No. 679,483. Patented July 30, 1901.

L. W. SIPLE.

TUBE CUTTER.

(Application filed Dec. 13, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

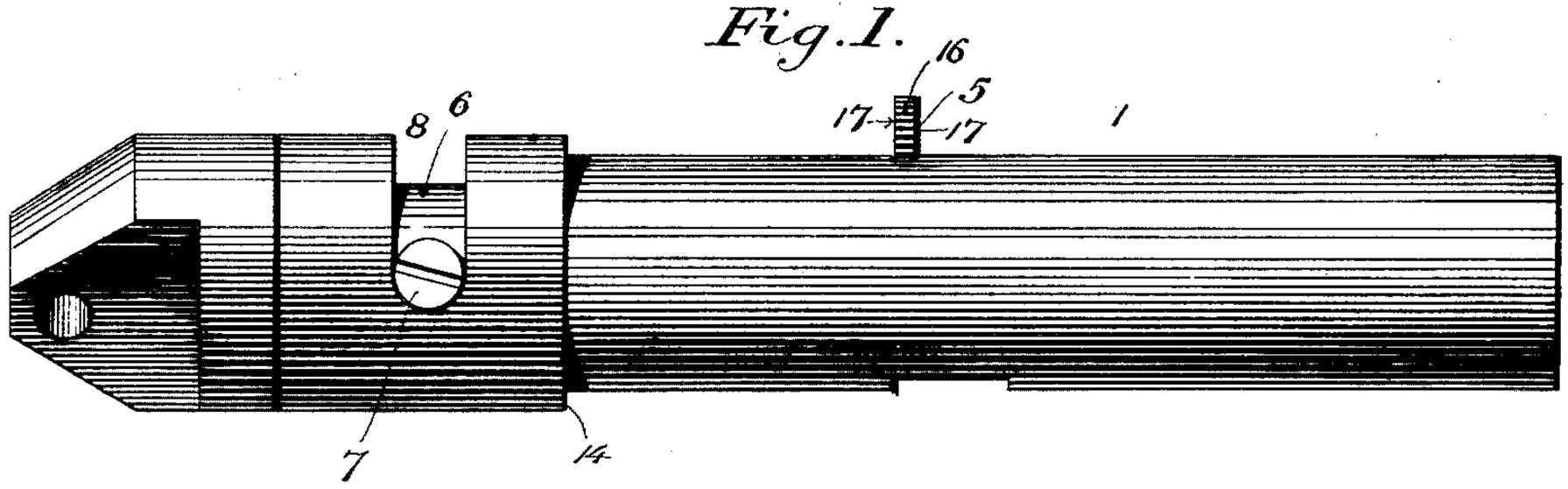


Fig. 2.

