May 29, 1962 W. C. LINDSEY 3,036,522

WIRE LINE CUTTER

Filed Oct. 7, 1959

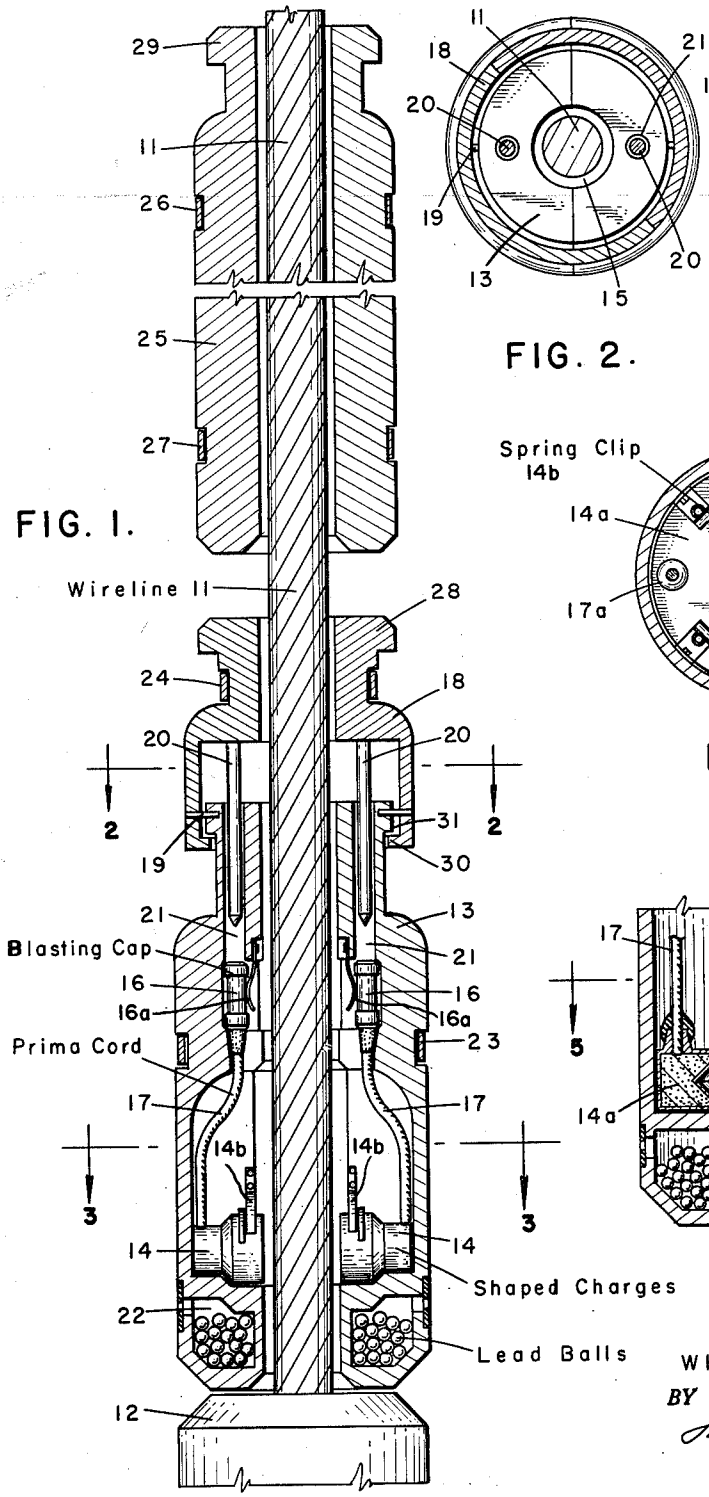


FIG. 1.

FIG. 2.

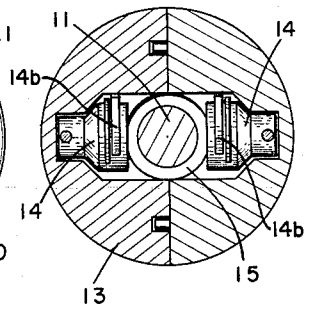


FIG. 3.

