

No. 672,133.

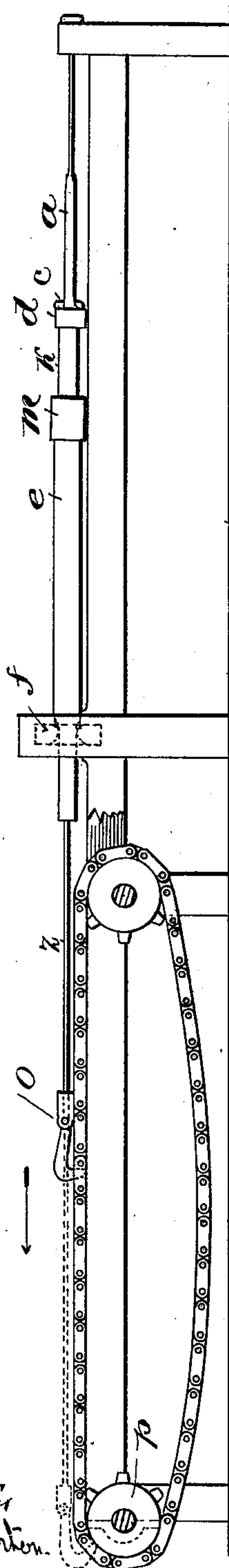
Patented Apr. 16, 1901.

J. H. NICHOLSON.  
APPARATUS FOR DRAWING TUBES

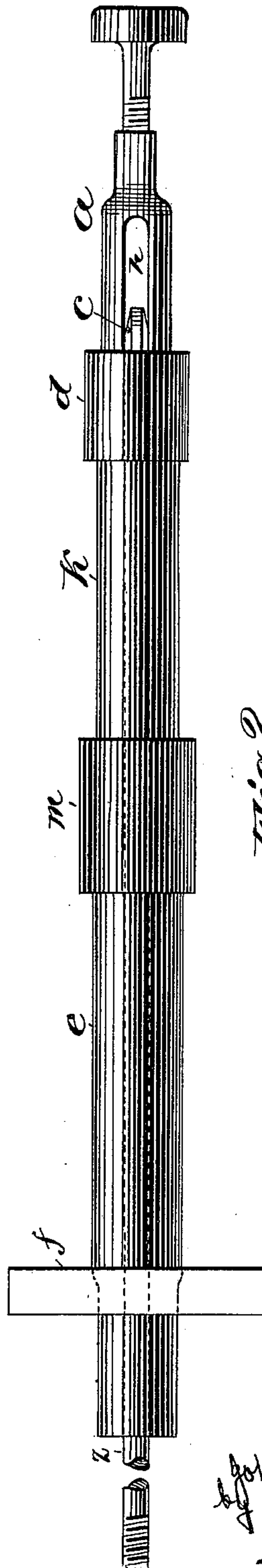
(Application filed Aug. 8, 1900.)

(No Model.)

