G. A. SPANG.

APPARATUS FOR CUTTING WELL PUMPING CABLES.

APPLICATION FILED JAN. 13, 1910.

969,755.

Patented Sept. 6, 1910.

2 SHEETS—SHEET 1.

FIG. 1.

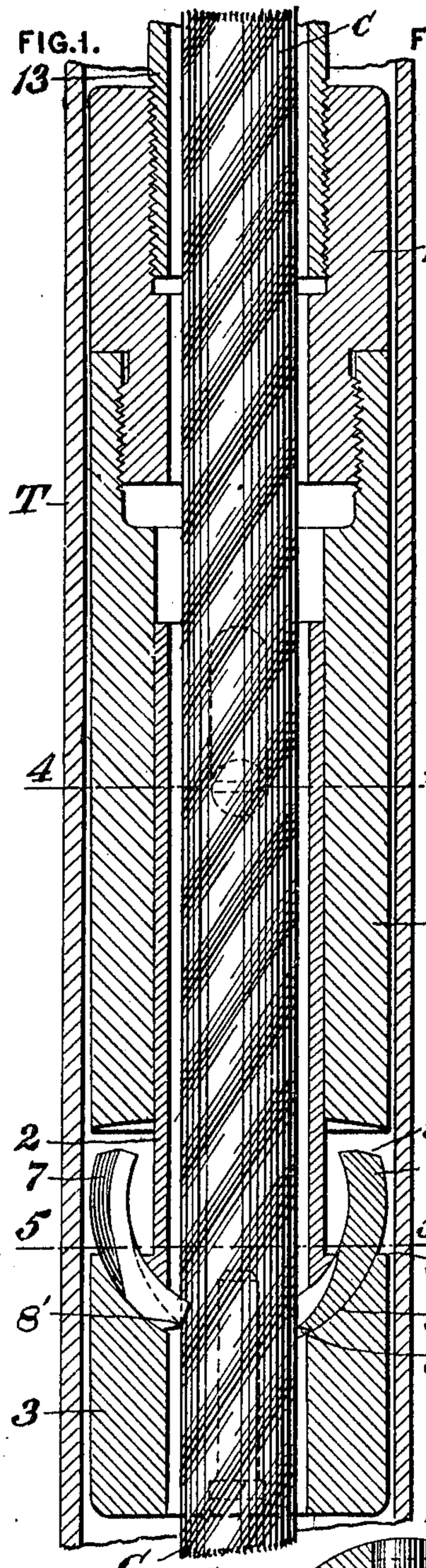


FIG. 2.

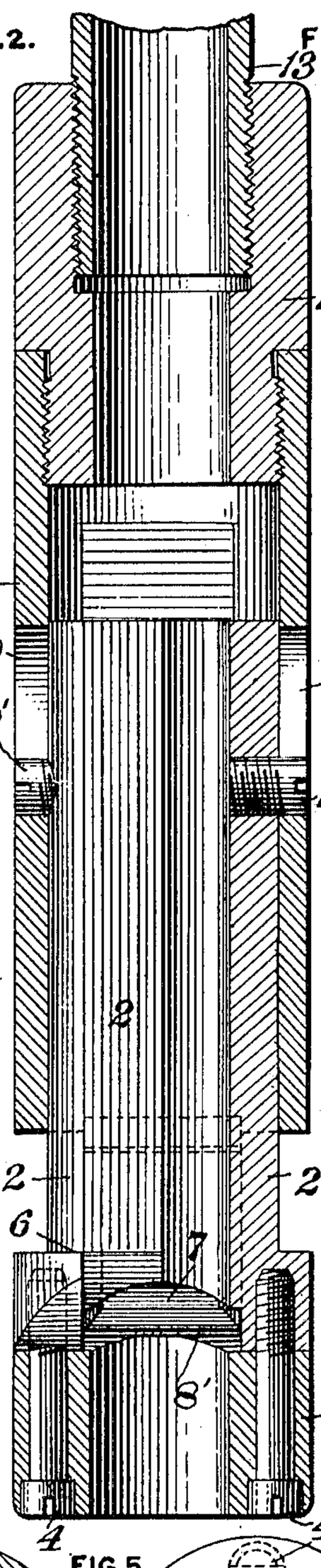


FIG. 3.

