

(No Model.)

C. KANE.
TUBE EXPANDER.

No. 370,876.

Patented Oct. 4, 1887.

Fig. 1.

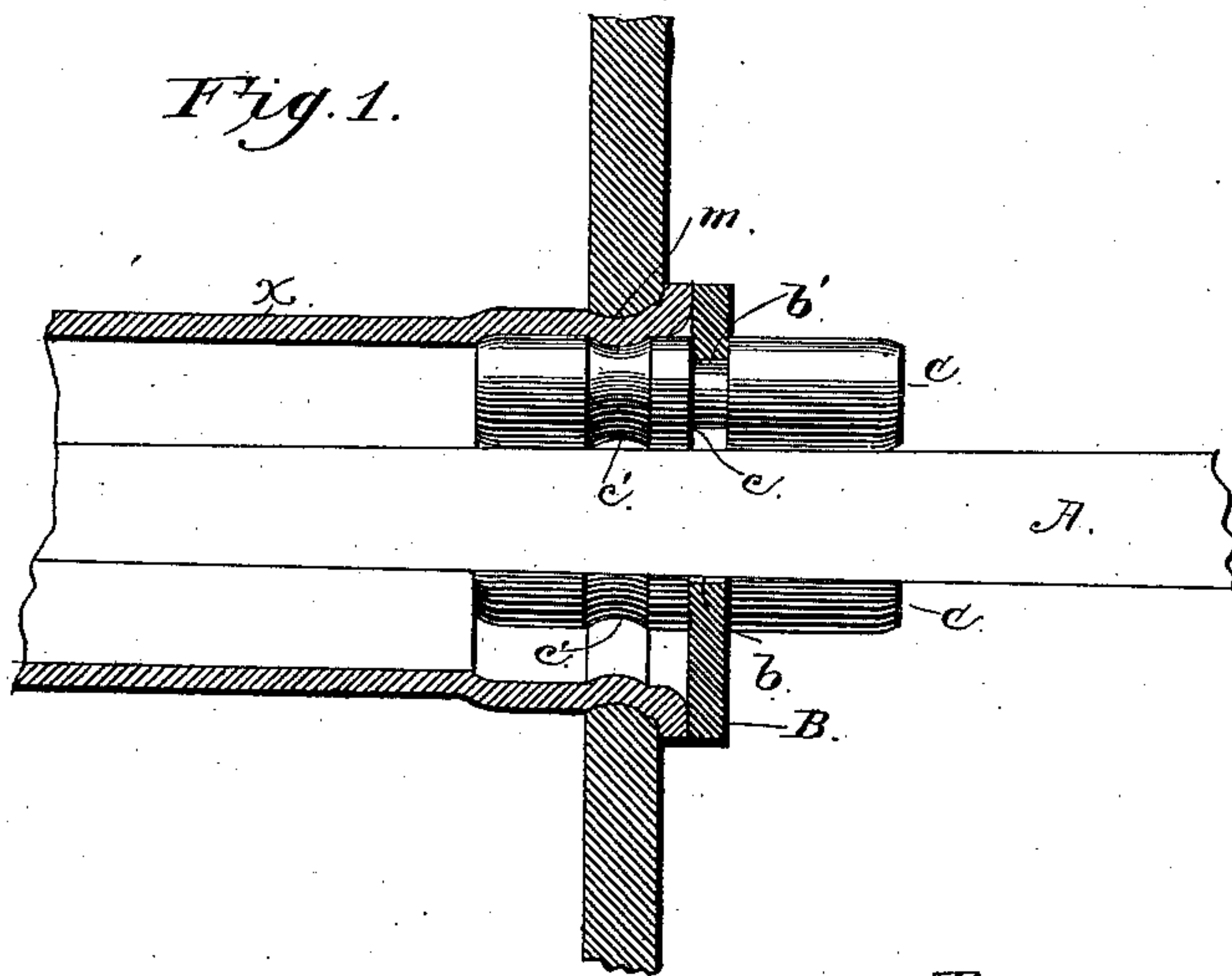


Fig. 2.