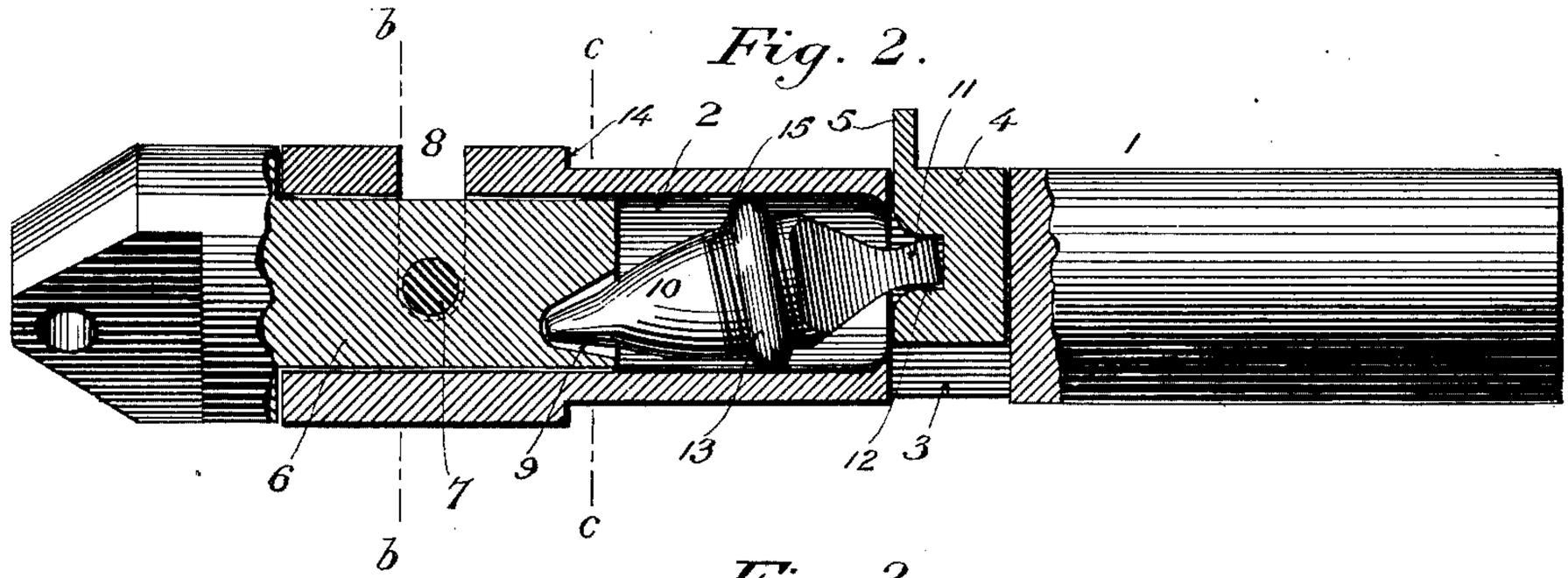


Fig. 3.

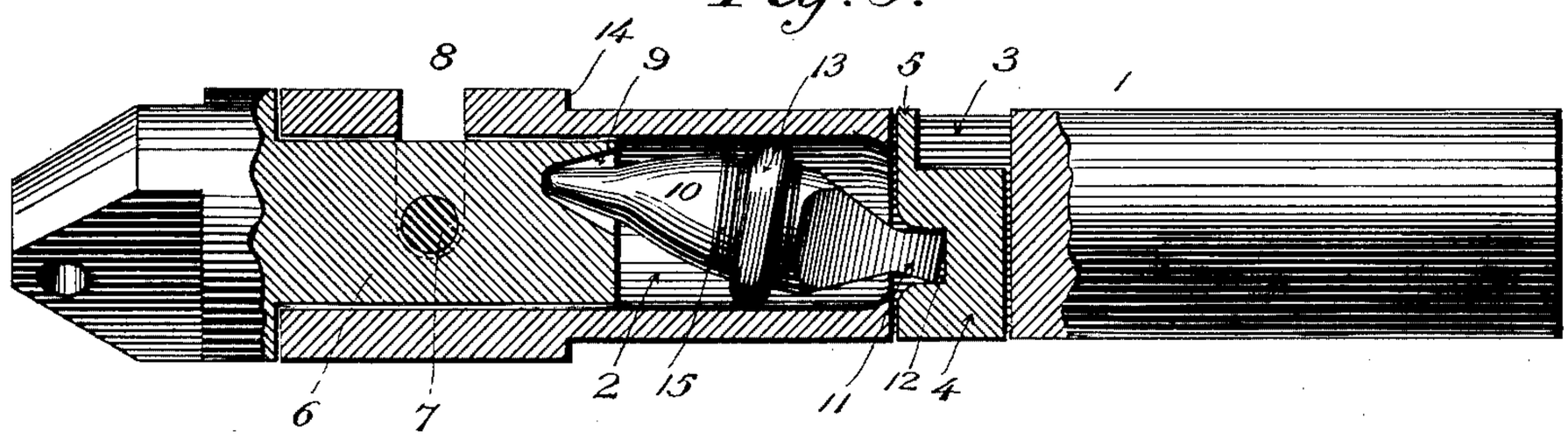
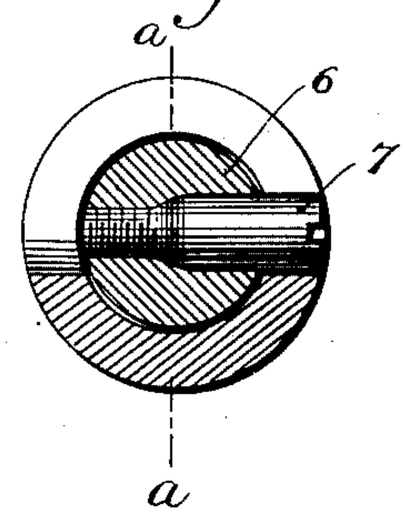


Fig. 4.



Witnesses
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(No Model.) 2 Sheets—Sheet 2.

Fig. 5.

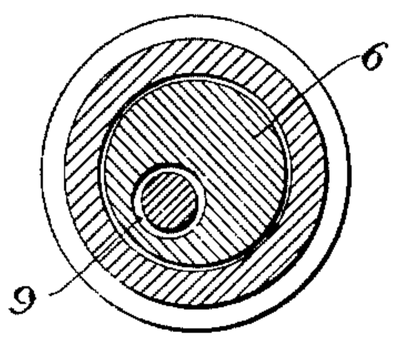


Fig. 6.