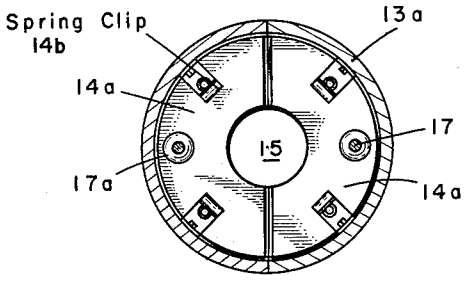


FIG. 5.

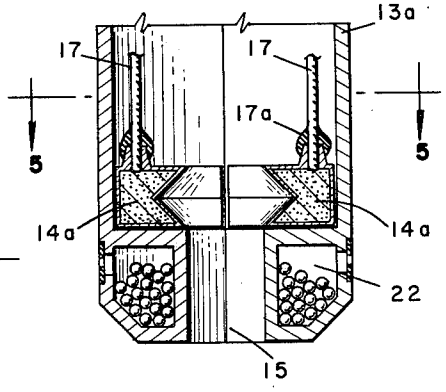


FIG. 4.

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WIRE LINE CUTTER

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The present invention is directed to a device for cutting wire lines and the like. More particularly, the invention is concerned with an apparatus for placement on a wire line for cutting same. In its more specific aspects, the invention is concerned with a device for burning or piercing a wire line.

The present invention may be briefly described as a device for cutting wire lines and the like which comprises a body member having a central bore and adapted to have a wire line inserted therethrough. One or more shaped charges in the body member are inwardly directed toward the central bore. The body member is provided with means such as a firing pin and a percussion cap connected to the shaped charge by a primacord for detonating the shaped charge. Actuating means are carried by the body member for limited vertical movement on the wire line relative to the body member. The actuating means is normally restrained in a first position on the body member by a frangible means such as a shear pin and is adapted to be moved to a second position. Means such as firing means are attached to the actuating means and are matingly received in cavities in the body member for firing the detonation means by contact therewith on movement of the actuating means to its second position. The actuating means is drivingly moved from its first position to its second position on exertion of pressure such as by weight dropped thereagainst.

The device of the present invention, including the body member and the actuating means, are suitably formed in segments for placement around the wire line and the segments are held together by holding means such as metallic bands. A sinker bar or a go-devil is also made in segments and provided with a central bore such that the segmented go-devil may be placed on the wire line, the segments being held together by metallic bands for dropping against the actuating means to cause the device to sever the wire line.

The present invention will be further illustrated by reference to the drawing in which:

FIG. 1 is a sectional view of the device of the present invention positioned on a wire line.

FIG. 2 is a sectional view taken along the line 2—2 of FIG. 1.

FIG. 3 is a sectional view taken along the line 3—3 of FIG. 1.

FIG. 4 is a sectional view illustrating a modification of the device of FIG. 1.

FIG. 5 is a sectional view taken along the line 5—5 of FIG. 4.

Referring now to FIGS. 1 to 3 of the drawings, numeral **11** designates a wire line which is connected to a rope socket **12** forming part of a carriage such as a well tool, for example, a gun perforator, a bailer, and the like. Arranged around the wire line **11** is a body member **13** which is provided with a plurality of shaped charges **14** inwardly directed toward a central bore **15** through which the wire line **11** is inserted. Arranged in the body member **13** are percussion actuated blasting caps **16** operatively connected to the shaped charges **14** by primacord **17**. As shown, the units consisting of blasting caps **16**, primacord **17**, and jet charges **14** are held in recesses in housing by means of spring clips such as spring clips **16*a*** which hold caps **16** in place and spring clips **14*b*** which hold charges **14** in place since

the caps **16**, primacord **17**, and charges **14** are separate from body member **13**.

Carried on the body member **13** is an actuating means **18** attached in a restrained first position to the body member **13** by shear pins **19**. Connected to the actuating means **18** are firing pins **20** which are matingly received in elongated cavities **21** in the body member **13**. The firing pins **20** are of sufficient length such that when the shear pins **19** are broken, the firing pins contact the blasting cap **16** to fire same and, in turn, the primacord **17** and the shaped charges **14**.