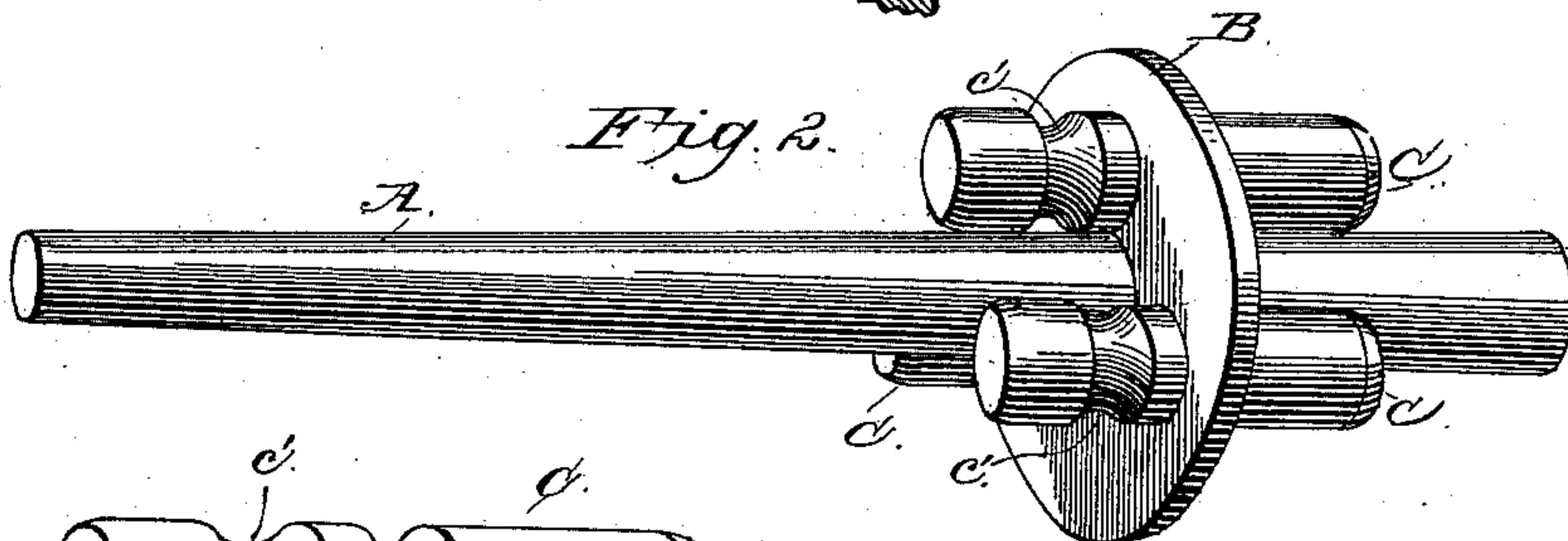


Fig. 3.

