

(No Model.)

O. F. MARTIN.
TUBE CUTTER.

No. 360,709.

Patented Apr. 5, 1887.

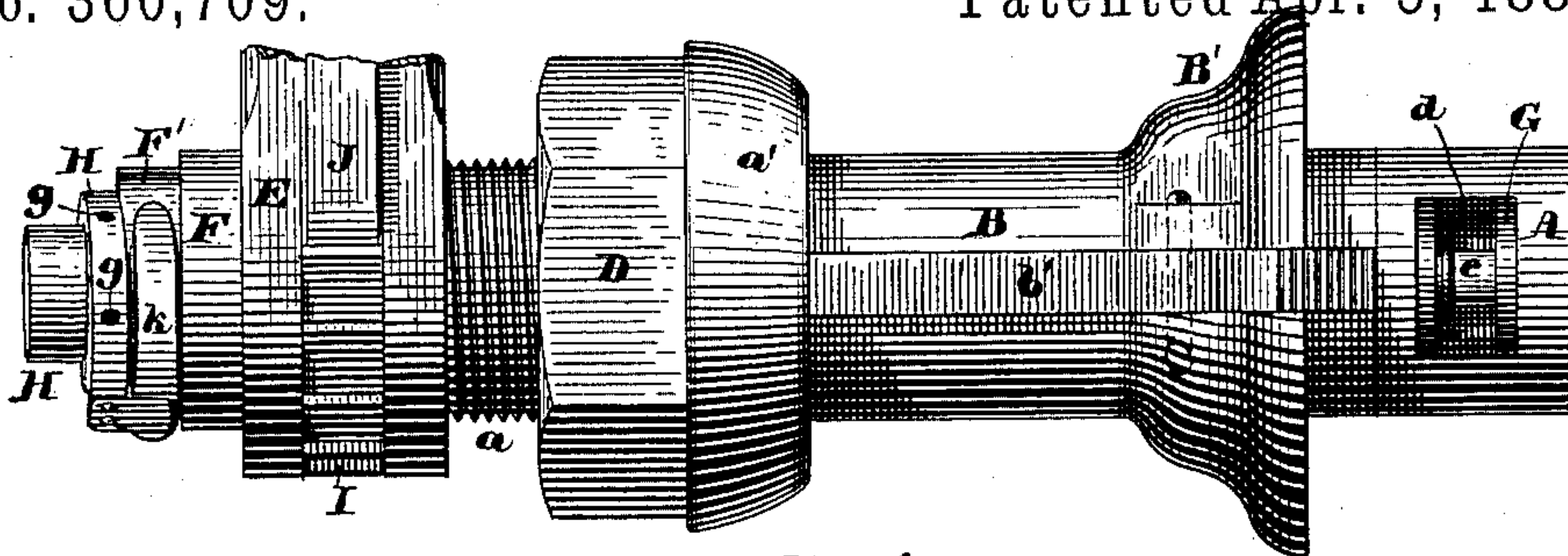


Fig. 1.