2 Sheets—Sheet 1.



*Fig. 1.*



*Fig. 2.*

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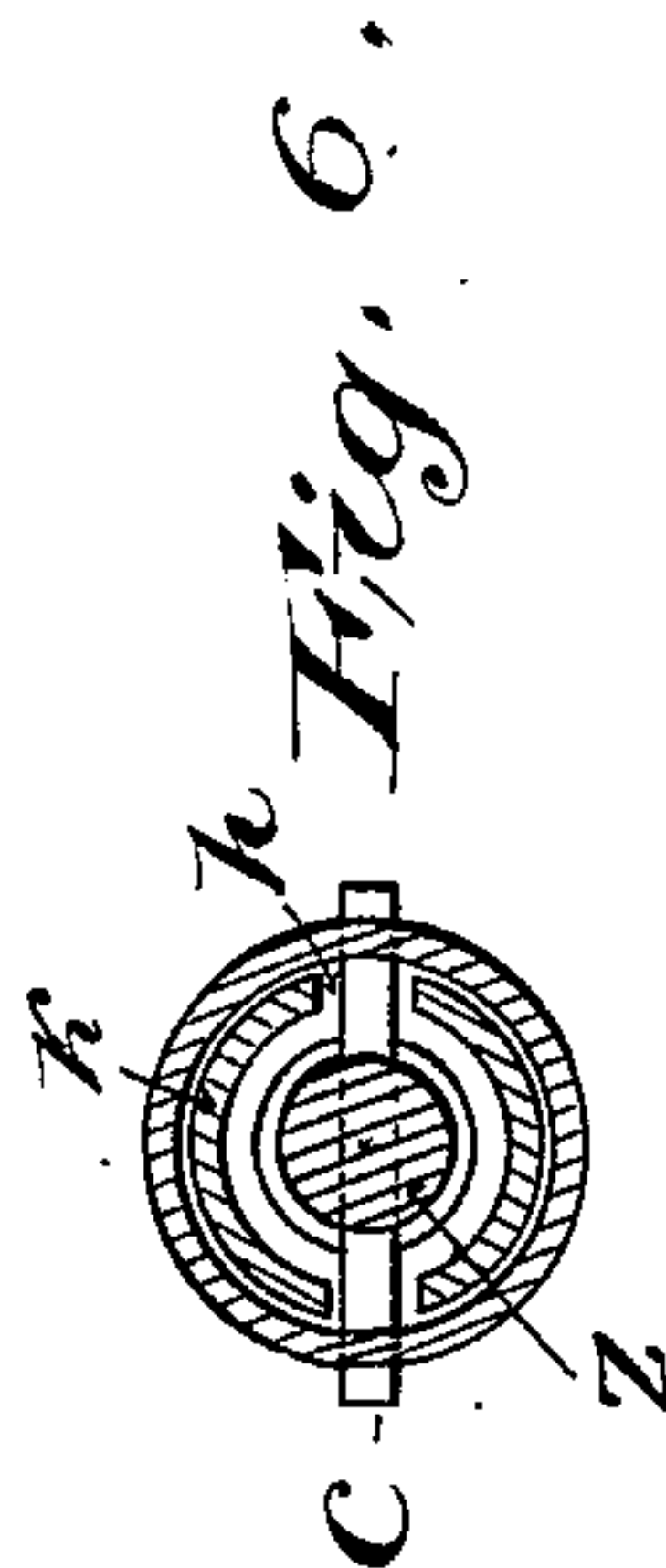
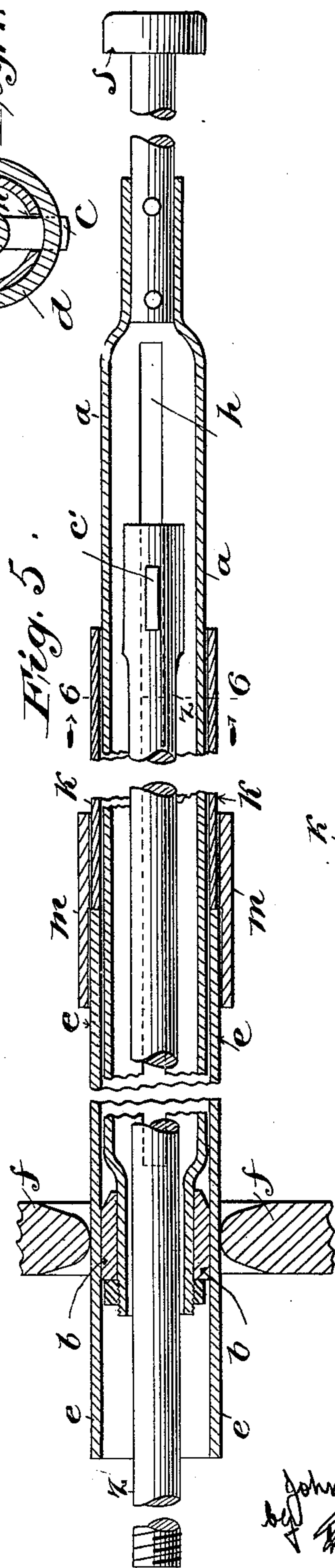