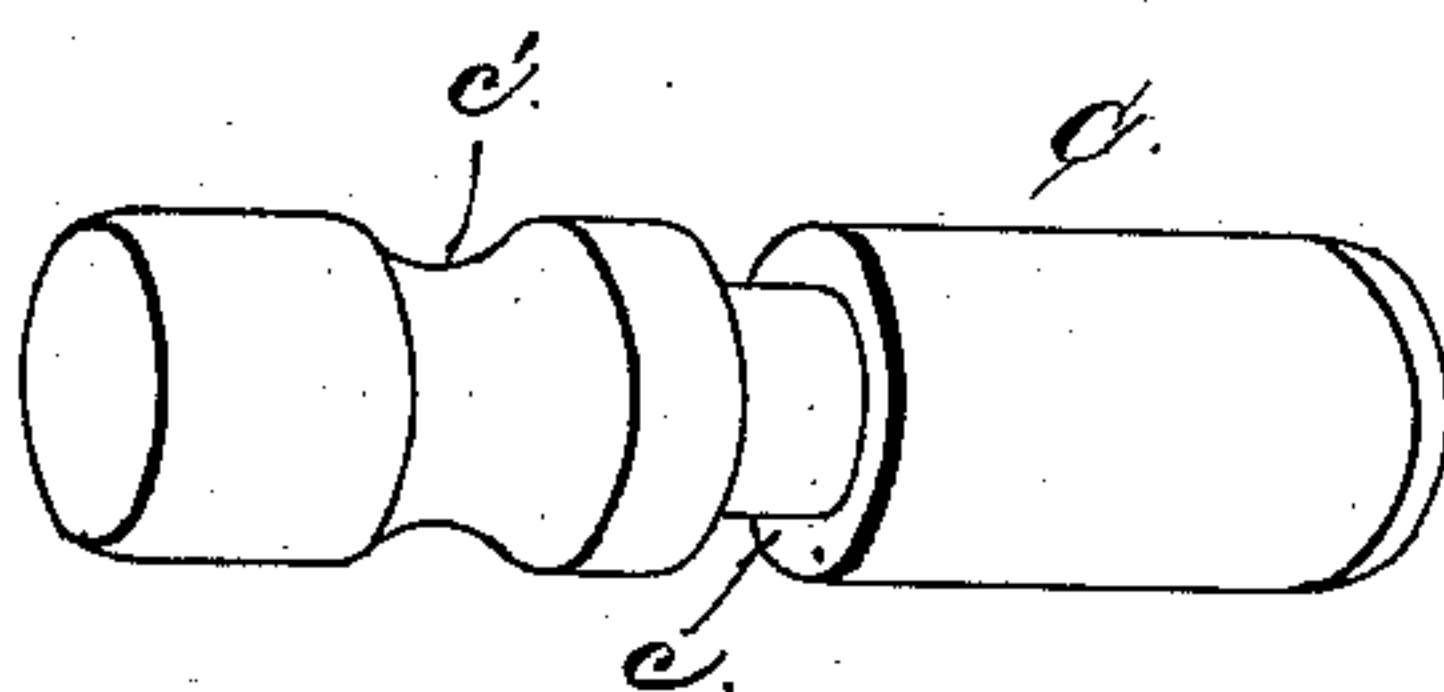


Fig. 5.

