

No. 700,510.

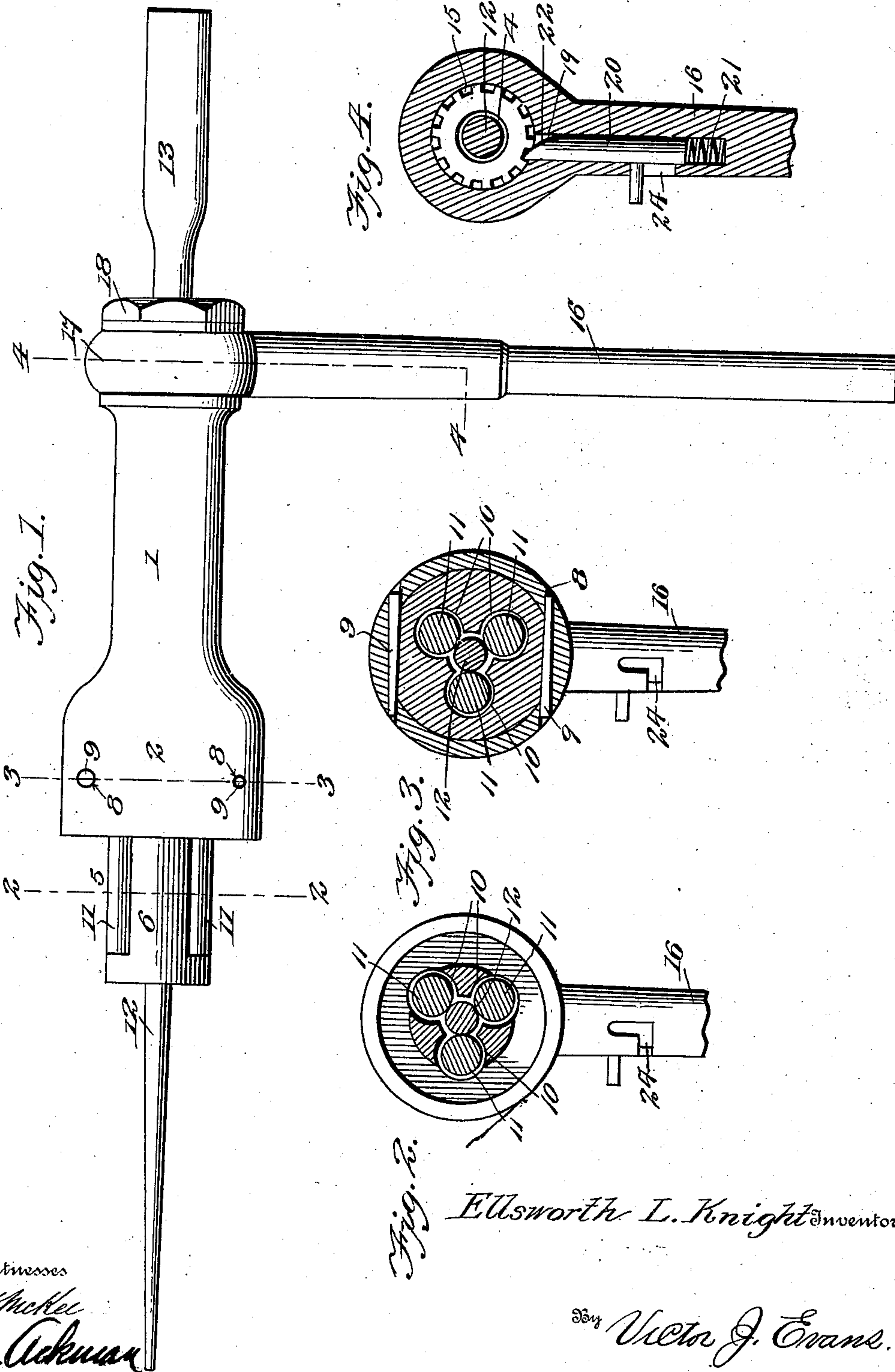
Patented May 20, 1902.

E. L. KNIGHT.
TUBE EXPANDER.

(Application filed June 8, 1901.)

(No Model.)

