said body and movable in cooperation with the first named cutting member, means pivotally connecting said piston to the second named cutting member at a point eccentric to the first named pivot thereof, a hammer having a firing point movable into engagement with the percussion cap of a cartridge in said holder, a spring normally tending to operate said hammer, and a trigger for said hammer.

10. A device constructed in accordance with claim 9 wherein said body is provided with a recess, said end of said cylinder being provided with a disk arranged in said recess, and means for pivotally connecting said disk to said body.

11. A device constructed in accordance with claim 9 wherein said body at the end thereof opposite said cutting members is provided with means for attaching the body to a holder.

12. A device constructed in accordance with claim 9 provided with resilient cushion means tending to move the second named cutting member to a normal position with respect to the first named cutting member at a point spaced therefrom to permit the insertion between said cutting members of an element to be severed.

13. A device of the character described comprising a pair of relatively movable cutting members, a cartridge holder, an expansible chamber device having a movable member connected to one of said cutting members and operable by pressure generated by an exploding cartridge, and adjustable means for releasing the pressure in said chamber.

14. A device of the character described comprising a pair of relatively movable cutting members, a cartridge holder, an expansible chamber device having a movable member connected to one of said cutting members and operable by pressure generated by an exploding cartridge, said expansible chamber device being provided with a pressure release port, and a manually operable valve movable to open and close said port.

15. A device of the character described comprising a pair of relatively movable cutting members, a cartridge holder, an expansible chamber device having a movable member connected to one of said cutting members and operable by pressure generated by an exploding cartridge, said expansible chamber device being provided with a plurality of pressure release ports, and a manually operable valve controlling said ports and movable to progressively open them to the atmosphere.

In testimony whereof I affix my signature.

HERBERT E. MILLER.