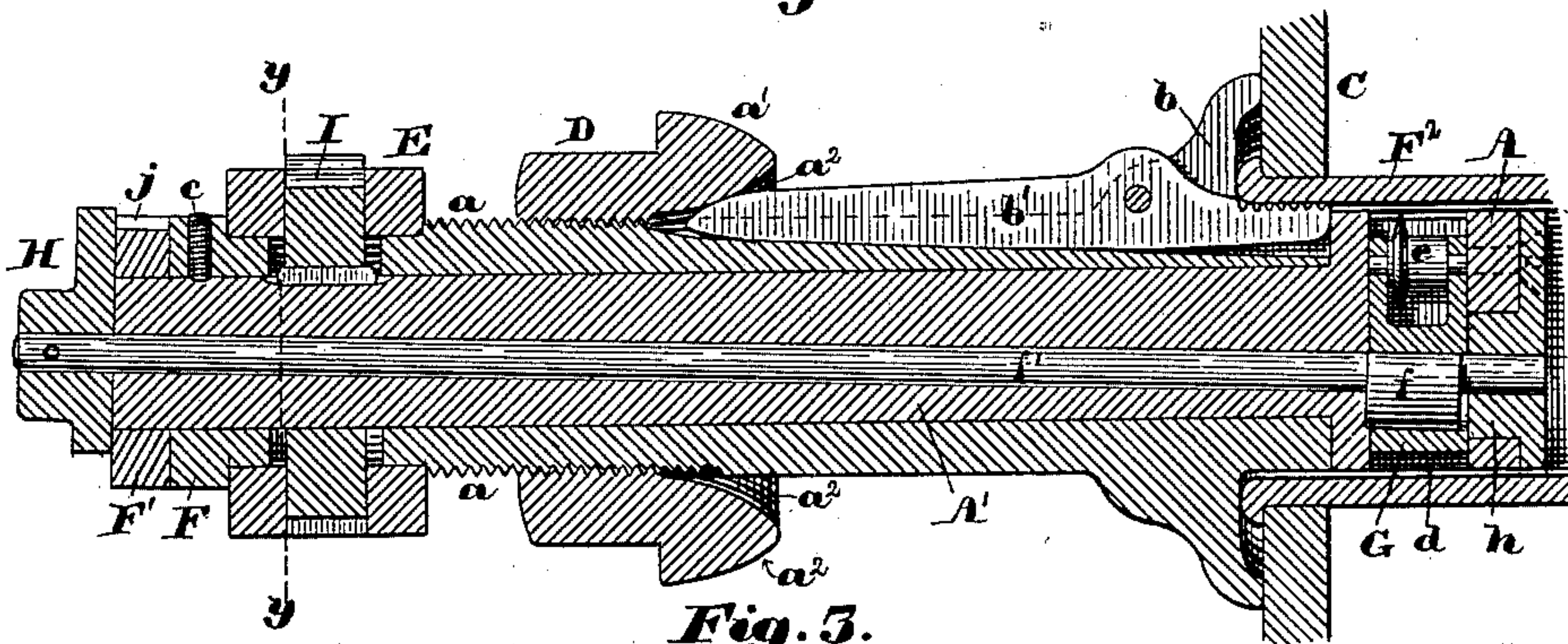


Fig. 3.