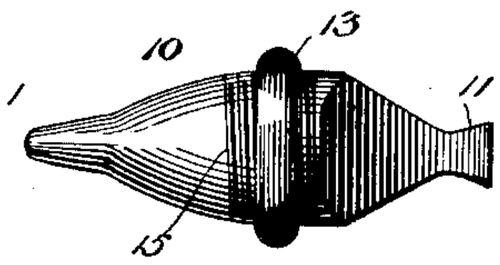


Fig. 7.

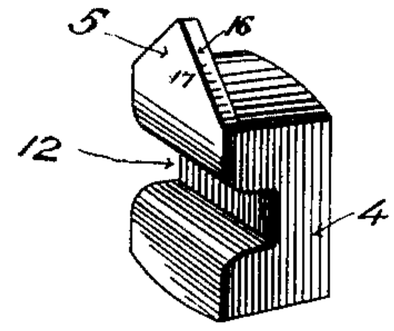


Fig. 8.

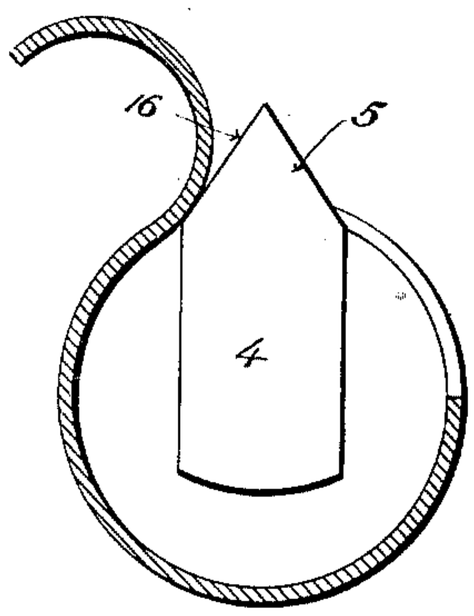
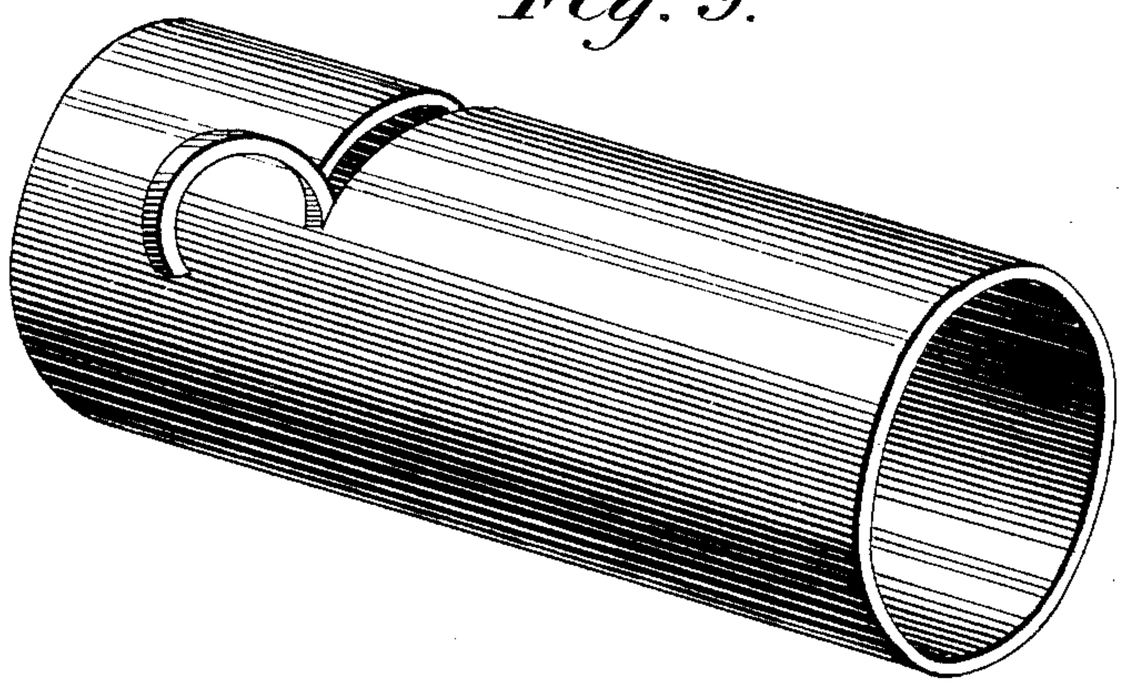


Fig. 9.