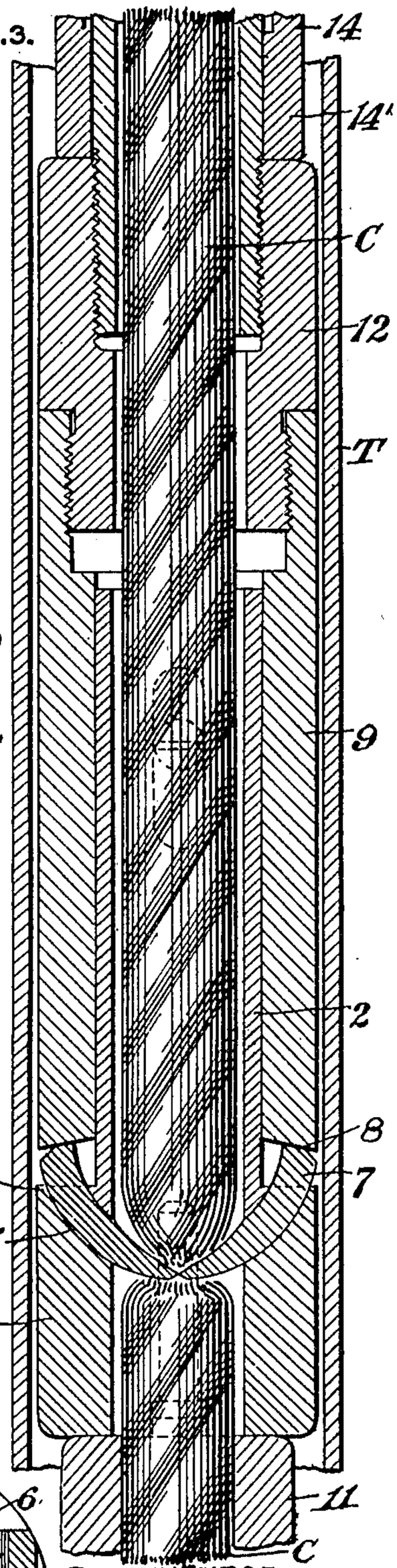


FIG. 4.

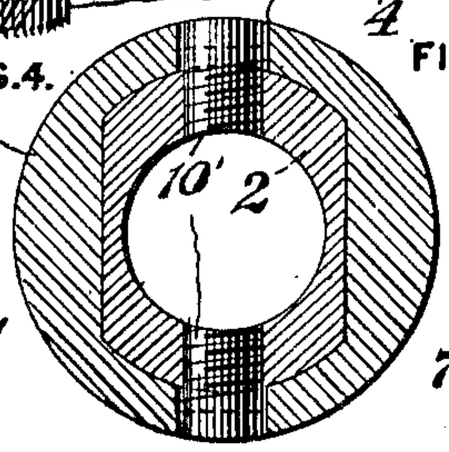
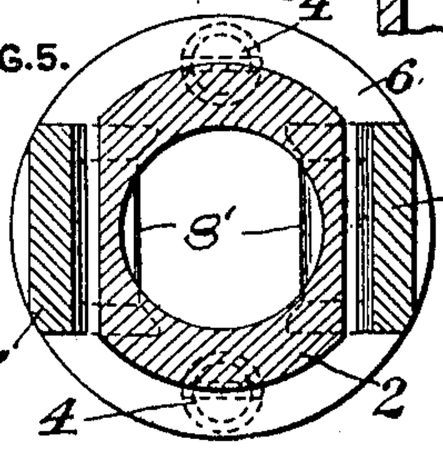


FIG. 5.



WITNESSES,

F. E. Gaither.

Ellen M. Conrad.

INVENTOR,

Geo. A. Spang

By Jno. Van Dyke

Atty.

G. A. SPANG.

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2 SHEETS—SHEET 2.

FIG. 6.

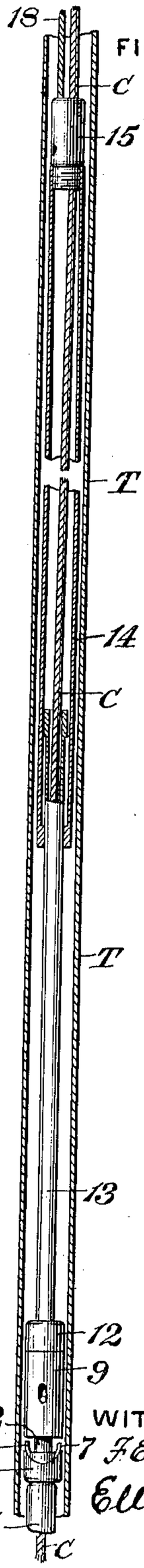


FIG. 7.