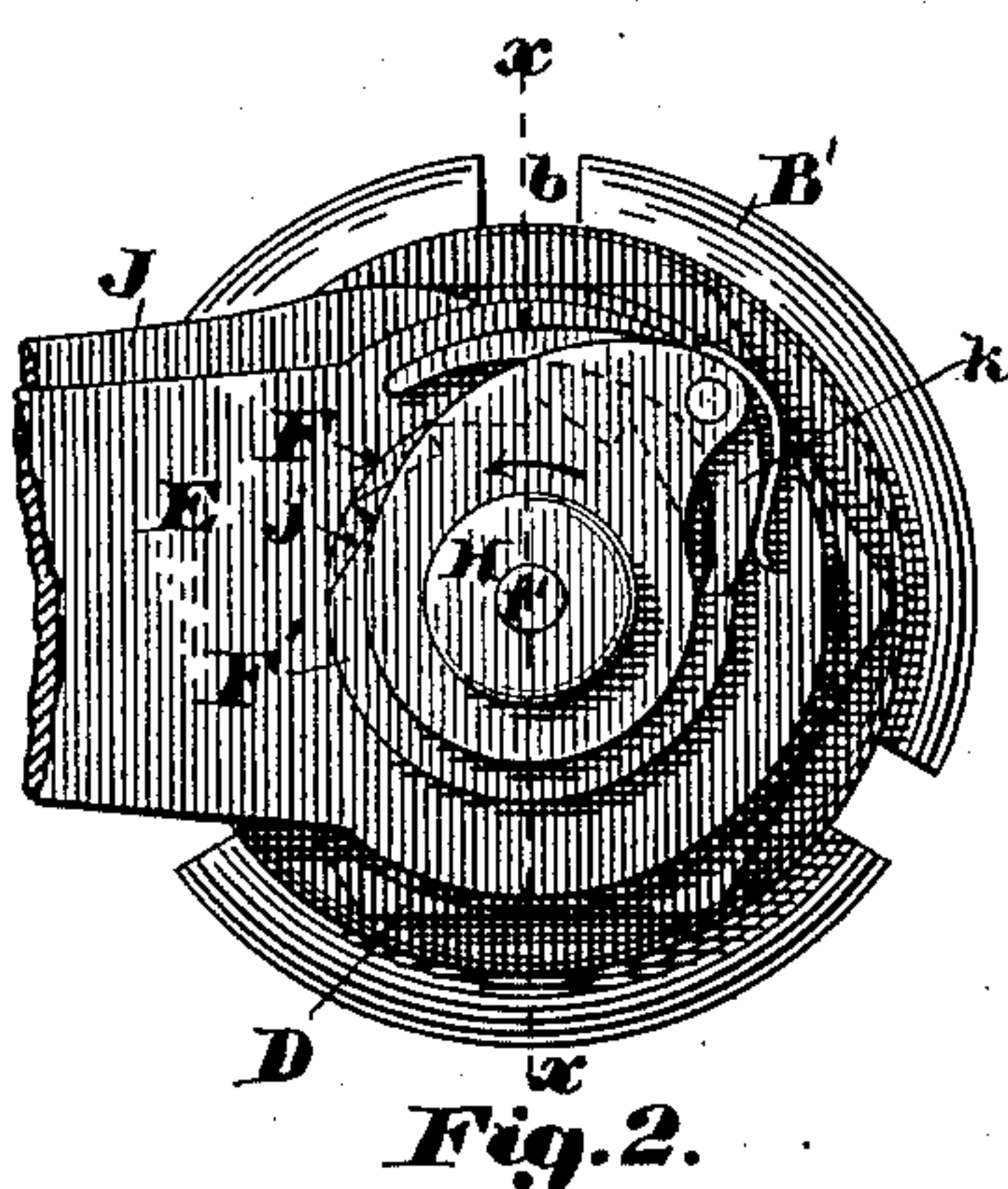


Fig. 2.