2 Sheets—Sheet 1.



Ellsworth L. Knight Inventor

By Victor J. Evans.
Attorney

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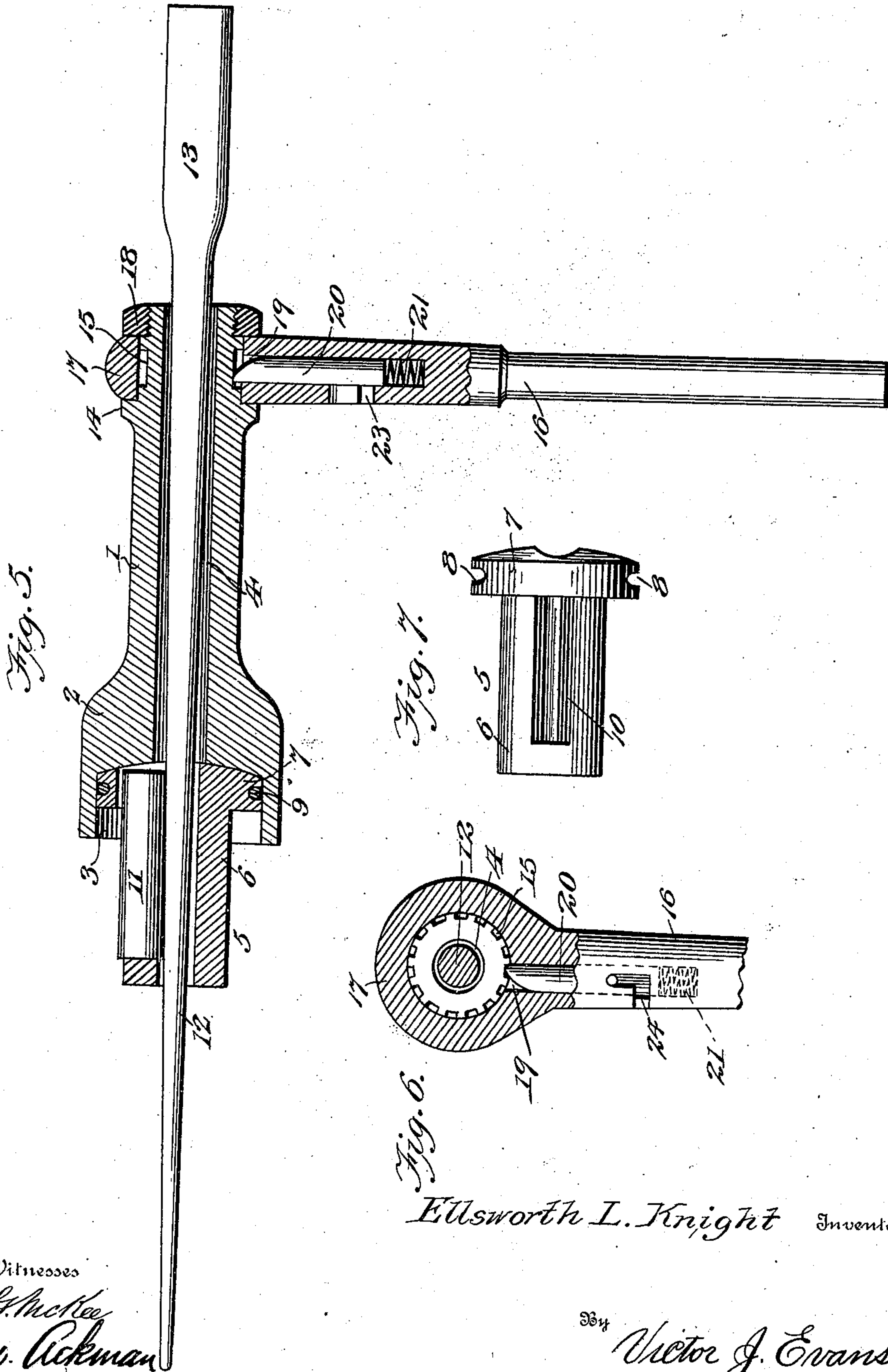
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UNITED STATES PATENT OFFICE.

ELLSWORTH L. KNIGHT, OF ELKHORN, WEST VIRGINIA.

TUBE-EXPANDER.

SPECIFICATION forming part of Letters Patent No. 700,510, dated May 20, 1902.

Application filed June 8, 1901. Serial No. 63,828. (No model.)

To all whom it may concern:

Be it known that I, ELLSWORTH L. KNIGHT, a citizen of the United States, residing at Elkhorn, and whose post-office address is Box 5 47, Elkhorn, in the county of McDowell and State of West Virginia, have invented new and useful Improvements in Tube-Expanders, of which the following is a specification.

This invention relates to improvements in 10 tube-expanders.

The object of the present invention is the provision of a device for expanding boiler-tubes and one which is adapted for use in connection with boiler-tubes, whether the lat- 15 ter are provided with welded seams or affected with blisters and other inequalities occasioned by the intense heat to which the seams are subjected, and, furthermore, the invention aims to provide an expander which is of ex- 20 tremely simple construction and one through the use of which the operation of expanding tubes may be greatly simplified, as well as to effect a reduction in the time usually required in effecting the expansion.