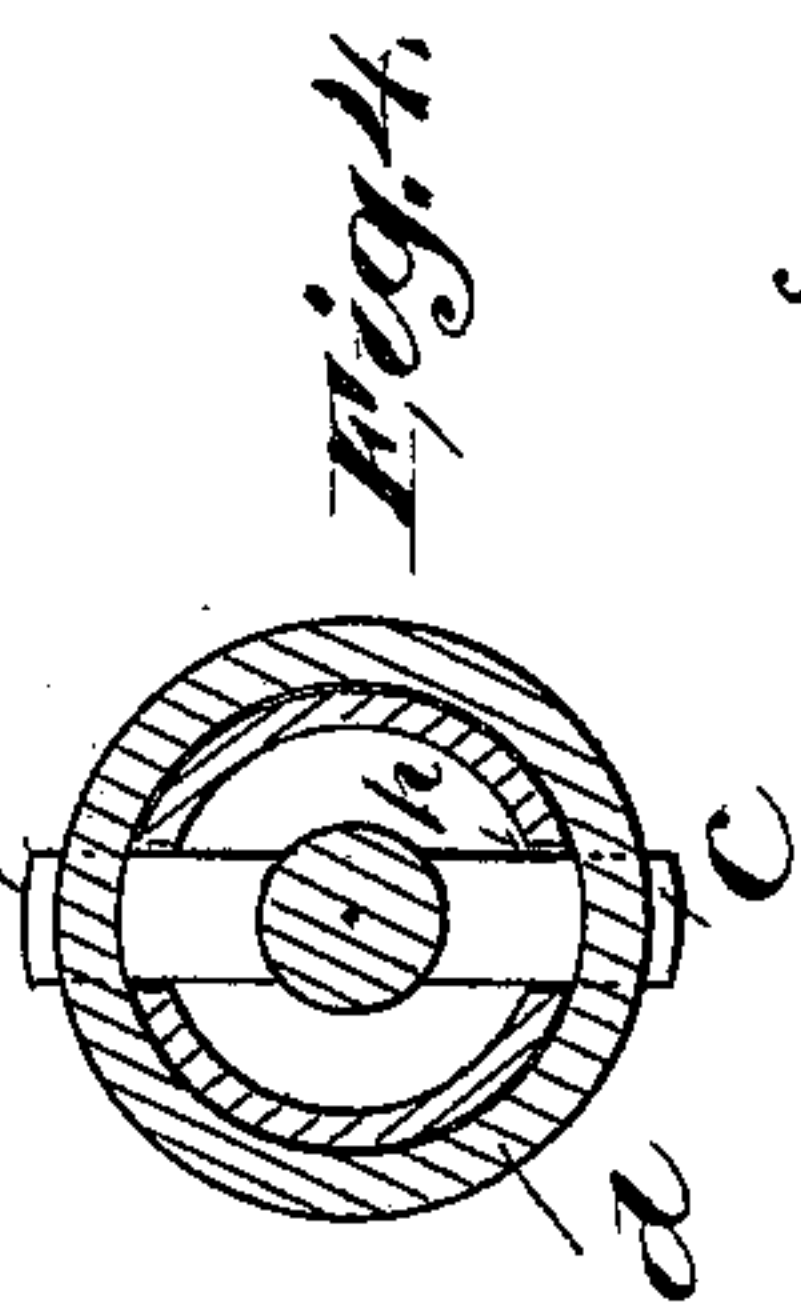
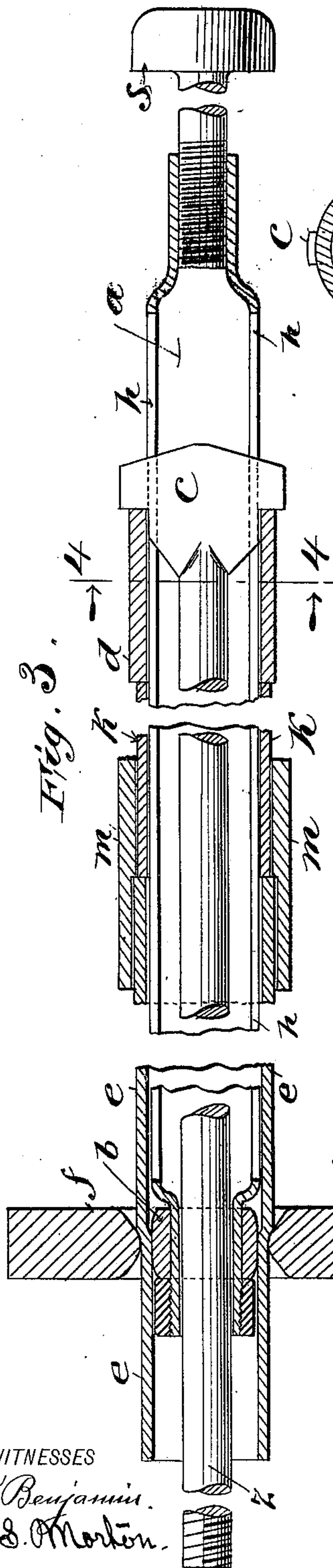
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2 Sheets—Sheet 2.