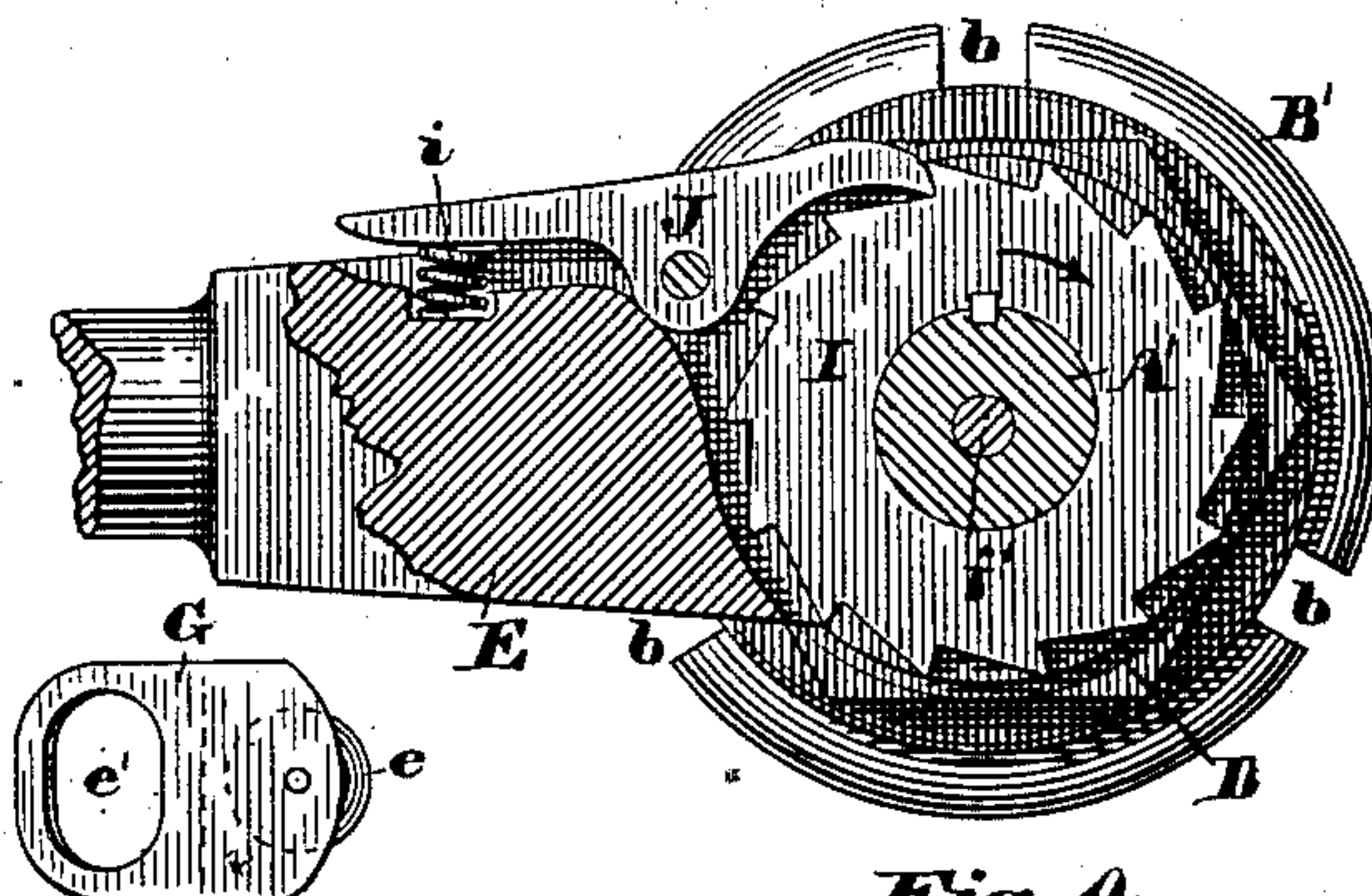


Fig. 4.

Fig. 6.

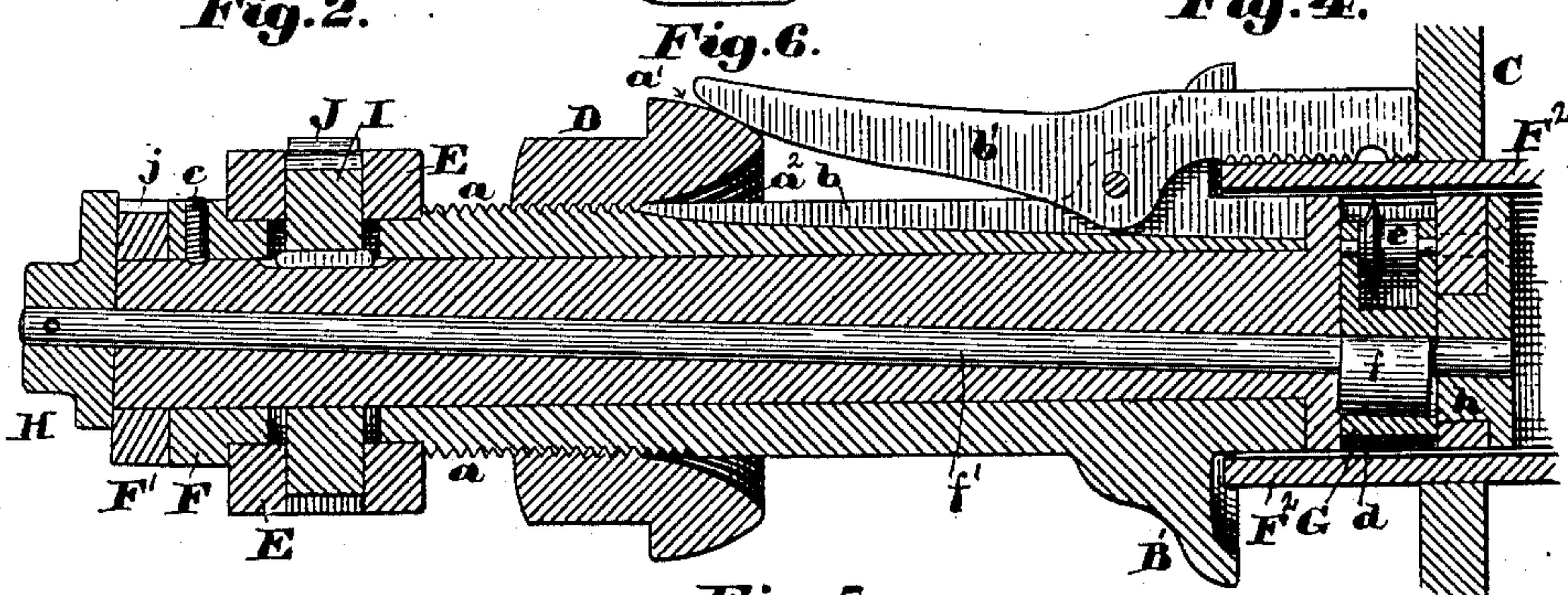


Fig. 5.

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UNITED STATES PATENT OFFICE.

ORIN F. MARTIN, OF SOMERVILLE, ASSIGNOR OF ONE-HALF TO WILLIAM P. DEAN, OF BOSTON, MASSACHUSETTS.