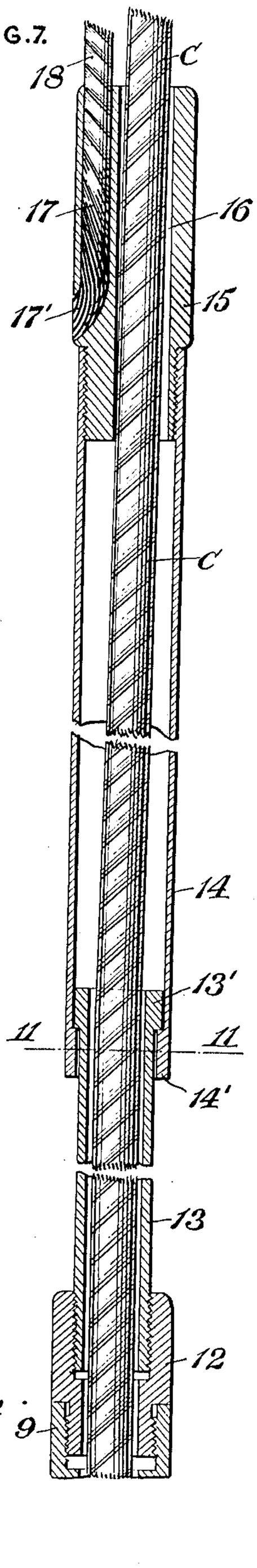


FIG. 8.

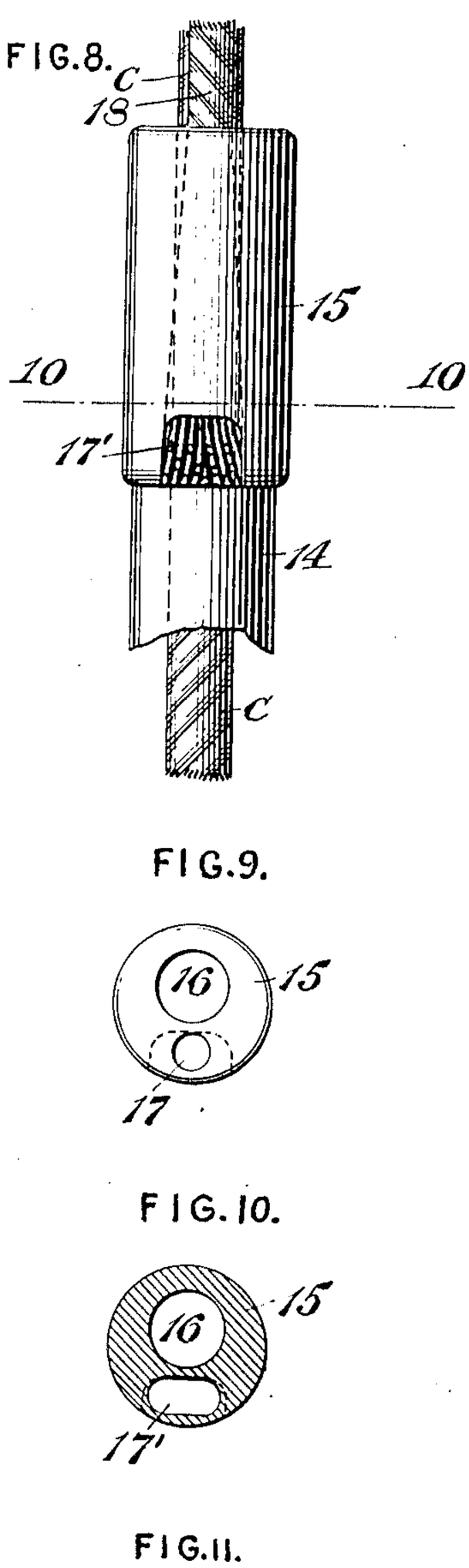
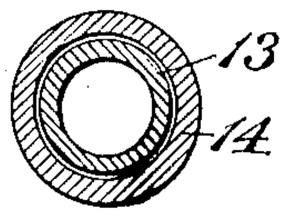


FIG. 9.

FIG. 10.

FIG. 11.



WITNESSES,

F. E. Gaither.

Ella M. Connell.