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# UNITED STATES PATENT OFFICE.

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## APPARATUS FOR DRAWING TUBES.

SPECIFICATION forming part of Letters Patent No. 672,133, dated April 16, 1901

Application filed August 8, 1900. Serial No. 26,266. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN H. NICHOLSON, engineer, of Pittsburg, in the State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Drawing Tubes, of which the following is a specification, illustrated by drawings.

The invention is adapted particularly for cold-drawing tubes.

10 The object of the invention is to accomplish the drawing in an efficient and satisfactory manner without requiring the pointing of the tubes, with its attendant disadvantages and loss of metal. With the new apparatus  
15 the tube can be drawn over a mandrel through a die and the thickness or gage can be decreased without varying the size or diameter, or its diameter may even be increased or the tube can be decreased both in diameter  
20 and gage at the same time. By the common method of pointing the tube and gripping the point to draw it through the die the tube cannot be reduced beyond a certain size and gage without reducing the diameter of the  
25 tube, as well as its thickness or gage, and it is impossible to increase its diameter in any way.

In my improved apparatus the mandrel has an opening through it, and the pulling-rod  
30 instead of being secured to the forward end of the tube extends centrally through the mandrel and connects with the rear end of the tube, so as to force the tube over the mandrel and through the die without necessitating any pointing of the tube or any gripping  
35 of its forward end.

In the drawings, Figure 1 is a diagrammatic view, partly in section, showing the improved apparatus as applied to a draw-bench. Fig.  
40 2 is a view of one form of the apparatus in position within the tube. Fig. 3 is a longitudinal cross-section of the same as seen at right angles to Fig. 2. Fig. 4 is a transverse cross-section on the plane 4 4 of Fig. 3 looking toward the right. Fig. 5 is a cross-sectional view of the preferred form of the apparatus. Fig. 6 is a cross-section on the plane 6 6 of Fig. 5 looking toward the right.

50 In Figs. 1 to 4 the mandrel-bar *a* is tubular and slotted at *h* longitudinally. The mandrel *b* is also tubular or hollow and secured

upon the mandrel-rod *a*. The tube *e* is shown in position between the mandrel *b* and the die *f*. The pulling-rod *z* instead of being provided with means for gripping the  
55 forward end of the tube extends centrally through the mandrel and within the mandrel-rod and is provided with a cross-piece or laterally-projecting head *c*, which projects through the slots *h* to engage the rear end  
60 of the tube *e*. Behind the rear end of the tube *e* should be interposed a tube or collar or sleeve *k* small enough to pass through the die freely, so that the extreme rear end of the tube *e* may be forced through the die with-  
65 out the head *c* striking the die. When the sleeve *k* is necessarily very thin, a short piece of stronger tube *d* may be placed behind it and directly engage the head or cross piece *c*, so as to protect the sleeve *k* from  
70 being injured by the direct pressure of the head or cross piece *c*. For the purposes of keeping the tube *e* and sleeve *k* in alignment a short sleeve or collar *m* may be provided loosely but accurately fitted to the  
75 sleeve *k* and to the tube *e* at its respective ends and serving to hold tube *e* concentric with the sleeve *k*. The operation of this form of the apparatus is as follows: The pulling-rod *z* is pushed back into the mandrel-rod and the  
80 sleeves and collars *d*, *k*, and *m* put in place. The tube *e* is then pushed over the mandrel and back onto the mandrel-bar against the end of the sleeve *k* and the collar *m* is placed as shown in Fig. 3. Then the apparatus and  
85 the tube are placed in the draw-bench, the mandrel-rod *a* being secured to the bench in the familiar manner and the pulling-rod *z* connected to the chain of the bench by a hook or coupling device *o*, which is shown in Fig. 90  
1, but omitted in Figs. 2 and 3. As the rod *z* is pulled forward the tube is forced through the die over the mandrel, the head or cross piece *c* moving freely in the slots *h* and forcing forward the sleeves *d* and *k* and the tube *e*.  
95 When the rear end of the tube reaches the die and passes clear of it, the tension on the pulling-rod *z* stops and the hook *o* may be released from the chain or may release itself, as well understood, when the chain passes over  
100 the wheel *p* at the end of the bench. The tube may then be slipped off the rod *z* and the rod



with the mandrel and mandrel-rod may be removed from the bench and made ready for drawing another tube. The sleeve *m* does not interfere with the movement of the rear end of the tube through the die, because when the sleeve or collar *m* strikes the die it remains stationary, while the tube *e* and sleeve *k* move forward within it.