TUBE-CUTTER.

SPECIFICATION forming part of Letters Patent No. 360,709, dated April 5, 1887.

Application filed March 3, 1887. Serial No. 29,511. (No model.)

To all whom it may concern:

Be it known that I, ORIN F. MARTIN, of Somerville, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Tube-Cutters, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention relates to a tool for cutting off boiler-tubes, either for trimming the tube to the desired length when one end thereof has been properly expanded and secured in the tube-sheet and the tube projects too far through the opposite tube-sheet, or for cutting off a defective tube within the tube-sheet for the purpose of removing the same preparatory to setting a new tube in its place; and it consists in certain novel features of construction, arrangement, and combination of parts, which will be readily understood by reference to the description of the drawings, and to the claims to be hereinafter given.

Figure 1 of the drawings is an elevation of my improved tube-cutter with the main body of the ratchet-handle broken away. Fig. 2 is an end elevation of the same. Fig. 3 is a longitudinal section of the same, the cutting-plane being on line *x x* on Fig. 2. Fig. 4 is a transverse sectional elevation, the cutting-plane being on line *y y* on Fig. 3. Fig. 5 is a longitudinal section similar to Fig. 3, and illustrating the adaptation of the tool to cutting off tubes outside of the tube-sheet; and Fig. 6 is an elevation of the cutter and cutter-stock.

In the drawings, A is a cylindrical head, formed in one piece, with the cylindrical shank A', fitted to and rotatable in the sleeve B, which has formed upon one end thereof the flange B', to rest against the tube-sheet C when a tube is to be cut inside of said tube-sheet, and provided at its other end with a male screw-thread, *a*, upon which is fitted the nut D, so as to be moved along said shank when desired, and having a portion of its exterior made conical, as at *a'*, and a portion of its inner surface or bore made smooth and flaring, as at *a''*.

The sleeve B has formed in its periphery a plurality of rectangular grooves, *b b*, extending to and cutting through the flange B', which is located a short distance—say one-half inch,

more or less—from the end of said sleeve. The portion of said sleeve which projects beyond said flange toward the head A abuts against and is of the same diameter as said head, which diameter must approximate to the inner diameter of the tube upon which the tool is designed to operate.

Within the recesses *b b* in the sleeve B are pivoted the hardened-steel levers *b' b'*, one arm of each of which has its outer or inner surface serrated or roughened, according as the tool is to be used to cut off the tube inside or outside of the tube-sheet C, and the other arm is made smooth and inclined to the axis of the shaft upon the outside, as shown in Fig. 3, or upon the inside, as shown in Fig. 5.

A portion of the end of the sleeve B opposite to the flange B' is reduced in diameter to form a bearing for one branch of the bifurcated ratchet-operating lever E, the other branch of said lever having its bearing upon the reduced inner portion of the collar F, which is secured in position upon the shank A' of the head A by the set-screw *c*.

The nut D is fitted to the threaded portion of the sleeve B, and when it is moved toward the flange B' its inner flaring surface, *a''*, or its outer conical surface, *a'*, engages with the inclined surfaces of the long arms of the levers *b' b'* and moves them about their pivots to force the serrated surfaces of their shorter arms hard against the tube to be cut, thereby firmly clamping the sleeve B to the tube F² in axial line therewith, as shown in Figs. 3 and 5.

The head A has formed therein the rectangular slot *d*, extending transversely through the same, and in which is fitted, so as to be movable endwise therein, the cutter-stock G, having mounted upon a suitable journal set therein the rotating cutter *e*.

The cutter-stock G has formed in its end opposite the cutter *e* an oval or oblong slot, *e'*, in which is fitted the eccentric *f*, formed in one piece with the shaft *f'*, fitted to and rotatable in a slightly-inclined bearing extending through the shank A' from end to end, said shaft *f'* having secured upon its end opposite the eccentric *f* the collar H, provided in its edge with holes *g g* to receive a pin or

handle for rotating said collar and shaft. The head A, also, has formed in its end opposite the shank A' a circular opening, to facilitate the placing of the eccentric *f* and shaft *f'* in position, said opening having fitted therein the bushing *h*, through which is drilled a hole to form a second bearing for the shaft of the eccentric, as shown in Figs. 3 and 5.