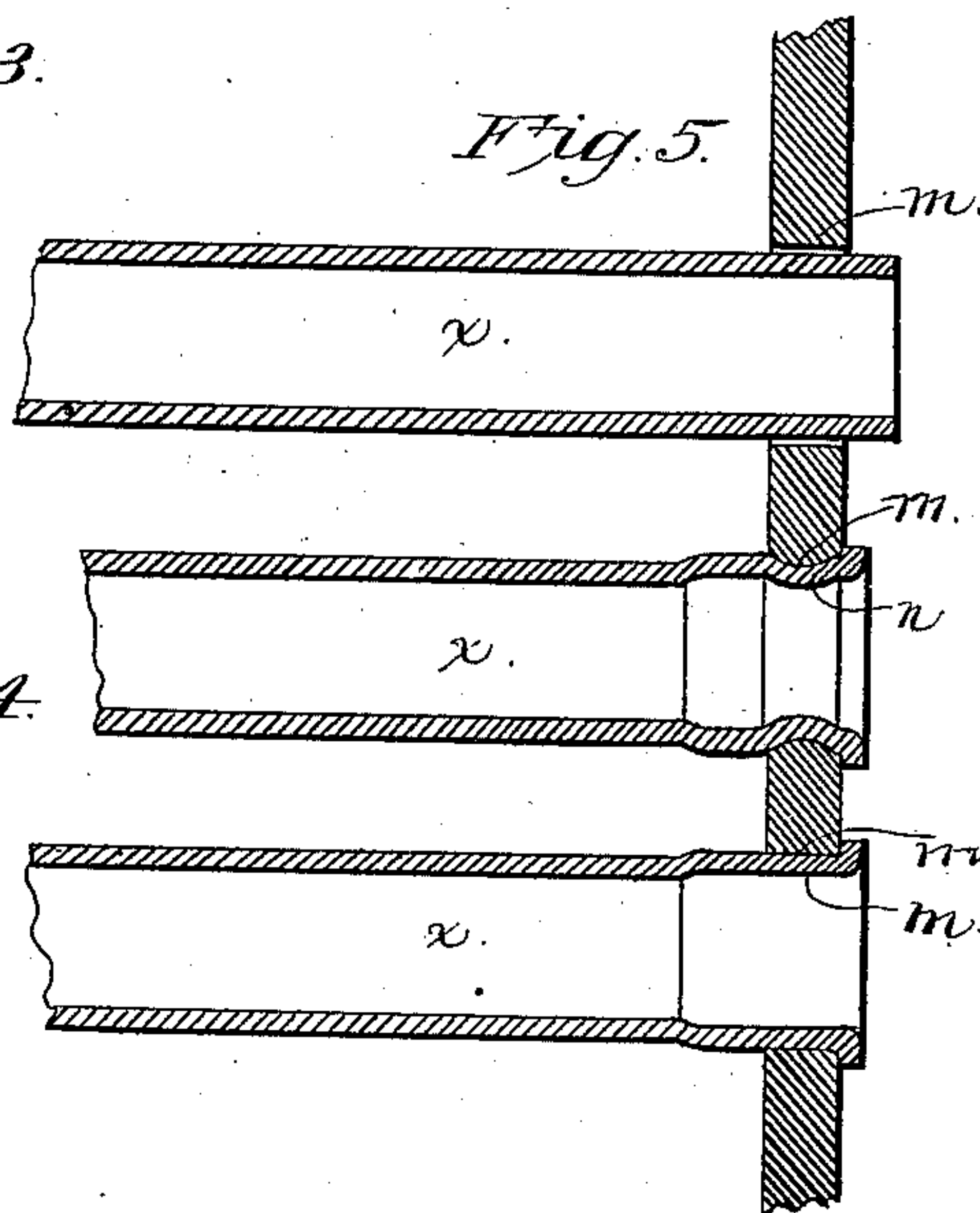
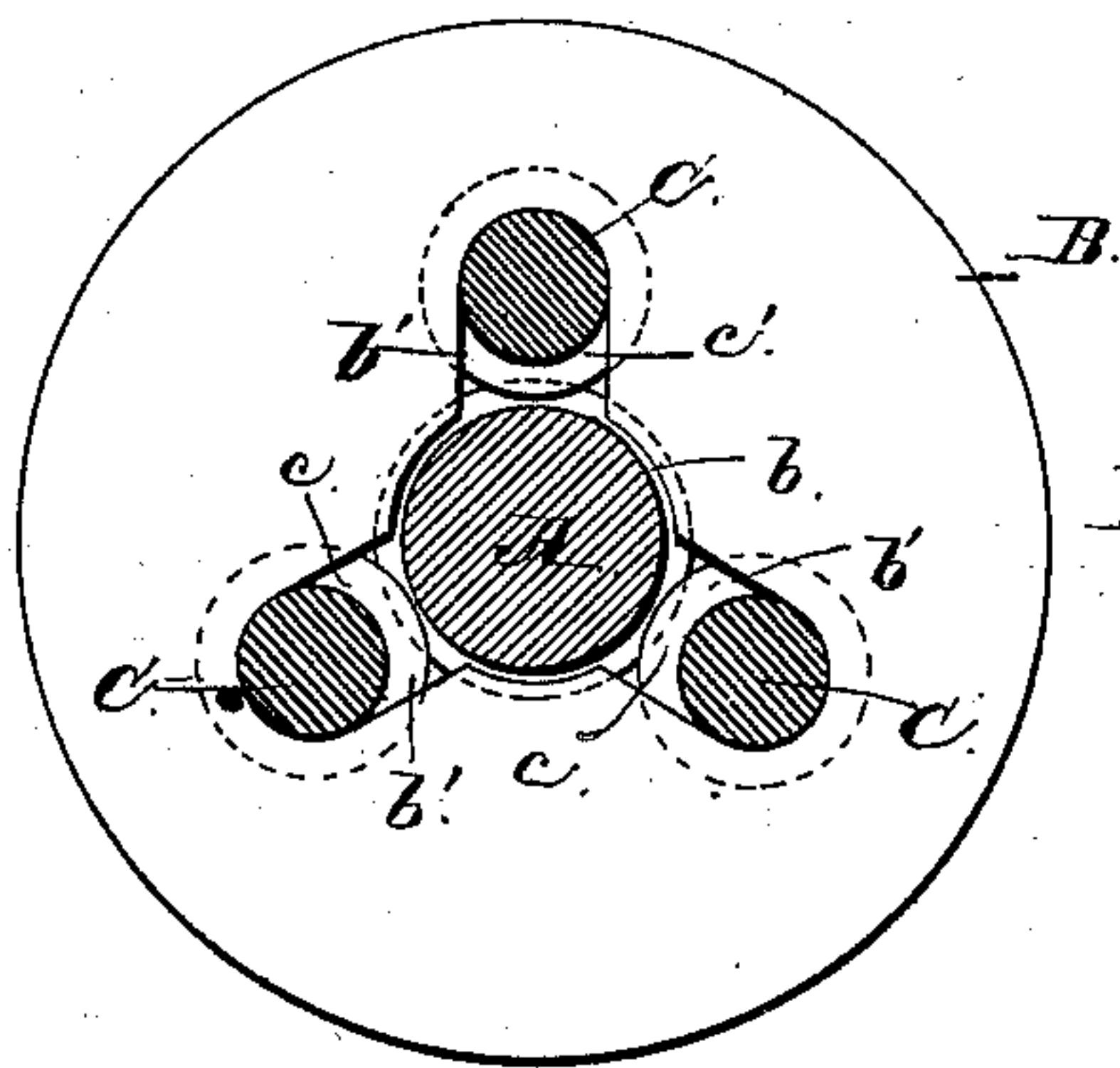