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Attorney

UNITED STATES PATENT OFFICE.

LYNN W. SIPLE, OF CHEROKEE, IOWA.

TUBE-CUTTER.

SPECIFICATION forming part of Letters Patent No. 679,483, dated July 30, 1901.

Application filed December 13, 1900. Serial No. 39,783. (No model.)

To all whom it may concern:

Be it known that I, LYNN W. SIPLE, of Cherokee, county of Cherokee, and State of Iowa, have invented a new and useful Improvement in Tube-Cutters, of which the following is a specification.

This invention relates to a tube-cutter, and has reference more particularly to that class of cutters designed for severing tubes from the inside and embodying a knife movable in a mandrel or support, which latter is adapted to be inserted in the tube and rotated to cause the knife to be projected and cut its way through the material of the tube.

The invention consists in various improvements in devices of this character directed to the form of the knife, the mechanism for operating the same to bring it into action, to means for varying the projection of the knife according to the size of the tubes to be severed, and to various other features, which will be fully described in the specification and pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of my improved tube-cutter, showing the knife projected. Fig. 2 is a longitudinal sectional elevation through the same on the line *a a*. Fig. 3 is a similar view showing the knife retracted. Fig. 4 is a transverse sectional elevation on the line *b b* of Fig. 2. Fig. 5 is a transverse sectional elevation on the line *c c* of Fig. 2. Fig. 6 is an elevation of the rocking member for transmitting motion from the operating-stem to the knife for projecting and retracting the latter. Fig. 7 is a perspective view of the knife-block and knife carried thereby. Fig. 8 is a diagrammatic view of a tube, showing how the knife acts in severing the same. Fig. 9 is a perspective view of a tube partly severed.

Referring to the drawings, 1 represents a mandrel in the form of a cylindrical body adapted to be inserted in the tube to be severed and formed at its front with a cylindrical chamber 2, extending about midway of its length, where it joins a transverse opening 3, extending entirely through the mandrel from side to side. Within this transverse opening is slidingly mounted a knife-block 4, carrying on one end a knife or cutter 5, which by the movements of the block in the opening is adapted to be projected beyond the surface of the mandrel, as in Fig. 2, or retracted, as in Fig. 3. The movements of the knife-block to thus project and retract the knife are effected by a cylindrical oscillating stem 6, fitting in the front end of the mandrel and confined and limited in its oscillating motion therein by a radial stop 7 in the form of a screw tapped in the stem, with its outer end projecting through a slot 8, extending through the wall of the mandrel and about half around the same. The projecting end of this screw is adapted to encounter the ends of the slot when the stem is turned in either direction to project or retract the knife, so that it serves to limit the motion of the knife-block and also as a means for holding the stem in the mandrel. The inner end of the stem is provided with a hole or socket 9, arranged at the side of its center, in which is seated the rear conical end of an elongated body 10, whose opposite end is in the form of an angular finger 11, seated loosely in a transverse open slot 12 in the face of the knife-block. This elongated body is encircled by a ring 13, which fits snugly within the chamber 2 in such manner that as its conical end is carried around by the eccentric hole in the stem when the latter is oscillated in the mandrel the elongated body will rock on the ring 13 as a fulcrum, causing the angular finger in the knife-block to partake of corresponding motions and resulting in the movement of the block in its opening outward or inward to project or retract the knife. The relative arrangement of these parts—the stop-screw and the slot in the mandrel—is such that when the stop-screw is at the left end of the slot, as shown by dotted lines in Fig. 4, the conical end of the elongated body will be at its highest point and the angular finger will be at its lowest point, with the knife-block retracted, as shown in Fig. 3. This is the position of the parts when the mandrel is inserted in the tube preparatory to severing it. When inserted to the proper depth, which may be determined by a gage-shoulder 14 on the mandrel, adapted to abut against the boiler-sheathing or end of the tube, the operating-stem is turned to the right, and the eccentric socket in the end of the stem will be moved in the arc of a circle and downward

and will carry the conical end of the body in a corresponding path, which will cause the body to rock within the chamber on the encircling ring as a fulcrum, and this rocking motion will cause the angular finger engaging in the knife-block to move upward in the arc of a circle, and it will carry the block outward and project the knife, as shown in Fig. 2, through the wall of the tube. At this point the stop-screw will have reached the end of the slot, as shown in Fig. 4, and the motion of the stem being continued the stop-screw will, by its engagement with the end of the slot, carry the mandrel around within the tube, carrying the knife around with it and forming an incision entirely around the tube through the material of the same. When the tube is thus severed, the stem is turned to the left again, which action will rock the elongated body and retract the knife-block, so that the mandrel may be withdrawn from the severed tube for another operation.