The shank A' has secured thereon, between the ends of the sleeve B and collar F, the ratchet-wheel I, upon the teeth of which the pawl J, pivoted to the lever E, (only a portion of which is shown in the drawings,) engages to impart to said shank A' and head A a rotary motion as said lever is moved about its axis of motion, said pawl J being kept in engagement with the teeth of the ratchet-wheel I by the tension of the spring *i*, as shown in Fig. 4.

The shank A' has firmly secured thereon, outside of the collar F, a second collar, F', having formed in its periphery a series of ratchet-teeth or detent-notches, *j*, extending around one half of its circumference, the other half of said circumference being made smooth and concentric with the axis of the shank A', as shown in Fig. 2.

The collar H is provided with a projection at one side, to which is pivoted the pawl *k*, constructed and arranged to engage with the teeth or detent-notches in the periphery of the collar F', as shown in Fig. 2.

The collars F' and H are so set relative to each other and the eccentric *f* that when the eccentric and cutter *e* are in the positions shown in Figs. 3 and 5 the pawl *k* will be in engagement with the first tooth or notch on the collar F', as shown in Fig. 2.

The operation of my invention is as follows: The parts being in the positions shown in the drawings, except that the nut D is moved toward the left of Figs. 1 and 3 until it is in contact with the side of the lever E, if the tool is provided with the clamping-levers *b' b'*, (shown in Fig. 3,) and it is desired to cut off a tube set in the tube-sheet C at a point inside of said sheet, the head A is inserted in the end of the tube until the flange B' rests fair against the outer face of the tube-sheet C, when the nut D is moved along the sleeve B toward said flange until its conical or flaring inner surface has impinged upon the long arms of said levers *b' b'* and forced them inward and their short arms outward sufficiently to firmly clamp the tube F' and hold the sleeve B in a fixed position in axial line with said tube, as shown in Fig. 3. When this is done, the operator will turn the collar H in the direction indicated by the arrow on Fig. 2 until the pawl *k* drops into the next notch on the collar F'. He then operates the ratchet-lever E to turn the ratchet-wheel I, the shank A', and the head A in the direction indicated by the arrow on Fig. 4 until said parts have made a complete revolution and the cutter *e* has cut

a line around the inner surface of the tube. The collar H is then moved another notch. The ratchet-lever is again operated to give another revolution to the head A and the cutter-stock, and so on, alternately moving the collar H and its pawl *k* one notch and working the ratchet-lever to give a revolution to the cutter-head and stock, until the pawl *k* is in engagement with the last notch on the collar F', when the tube will be severed and the tool may be removed by simply turning the nut D back sufficiently to slacken the clamping-levers, the collar H being first turned a half-revolution to retract the cutter to the starting-point.

The operation of cutting a tube outside of the tube-sheet to trim it to the desired length when setting new tubes is precisely the same as above described, except that the levers shown in Fig. 5 are substituted for those shown in Fig. 3 and the ends of the levers are placed against the tube-sheet, as shown in Fig. 5.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a tool for cutting tubes, the combination of a sleeve having a diameter at one end not greater than the interior diameter of the tube to be cut, a plurality of clamping-levers pivoted to said sleeve, a nut fitted to said sleeve and constructed and arranged to act upon said levers to vibrate them and cause them to clamp the tube to be cut, a revoluble cutter-head constructed and arranged to enter the tube to be cut and mounted by its shank in a bearing in said sleeve, a cutter-stock carrying a rotatable cutter and fitted to a bearing in and movable transversely to the axis of said cutter-head, a revoluble shaft extending through the shank of said head, an eccentric formed upon or secured to said shaft and fitted to work in a slot formed in the cutter-stock for the purpose of feeding said stock and its cutter outward, a ratchet mechanism for rotating the cutter-head, and means, substantially as set forth, for rotating said eccentric.

2. The combination of the revoluble head A, the cutter-stock G, provided with the slot *e'*, the revoluble cutter *e*, the eccentric *f*, the shaft *f'*, the collar H, mounted upon the shaft *f'* and provided with holes *g g*, the pawl *k*, and the collar F', mounted upon the shank A' of the head A, and having a series of ratchet-teeth formed in and extending around one half its periphery, the other half of said periphery being smooth and concentric with its axis.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 28th day of February, A. D. 1887.

ORIN F. MARTIN.

Witnesses:

N. C. LOMBARD,
WALTER E. LOMBARD.