Fig. 4.



WITNESSES

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CHARLES KANE, OF JAMESTOWN, NEW YORK, ASSIGNOR OF ONE-HALF TO
PATRICK MAHER AND JAMES L. WEEKS, OF SAME PLACE.

TUBE-EXPANDER.

SPECIFICATION forming part of Letters Patent No. 370,876, dated October 4, 1887.

Application filed May 17, 1887. Serial No. 233,525. (No model.)

To all whom it may concern:

Be it known that I, CHARLES KANE, a citizen of the United States, residing at Jamestown, in the county of Chautauqua and State of New York, have invented a new and useful Improvement in Tube-Expanders, of which the following is a specification.

My invention relates to tube-expanders; and it consists in the construction and arrangement of the parts of the same, which will be more fully hereinafter described, and particularly pointed out in the claims.

The object of my invention is to provide a cheap and efficient device for expanding the ends of boiler-tubes and constructing a watertight connection between said tubes and the sheets or head, the parts of the said device being of simple and effective construction and operation, strong and durable, removable and adjustable, readily handled and easily understood, positive in their result, and cheaply manufactured. I attain this object by the mechanism illustrated in the accompanying drawings, wherein like letters of reference indicate similar parts in the several views, and in which--

Figure 1 is a sectional view of a portion of a boiler with my improvements shown in operative connection therewith. Fig. 2 is a perspective view of my improved tube-expander. Fig. 3 is a detail view of one of the rollers. Fig. 4 is a transverse section of the expander. Fig. 5 is a sectional view illustrating the two different forms of expanding accomplished by my tool.

A indicates the mandrel, which is formed tapering and with which a circular disk or plate engages. The latter has a central opening, *b*, through which the mandrel A passes, and a series of openings, *b'*, in communication with the central opening, *b*, in which openings *b'* the rollers C are mounted and retained in connection with the plate B when the said plate is mounted upon the mandrel A. At the portion of the rollers C which engages with the slots *b'* (preferably the center) annular grooves *c* are formed therein, which engage with the slots *b'*, leaving a shoulder formed on the roller C and bearing on each side face of the plate B. This arrangement divides the

rollers C into two bearing faces or portions, each bearing-face being located in opposite sides to the plate B. In one bearing face or portion of the roller a concaved depression, *c'*, is also formed, and the remaining portion of the said rollers are in the form of plain cylinders. These rollers C are removable from the plate B, and as many thereof as may be desired may be used in connection with said plate, and the diameter and sides generally of which may be increased or decreased to suit the tubes to be expanded. By means of the tapering construction of the mandrel A the said rollers C are clamped in the said plate B when the mandrel A is rotated and driven through the central aperture, *b*, of the said plate B. When the mandrel A is removed from the plate B, the rollers will be readily disengaged from the plate B by dropping down into the central aperture, *b*, thereof, which, being of larger diameter than the said rollers, they may be readily drawn there-through. When the mandrel A is driven and rotated through the aperture *b* of the plate B in the usual manner, the enlarged portion thereof bears against the ends of the rollers and forces them outward, and also rotates them so as to effect the proper expansion.

