

(No Model.)

R. BARNARD & E. MILES.

TUBE EXPANDER.

No. 325,150.

Patented Aug. 25, 1885.

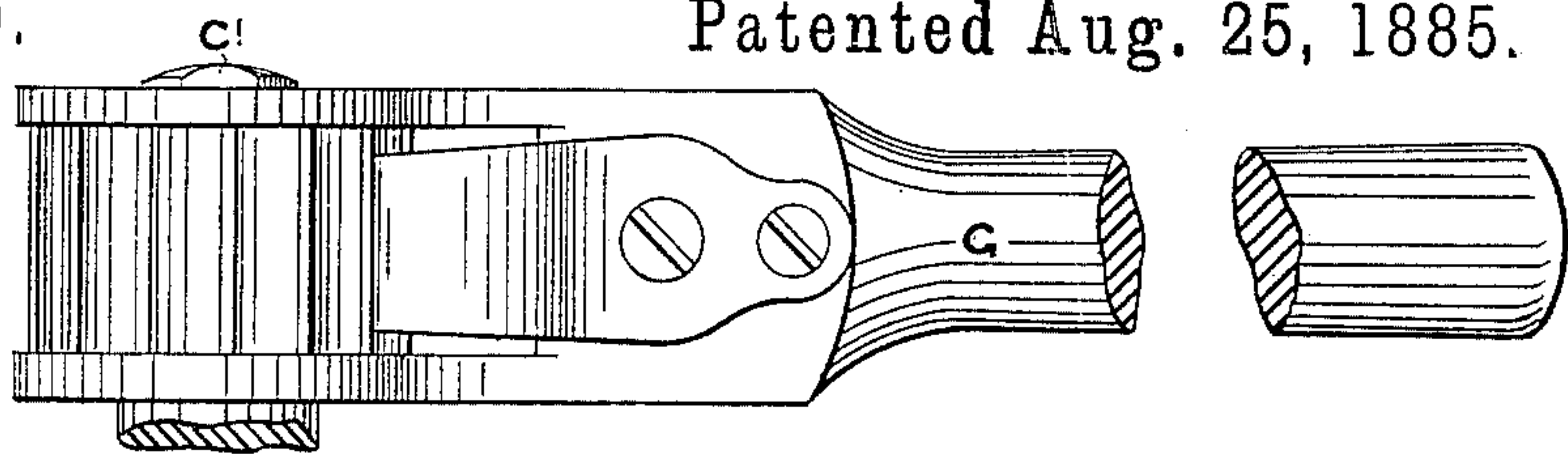


FIG. 1

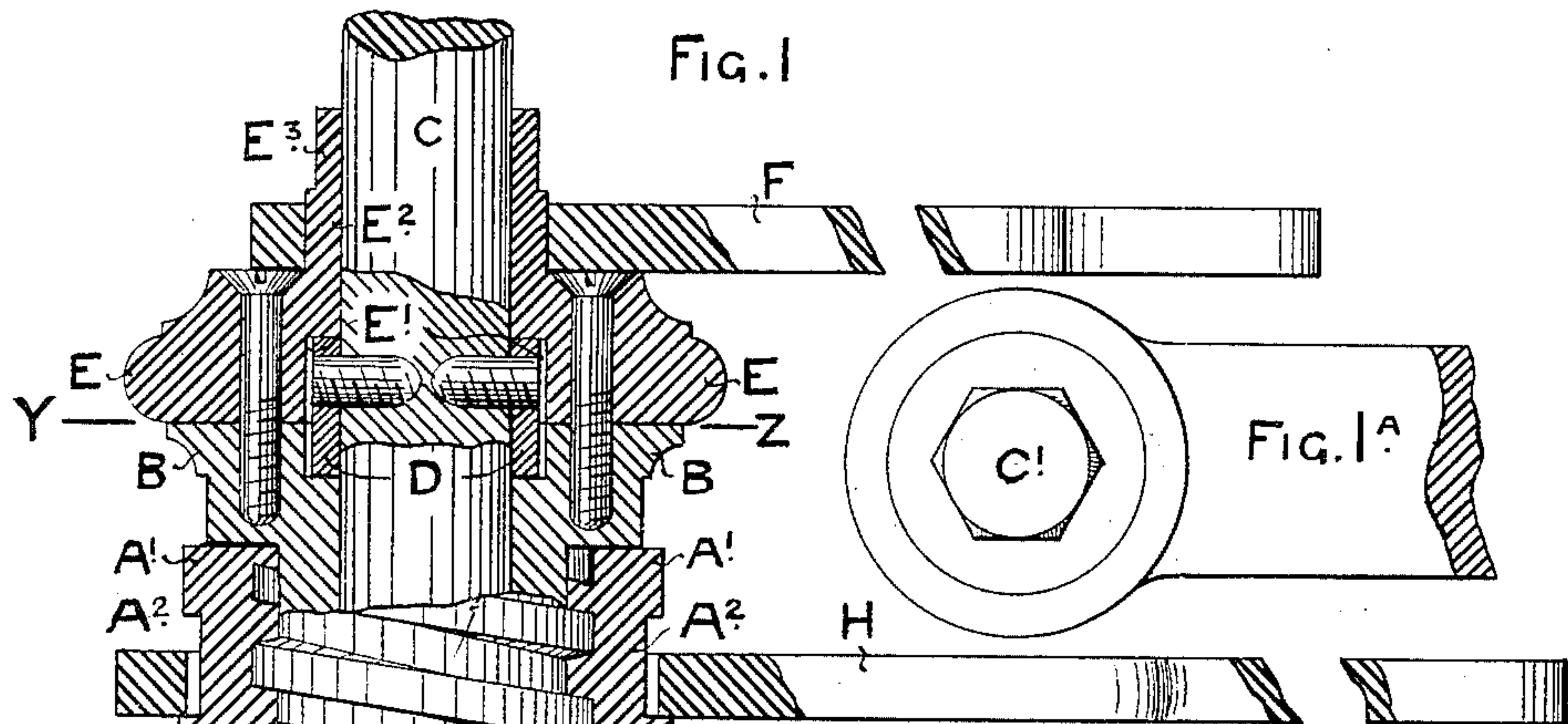


FIG. 1A

PLAN AT  
Y—Z

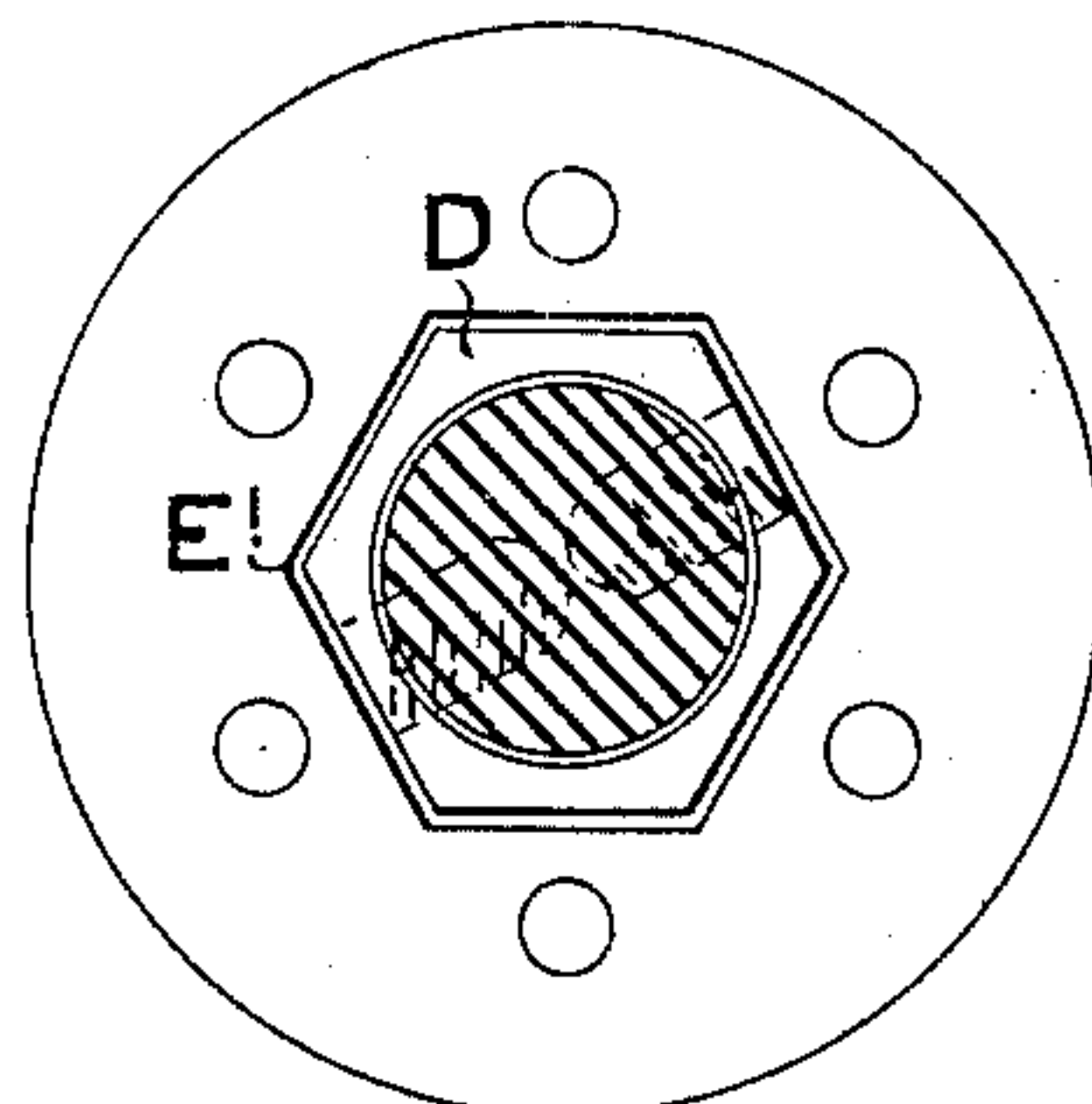


FIG. 2

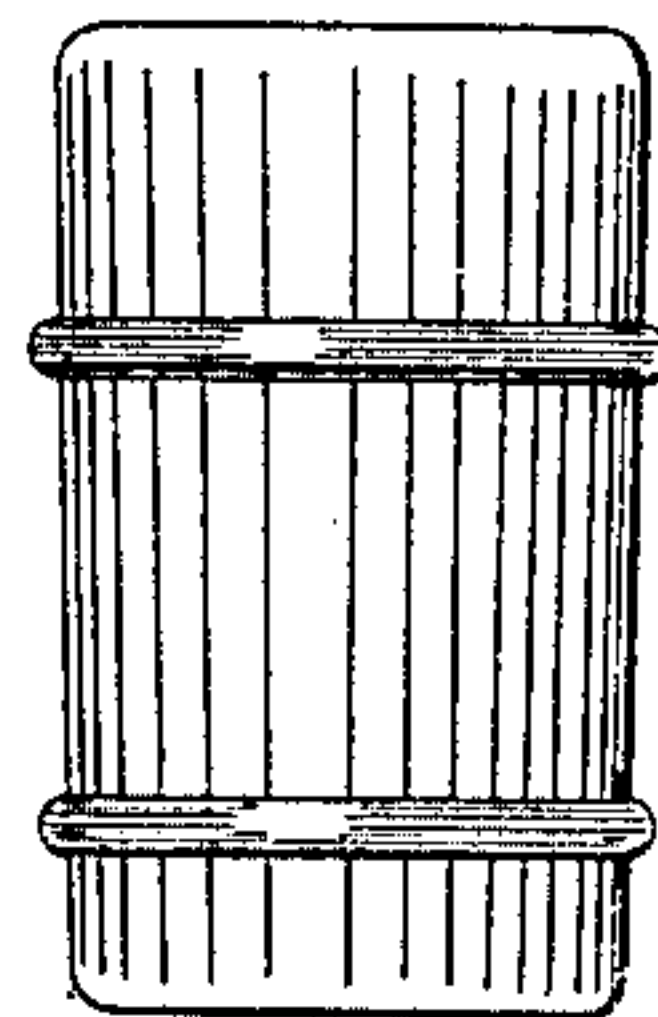


FIG. 3

Witnesses,  
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# UNITED STATES PATENT OFFICE.

ROBERT BARNARD AND EDWIN MILES, OF LONDON, ENGLAND.

## TUBE-EXPANDER.

SPECIFICATION forming part of Letters Patent No. 325,150, dated August 25, 1885.

Application filed October 23, 1884. (No model.)

*To all whom it may concern:*

Be it known that we, ROBERT BARNARD and EDWIN MILES, subjects of the Queen of England, residing at London, England, have invented new and useful Improvements in Tube-Expanders, of which the following is a specification.

This invention will be best explained by reference to the accompanying drawings, in which  
10 Figure 1 is a sectional elevation of the tool; Fig. 2, a plan upon line  $y z$  of Fig. 1, and Fig. 3 a view of one form of roller for expanding or shouldering the tube on both sides of the tube-plate. Fig. 1<sup>a</sup> is a plan of the ratchet  
15 shown in Fig. 1.

A is the box or nut, B the screw, and C the mandrel, having the circular collar D fixed to it by screws, so that it can be readily removed and changed for the hexagonal collar  
20 shown in Fig. 2.