INVENTOR,

Geo. A. Spang

By Lou Webb Jr.

Atty.

UNITED STATES PATENT OFFICE.

GEORGE A. SPANG, OF BUTLER, PENNSYLVANIA.

APPARATUS FOR CUTTING WELL-PUMPING CABLES.

969,755. Specification of Letters Patent. **Patented Sept. 6, 1910.**

Application filed January 13, 1910. Serial No. 537,920.

To all whom it may concern:

Be it known that I, GEORGE A. SPANG, a resident of Butler, in the county of Butler and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Cutting Well-Pumping Cables, of which the following is a specification.

The object of this invention is to provide an efficient device for cutting the pump operating cable when the working valves become stuck in the working barrel. When a pump becomes inoperative from this cause it is necessary to pull the tubing, and this is a slow and troublesome operation, made so largely by withdrawing the cable at the same time. As the tubing is withdrawn the sections thereof are unscrewed and disconnected which is a comparatively simple operation. But great difficulty is experienced in removing the disconnected sections from the pumping cable of considerable length extending therethrough without cutting the same. This trouble is peculiar to the use of a cable for pumping, and does not arise when sucker rods are used as the latter are arranged in sections screwed together and are readily unscrewed as the withdrawing operation proceeds.

The improvement herein provides a tool which may be lowered within the tubing and which operates to cut the cable at the socket connecting with the valves, so that the entire length of the cable together with the cutting tool and its operating line are withdrawn and gotten entirely out of the way before the tube-raising operation proceeds. A tool for this work must be of such size as to enter the tubing which is usually only from two to three inches inside diameter, and there must be provision for effectively operating the tool. While it is a common expedient to employ jars for operating rope knives, jars of usual form are quite inadequate for the use herein proposed owing to the restricted space within the tubing, and especially as considerable of the tubing space is already taken up by the pump operating cable. I have therefore designed jars especially for this use which, so far as I am aware, would not be serviceable in any other connection and also which, in the present development of the tool, seem essential to the operation thereof.

In the accompanying drawings, Figures 1 and 2 are vertical longitudinal sections of the cutting tool taken at right angles to each other, showing the position of the cutter elements while being lowered on the pump operating cable. Fig. 3 is a view similar to Fig. 1, with the cutter elements in rope severing position. Figs. 4 and 5 are sectional plans on lines 4—4 and 5—5, respectively, of Fig. 1. Fig. 6 is a view partly in elevation and partly in section of the cutting tool and the tubular cutter-operating jars. Fig. 7 is a vertical section of the jars on a larger scale. Fig. 8 is an elevation of the tubular rope socket at the upper end of the jars. Fig. 9 is a top plan of the socket and Fig. 10 a sectional plan on line 10—10 of Fig. 8. Fig. 11 is a sectional plan on line 11—11 of Fig. 7.

Referring to the drawings, the body of the tool consists of the tubular upper and lower members 2 and 3, secured together by screws 4. The meeting ends of said members are recessed to form a substantially semicircular cutter passage 5, the latter curving downwardly and inwardly from opposite sides of the body with the ends of the passage opening upwardly through the annular shoulder or offset 6 near the lower end of member 2. Operating in the cutter passage are the curved cutters 7, having blunt upper or outer ends 8 and with their lower or inner ends forming cutting edges 8′. The cutters are so curved as to work freely in the cutter passage, with their upper portions projecting more or less above shoulder 6, the projection being considerable when they are held in outward position by the cable when being lowered in a well as in Fig. 1, while when forced inward to the extreme cutting position, as in Fig. 3, they are well lowered within the cutter passage.

Embracing and movable vertically on body member 2 is the tubular hammer or cutter driving element 9, formed with slots 10 into which project pins 10′ from body 2 for limiting the vertical movement or stroke of the driving member and for preventing it from becoming detached from the body. The outside diameter of the driving member is substantially the same as the diameter of the body below shoulder 6, and these parts must be of such size as to operate within the well tubing T. They are shown full size in Figs. 1, 2 and 3 for working in a two inch pumping tube, a size much used in the oil fields. The passage through the tubular body provides a way for the pumping cable

C, and when being lowered as in Figs. 1 and 2, the driving member 9 is raised relatively to the body with pins 10′ at the lower ends of slots 10, which affords ample room for cutters 7 to push outward with the cable therebetween, though not permitting the cutters to drop out. When the tool has been lowered into engagement with socket 11 which connects with the valves or with the sinker bars or other appliances above the valves, the downward movement of the body is arrested, the socket forming an abutment, and the blow or blows delivered to the cutters by driving member 9 force them downward and inward through the cable and sever it, as in Fig. 3.