In order that the degree of projection of the knife may be varied according to the diameter of the tube to be severed, I provide for varying the length of movement which will be given the knife-block when the stem is turned within the mandrel to project the knife. This I effect by mounting the fulcrum-ring adjustably on the elongated body, which is preferably accomplished by threading the interior of the ring to fit corresponding threads 15 on the exterior of the body. When the ring is midway between the two ends of the body, their movements will be the same. If now it is desired to sever a tube which is considerably greater in diameter than the diameter of the mandrel, the ring is screwed toward the conical end of the elongated body, which will result in a correspondingly-increased movement of the opposite end actuating the knife-block, so that the latter will be projected a greater degree beyond the mandrel. It is seen, therefore, that for the same movement given by the operating-stem to the conical end of the elongated body the knife may be projected a greater or less distance from the surface of the body, so that tubes of a greater diameter than the mandrel may be effectually severed without the necessity of enlarging the mandrel to bring the knife into its proper operative relation to form the incision.

The knife I employ is peculiarly formed to sever the tube cleanly and by a single rotation of the mandrel, it acting to first punch a hole through the tube-wall and then to plow through the same, displacing and removing a uniform section of the material and forming as it progresses a slot entirely around the tube, which slot has its walls parallel and extending at right angles to the axis of the tube, as clearly shown in Figs. 8 and 9. To accomplish this action, the knife has its advancing active edge flat, as at 16, Figs. 2 and 7, and arranged at right angles to the line of travel, its side faces 17 being parallel to each other and arranged in the direction of the line of travel. The front flat edge inclines rearward and upward and meets the rear edge in a point, which when the knife is projected punches through the tube-wall, and the knife being carried around by the rotation of the mandrel it displaces a uniform strip of the tube-wall, as shown in Fig. 9, corresponding in width to that of the knife. It is seen, therefore, that the tube is cleanly severed by a single rotation of the tool within the same.

It will be observed that the end of the knife-block in rear of the knife 5 is flat and when projected forms a continuation of the outer surface of the mandrel. This flat surface when the knife is in action has a bearing against the inner surface of the tube and serves to hold the knife steadily to its work.

Having thus described my invention, what I claim is—

1. The combination with a mandrel formed with a cylindrical longitudinal chamber and with a transverse slot extending through the wall of the chamber, of a stem rotatable in said chamber, a stop on the stem extending in the slot, a radially-movable knife, and operative connections between the stem and the knife.

2. The combination of a mandrel formed with a longitudinal chamber and with a transverse slot extending through the wall of the chamber, a radially-movable knife-block mounted in the mandrel, a rocking member detachably engaging the knife-block, a rotatable stem mounted in the chamber and detachably engaging the rocking member, and a removable stop-pin carried by the stem and engaging in the slot; whereby said pin serves the double function of a stop and as a means for holding the parts in operative relations.

3. In a tube-cutter the combination with a mandrel having a longitudinal chamber, of a stem rotatable therein, and formed in its end with an eccentric socket, a radially-movable knife formed with a transverse slot, and a rocking member having one end seated in the socket and its other end engaging in the slot in the knife.

4. In a tube-cutter the combination with the mandrel having a longitudinal cylindrical chamber, of a cylindrical stem rotatable in said chamber and formed in its end with an eccentric socket, a radially-movable block formed with a transverse slot, and a rocking member having one end seated in the socket in the stem and its other end engaging in the socket in the knife-block, said rocking member provided with an annular bearing-surface fitting snugly but loosely in the cylindrical chamber and constituting a fulcrum on which the member rocks.

5. In a tube-cutter the combination with a mandrel, of a radially-movable knife, means for moving the knife radially, and independent means for adjusting the movement of the knife, with reference to the movement of the stem.

6. The combination with a mandrel, of a radially-movable knife, an operating-stem rotatable to a limited extent with relation to the mandrel and operatively connected with the knife, and means for varying the movement of the knife with relation to the movement of the stem.

7. In a tube-cutter the combination with a mandrel provided with a chamber, of a radially-movable knife, a rotatable operating-stem mounted in the chamber, a transmitting member engaged by the stem and engaging the knife, and an encircling ring adjustably mounted on said member and formed to fit within the chamber, said ring forming the fulcrum on which the member rocks.

In testimony whereof I hereunto set my hand, this 10th day of December, 1900, in the presence of two attesting witnesses.

LYNN W. SIPLE.

Witnesses:
HENRY H. MORRIS,
RICHARD SIMS.