When the head or cross piece *c* is an integral part of the pulling-rod *z*, the tube *e* must necessarily be slipped onto the rod *z* at the front end and must consequently be slipped over the mandrel, unless, indeed, the mandrel be secured upon the mandrel-rod after the tube *e* has been put in place. Consequently this form of the apparatus is intended for drawing tubes that can be slipped freely over the mandrel before drawing and which are therefore decreased both in inner and outer diameter in the drawing process. For more general use and in all cases where the inner diameter of the tube is to remain constant or increase by being drawn over the mandrel the preferred form of the apparatus shown in Figs. 5 and 6 should be employed. The preferred form shown in Figs. 5 and 6 differs from that shown in Figs. 3 and 4 by having a removable cross piece or key *c'*, which is thrust through a slot or keyway in the rear end of the pulling-rod *z'*. When the key is removed, the tube that is to be drawn can be slipped over the rear end of the mandrel-rod and into place in the same direction as that in which it is to be drawn through the die. The key *c'* is then put in place after the interposed sleeve *k* has been put on with or without the sleeves or collars *d* and *m*. The knob *s* for securing the mandrel-rod *a* to the bench must of course be small enough to allow the passage of the tube over it if it is not detachable from the mandrel-rod. It will be understood that in this preferred form the tube that is smaller than the mandrel can be put in place ready for drawing. The operation of drawing is similar to that already described in connection with Figs. 1 to 4.

By this new apparatus there is effected not only the saving of material, but also the possibility of conveniently and economically producing a great variety of sizes and thicknesses of tubes from a comparatively few sizes of partially-manufactured tubing that may be kept in stock for the purpose. By this apparatus the tubes may be reduced in external and internal diameter simultaneously, with or without a change of gage, or the internal or, indeed, the external diameter may remain constant during a reduction in gage or thickness, or the inner diameter may be increased, and all this can be accomplished without requiring the pointing of the tubes, with

the attendant loss of metal and consequent shortening of the tube. Indeed, instead of shortening the length of the perfect tube by pointing the present process increases the length of the tube at each pass without requiring the cutting off of any considerable portion.

The features that I claim as new and characteristic of the present invention are the following:

1. In a tube-drawing apparatus, the combination of a mandrel having an opening through it, means for supporting the mandrel, and a pulling-rod for the tubes extending through the opening and provided with means for connecting it to act upon the rear end of the tubes to be drawn.

2. In a tube-drawing apparatus, the combination of a mandrel having an opening through it, a tubular mandrel-rod provided with longitudinal slots, a pulling-rod extending through the said mandrel into said mandrel-rod and provided with laterally-projecting means for connecting it through said slots with the rear end of the tubes to be drawn, substantially as set forth.

3. In a tube-drawing apparatus, the combination of a mandrel having an opening through it, a tubular mandrel-rod provided with longitudinal slots, a pulling-rod extending through said mandrel into said mandrel-rod and provided with a removable key which projects laterally through the said slots to engage the tubes, substantially as set forth.

4. In a tube-drawing apparatus, the combination of a mandrel having an opening through it, a tubular mandrel-rod provided with longitudinal slots, a pulling-rod extending through the said mandrel into said mandrel-rod and provided with laterally-projecting means for connecting it to the rear end of a tube, and a sleeve interposed behind the rear end of the tube, substantially as set forth.

5. In a tube-drawing apparatus, the combination of a mandrel having an opening through it, a tubular mandrel-rod provided with longitudinal slots, a pulling-rod extending through the said mandrel into said mandrel-rod and provided with laterally-projecting means for connecting it to the rear end of a tube, and a sleeve interposed behind the rear end of the tube and means for holding in alignment the said sleeve and the tube being drawn, substantially as set forth.

Signed this 30th day of July, 1900, at Ellwood City, Pennsylvania.

JOHN H. NICHOLSON.

Witnesses:

H. P. RICHARDSON,  
JOHN F. HAINES.