The cap E is secured by screws to the end of the screw B, as shown, the collar D being free to turn in the recess E'; but as the screw is moved in or out the mandrel C is carried  
25 with it.

The projecting portion of the cap E is squared at E<sup>2</sup> to receive the wrench or spanner F. The most convenient form of this portion is hexagonal, and we therefore prefer to adopt that  
30 shape in this and the other similar cases.

The portion E<sup>3</sup> of the cap is round for the spanner to rest on when not in use. The end of the mandrel is also squared hexagonal at C' to receive the ratchet-brace G, by which it is  
35 revolved.

The nut A is squared at A' to receive the wrench or spanner H, the round portion A<sup>2</sup> serving for it to hang on when not in use.

K is one of the rollers, having a double taper  
40 somewhat as shown.

The action is as follows: The tool being placed in the tube P, the mandrel C is drawn out by the screw B, which is turned by the wrench F, forcing out the rollers K against the  
45 tube. Sufficient pressure having been thus applied the mandrel C is revolved by the brace G, which is usually sufficient to revolve the rollers K and expand the tube, the inner portion of the rollers, K', expanding it against the  
50 tube-plate L, and the outer portion, K<sup>2</sup>, forcing out the end of the tube which projects be-

yond the tube-plate and bell mouthing it, as shown.

If the form of the roller shown in Fig. 3 be used, the tube will be expanded or have a shoulder formed on both sides of the tube-plate, as will be well understood.

When, on account of the roughness of the tube, the tool sticks and more power is required to turn it, the wrench H may be used upon  
60 the squared portion A'. This carries the whole tool round.

When the job is finished, the pressure is relaxed and the tool withdrawn.

It will be seen that in the roller K there is  
65 a shoulder, K<sup>2</sup>. The object of this is to set back the portion of the tube projecting beyond the tube-plate and form a shoulder, P', somewhat as shown in Fig. 1, so as to cause the tube to become a stronger stay than it would be if the  
70 end of the tube were merely bent outward.

The portion K' of the rollers is shown in Fig. 1 as having a very slight taper; but it must be understood that the exact shape of the rollers may be varied as required, though it  
75 is desirable to make the taper of the portion K<sup>2</sup> correspond to that of the mandrel, so that a large bearing-surface may be obtained.

Referring to Fig. 2, it will be noticed that the recess E' is squared, (hexagonal,) and that  
80 the collar D is also hexagonal to fit the recess, while the collar D in Fig. 1 is round, so as to turn free in the recess. Either collar may be used; but if the hexagonal one be used it forms a practically-rigid connection between  
85 the mandrel C and the screw B, so that operating either the brace G or the wrench F will have the effect of turning both screw and mandrel. This is useful to save time where a large  
90 number of similar tubes have to be expanded, and where a single revolution, or thereabout, is sufficient to finish one end of a tube.

By unscrewing the nut B the mandrel can be withdrawn from the nut or box A, and the rollers K be changed and the mandrel replaced  
95 without the necessity for taking the tool to pieces.

We claim—

1. In a tube-expander, the combination of the hollow screw, the hollow cap E, secured on  
100 the top thereof, the screw and cap having formed therein the recess E', the removable

collar in said recess, the mandrel, and means by which the said collar is secured to the mandrel, as set forth.

2. In a tube-expander, the combination of the  
5 hollow screw, the hollow cap E, secured on the top thereof, the screw and cap being provided with recess E', the mandrel C, located in and passing through the hollow of said screw and cap, and the collar D, located in said recess E' and encompassing and secured to the  
10 mandrel by means substantially as described.

3. In a tube-expander, the combination of the mandrel, the hollow screw having cap E secured on the top thereof, the wrench G,  
15 which revolves the mandrel, and is secured on the top thereof, and the wrench F, attached to the cap E and serving to rotate it and the screw, as set forth.

4. In a tube-expander, the combination of  
20 the mandrel, the hollow screw surrounding it,

the box or nut A in which the screw rotates, the wrench F, attached to the cap E and serving to rotate the screw, the wrench G, attached to and serving to rotate the mandrel, and the wrench H, attached to and serving to rotate  
25 the box, as set forth.

5. In a tube-expander, the combination of the hollow screw, the mandrel within said screw, the box surrounding the screw, and the roller having faces K' K<sup>2</sup> and shoulder K<sup>3</sup>, as  
30 set forth.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

ROBERT BARNARD.  
EDWIN MILES.

Witnesses:

ALFRED J. BOULT,  
BERNHARD DUKES.