The operation of my device in connection with the boiler-tubes is as follows: It will be understood by the reference to Fig. 1 that the holes *m* in the boiler-sheet are constructed to receive the flues or tubes *x*. As represented by the first of the series of tubes shown in said figure, the outer edge thereof will be plain and unconnected before being operated upon by the expander. As shown by the third tube in Fig. 5, the ends thereof are enlarged by the expander until they snugly fit and form a tight joint in connection with the boiler-tube. It will be observed that by using my improved form of expander a head will be formed similar in configuration to the depression *c'* in the roller C and the cylindrical portion of the said rollers. This joint will be formed in this manner just inside and outside of the boiler, and thereby produce a tight joint with a portion of each of the tubes projecting upwardly on each side of the boiler-sheet, and thereby retain the tubes in place

and at the same time provide a water-tight connection. It will be further observed that this produces so much of an expansion just inside and just on the outside of the boiler head or sheet as to prevent any movement of the flue in or out by reason of the expansion or contraction caused by heat or cold. These rollers C may be inserted within the disk B either in a plain form of construction, with or without depressions, as shown, or with the plain rollers on one side and the rollers having the depressions on the other side. By means of this interchangeable arrangement the formation of the joint will be varied in configuration and the rollers adapted to be released if they become worn. In heavy boilers containing seams within the tubes the expander is especially applicable by reason of its strength and the peculiar formation of the rollers, which will ride over the seams and produce a construction similar to that shown in Fig. 1.

In my improved form of expander no adjusting-screws are used, nor sectional plates or covering-frames, which are liable to become damaged and misplaced by the strain brought to bear thereupon in forming the joint or expanding the boiler-tube. By my improved construction also wear is obviated and the device thereby rendered more durable. It will be understood by what means and how the expander is operated, and this need not be fully herein referred to.

I am aware that various expanders have heretofore been constructed combining a series of rollers, a mandrel, and a box; but in every form known to me the box has never been in the form of a simple plate, but rather in the form of a cumbersome casing. My construction of expander in the form of a simple plate as a support for the rollers, together with the manner of fitting the rollers in the plate by means of their annular recesses or grooves *c*, so as to provide bearing-braces on each side of the plate, is the main feature of my invention. In the old expander the roller frequently slips in beyond the boiler-head, and the result is that by the expansion the tube is cut off. The plate in my expander prevents this and holds the rollers in place.

As shown in Fig. 5, when the plane face of the rollers is used the flue is expanded regularly, as seen at *m*; but when the grooved face of the rollers is utilized the flue is expanded on the outer and inner sides of the boiler-sheet, as shown at *n*, Fig. 5.

The novelty and utility of my improved device being apparent, it need not be further enlarged upon herein. It is obvious that slight variations in the construction and arrangement of the several parts may be made and substituted for those shown and described without in the least departing from the nature and principle of my invention.

It will be understood that my tube expander is reversible, so that either end of the expanding-roller can be used. To do this it is only necessary to withdraw the mandrel A from one side of the plate B and insert it in the opposite side.

Having thus described my invention, I claim—

1. A tube expander consisting, essentially, of a plate, B, which forms the supporting-frame, the mandrel A, and the series of expanding-rollers C, fitted at an intermediate point of their length in the plate B, the said rollers C projecting from each side of the plate B and provided with working-faces on each end of the roller, for the purposes set forth.

2. A tube expander consisting, essentially, of a plate B, which forms the supporting-frame, said plate having a series of openings, the mandrel A, and the series of expanding-rollers C, grooved at an intermediate point of their length, as at *c*, to fit in the series of the openings of plate B, the said rollers C projecting from each side of the plate B, and provided with working-faces on each end of the roller, one of the working-faces being grooved, as at *c'*, for the purposes set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

CHARLES KANE.

Witnesses:

LYMAN S. WOODWARD,
JAMES L. WEEKS.