It is necessary to provide means for actuating the cutter driving member 9, and as such driving means must operate within the relatively small tubing the only practicable way seems to be to employ a form of jars that will embrace the pumping cable, the latter extending therethrough and through the cutting tool, thus utilizing all available space within the tubing. In the present embodiment, a tubular head 12 of the same external diameter as the driving member is coupled to the upper end of the latter and connecting with this head is the lower inner tubular member 13 of the tubular jars, of which 14 is the upper telescoping member, with external shoulder 13′ at the upper extremity of part 13 and similar internal shoulder 14′ at the lower extremity of part 14 preventing the jar members from separating. On the down stroke of the jars the lower end of the outer member 14 imparts a downward blow to head 12, and on the up stroke the engagement of shoulder 13′ and 14′ lifts the jars and the cutter driving member 9 for the next blow. With the drilling cable embraced by the tubular jars it is necessary to provide a tubular rope socket for the jars through which the drilling cable may extend, and such a socket is here shown at 15, the cable passage therethrough being indicated at 16, while at one side thereof is vertical passage 17 for the tool operating rope or cable 18, the latter entered in passage 17 with its lower end spread out in the laterally turned and enlarged lower extremity 17′ of the passage, the spread end of the rope being held by babbitt, lead, or other means.

The invention herein provides a cable severing tool adapted to enter and operate within the pumping tubing, and the same provides a passage for the drilling cable which is continuous from the top of the jars to the bottom of the tool body, and which may thus be readily lowered into the tubing until a rope socket or other obstruction is reached when the tool is operated to sever the cable as above described. And when this has been accomplished the cable and tool are removed from the tubing and the latter may be drawn and detached section by section in the operation of raising the obstructed valves to the surface.

I claim:

1. The combination of a tubular body having opposite inwardly and downwardly extending cutter passages, cutters and cutter driving means telescoping and moving longitudinally of the body.

2. The combination of a tubular body having opposite downwardly and inwardly curved cutter passages with the outer ends of the passages opening upwardly, curved opposing cutters in said passages and extending upwardly therefrom, and cutter driving means movable longitudinally of the body.

3. The combination of a tubular body having opposite inwardly and downwardly curved cutter passages with the outer ends of the passages opening upwardly, curved opposing cutters in said passages and extending upwardly therefrom, and cutter driving means telescoping and movable longitudinally of the body.

4. The combination of a tubular body having a shoulder forming enlargement adjacent its lower end and formed with opposite inwardly extending cutter passages which are open through the top surface of the shoulder, opposing cutters movable in and projecting from the passages, and cutter driving means.

5. The combination of a tubular body having a shoulder forming enlargement adjacent its lower end with opposite downwardly and inwardly curved cutter passages extending downwardly from the top surface of the shoulder, curved opposing cutters movable in the passages and at the outer side of the body above said shoulder, and cutter driving means movable vertically on the exterior of the body, and means for limiting such vertical movement.

6. The combination of a tubular body, rope cutting means carried thereby, and cutter driving means embracing and movable longitudinally of the body and having pin and slot connection therewith.

7. Mechanism for cutting a pumping line within well tubing, comprising a tubular tube-entering body, cutting means movably carried by the body and actuated by force applied in a vertical direction, a cutter driving device movable longitudinally of the body, and tubular tube-entering jars connected to the cutter driving device.

8. Mechanism for cutting a pumping line within well tubing, comprising a tubular tube-entering body, cutting means movably carried by the body and actuated by force applied in a vertical direction, a tubular cutter driving device embracing and movable longitudinally of a body with means limit-

ing such movement, tubular tube-entering jars connected to the upper end of the cutter driving device, the jars consisting of upper and lower telescoping tube members, and a tubular tube-entering rope socket secured to the upper end of the jars, the tubular socket tubular jars tubular driving device and tubular body providing a passage for the pumping cable.

9. Mechanism for cutting a pumping line within well tubing, comprising a tubular tube-entering line-embracing body, line cutting means movably carried by the body and actuated by force applied in a vertical direction, and longitudinally movable line-embracing cutter actuating means.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE A. SPANG.

Witnesses:

J. CAMPBELL BRANDON,

JAMES O. CAMPBELL.