The body member **13** and the actuating means **18** are preferably formed in two segments for placement around the wire line **11**, the segments being held together by metallic bands **23** and **24**.

Formed in the lower end of the body **13** is a chamber **22** for the purpose of receiving weighting material such as lead balls. This added weight may be needed to allow the body **13** to drop more freely on the wire line **11**.

Also arranged on the wire line **11** is a go-devil **25** also preferably formed of two segments for placement on the wire line **11**, the segments being held together by metallic bands **26** and **27**.

When it is desired to sever a wire line such as **11**, the device such as the body member **13** and the actuating means **18** with the shear pins **19** restraining the actuating means in its first position is placed on the wire line and allowed to drop downwardly in a well until the carriage **12** is reached. Thereafter a go-devil such as **25** is also placed on the wire line and dropped on the wire line such that it strikes against the actuating means **18**. The force or pressure of the go-devil **25** against the fishing neck **28** of the actuating means **18**, shears the shear pins **19**, and causes the actuating means **18** to move from its first to its second position relative to the body member **13**. The firing pins **21** contact the blasting caps **16** firing or detonating same, in turn setting off the primacord **17** and the shaped charges **14** which burn through or pierce the wire line **11**, severing same.

In FIGS. 4 and 5, the shaped charges **14*a*** are semicircular and when placed in the housing **13*a*** as shown form a doughnut shaped charge. This form of jet charge completely encircles the wire line **11** and provides positive parting of the line when the charges are fired. Primachords **17** are sealingly attached to the charges by seals **17*a***. As can be seen in FIG. 5, the jet charges are retained in the housing **13*a*** by means of spring clips.

The wire line cutter of the present invention is particularly suitable for use for severing wire lines where pipe strings of about 2⅞ inch outside diameter are employed or where pipe strings of 2½ inch outside diameter are used. The wire line cutters heretofore available were not suitable for cutting wire lines used in small diameter pipe strings. In the present invention where inwardly directed shaped charges are used, it is possible to sever or burn through the wire line and then afterwards retrieve the body member and the go-devil. To this end, the go-devil **25** is provided with a fishing neck **29** which allows retrievement of the go-devil **25**, and the inwardly turned shoulder **30** of the actuating means **18** connects with the outwardly extending shoulder **31** of the body member **13**, allowing the body member **13** to be retrieved when the fishing neck **28** of the actuating means is picked up by a wire line grab tool.

The present invention is quite advantageous and useful in that devices of this nature having an outside diameter of less than 2" may be employed to cut or sever wire lines or cables of ½" or 9/16", the diameter suitable for use in pipe strings of less than 3" diameter.

The device of the present invention is, therefore, quite useful and important.

The nature and objects of the present invention having

been completely described and illustrated, what I wish to claim as new and useful and secure by Letters Patent is:

1. A retrievable device for cutting wire lines and the like which comprises a weighted segmented body member having a central bore adapted for placement movably and for free fall on a wire line, first means for holding said body member segments together, shaped charges in but separate from said body member inwardly directed toward said central bore, explosive means in said body member for detonating said charges, first and second spring means for releasably holding said shaped charges and said explosive means, respectively, in said body member, segmented actuation means for said detonation means carried by said body member for limited vertical movement on said wire line relative to said body member and normally restrained in a first position on said body member and adapted to be moved to a second position, means for holding said actuation means segments together, shoulder means on the upper end of said body member cooperatively engaging with shoulder means on the lower end of said actuation means for retrieval of said body member, firing pin means attached to said actuation means matingly received in cavities in said body member for firing said detonation means by contact therewith

on movement of said actuation means to its second position, said actuation means being drivingly moved from its first position to its second position on exertion of pressure thereagainst, and means on the upper end of said actuation means for retrieving said actuation means and said body member on cutting of said wireline by detonation of said shaped charges.

2. A device in accordance with claim 1 in which the body member comprises two segments and said first holding means for said body member and said actuation means are metallic bands peripherally embracing said body member and said actuation means, and said first and second spring means are spring clips.

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