25 With these general objects in view and others which will appear as the nature of the improvements is better understood the invention consists, substantially, in the novel construction, combination, and arrangement of 30 parts, as will be hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the appended claim.

In the drawings, Figure 1 is a side elevation of an expander constructed in accord- 35 ance with the present invention. Figs. 2, 3, and 4 are transverse sectional views on the lines 2 2 3 3 4 4, Fig. 1. Fig. 5 is a longitudinal sectional view of the expander. Fig. 6 is a transverse sectional view similar to 40 Fig. 4, illustrating the ratchet-dog in reverse position. Fig. 7 is a side elevation of the expander proper removed.

Referring to the drawings, the numeral 1 45 designates a tubular stock or handle, which stock is provided with an enlarged head 2, and said head is likewise provided with a cavity or recess 3 in its free end. The cavity or recess 3 registers with the longitudinal bore 4 of the stock or handle 1 and is designed to receive 50 the expander proper, 5. The latter comprises an elongated body 6, having at one of its ends a head 7, and said head is received by the

cavity or recess 3, the head 7 being provided at diametrically opposite points with transversely-extending grooves 8, designed to re- 55 ceive a series of securing-pins 9, which are inserted through the head 2. As will be observed, the pins 9 are tapering and are inserted from opposite sides of the head 2, and by means of said pins or grooves 8 the expander proper is 60 securely but removably held within the cavity or recess 3. The expander proper is provided with a series of longitudinally-extending openings 10, which openings extend 65 through the head 7, and inserted within said openings 10 is a series of expanding-rollers 11, by means of which the expansion of the tubes is effected. By reason of the openings 10 being also formed within the head 7 the 70 rollers 11 are securely held in the body 6 and prevented becoming displaced therefrom, but at the same time capable of outward movement in order to be brought into immediate contact with the tube being acted upon. For 75 effecting the outward movement of the rollers 11 a tapering elongated mandrel 12 is employed, said mandrel being inserted through the bore of the handle 1 and between the rollers 11, as clearly shown. The mandrel 12 is 80 provided with an enlarged head 13, by which the same may be readily grasped for manipulating the mandrel in the use of the expander.

To effect rotation of the handle or stock 1 and at the same time the expander carried 85 thereby, the end of the handle or stock 1 opposite to the head 2 is reduced in diameter to form an annular shoulder 14, and immediately adjacent said shoulder is formed a series of ratchet-teeth 15. Mounted upon the re- 90 duced end of the handle or stock 1 is an operating-lever 16, one end of which is provided with a loop or eye 17, and said loop or eye is adapted to surround the reduced end of the handle 1 at the point wherein the teeth 15 are 95 formed, said loop or eye being secured upon the handle 1 through the medium of a nut 18. The lever 16 adjacent the loop or eye 17 is provided with a longitudinal bore 19, and seated within said bore is a ratchet-dog 20, said 100 dog being normally pressed outwardly by means of a coiled spring 21, arranged within the outer end of the bore 19. The inner end of the dog 20 is provided with a compound

reversely-arranged engaging face 22, which face is designed to be brought into contact with the teeth 15 in order to rotate the handle 1. By forming the face 22 of reversely-arranged sections the movement of the handle or stock 1 may be reversed by simply rotating the dog 20 approximately one-fourth of a rotation, and this may be effected through the medium of an outwardly-extending stud 23, arranged in a substantially U-shaped slot 24, formed in the lever 16 at a point adjacent the bore 19 thereof. When the stud 23 is within one of the longitudinal legs of the slot 24 and urged to the inner end of the said leg, the dog 20 will rotate the handle 1 in one direction; but immediately upon the stud 23 being shifted to the other longitudinal leg, which shifting effects the partial rotation of the dog 20, as above indicated, said dog engages the teeth 15 in such manner as to effect reverse rotation of the handle or stock 1.

With the parts assembled in the manner herein shown and described the operation is as follows: The expander 5 is inserted in the end of the tube to be expanded until the head 2 of the handle 1 contacts with the tube-sheet, whereupon the mandrel 12 is introduced into the bore 4 and between the rollers 11 until the latter are forced outwardly a sufficient distance to contact with the tube. Pressure is now applied to the lever 16, and as the dog 20 engages the teeth 15 the handle 1, with the rollers 11, is rotated. The tube is thus expanded; but during the movement of the handle 1 the mandrel 12 is gradually forced inwardly to effect greater spreading of the rollers 11 as expansion takes place, and this is continued until the tube has become expanded to the desired extent. Should it be nec-

essary to reverse rotation of the handle 1, it is simply necessary to reverse the position of the dog 20 in the manner described, when the handle 1 becomes immediately reversed in its movements upon pressure being again applied to the lever 16.

While the form of the invention herein shown and described is what is believed to be a preferable embodiment thereof, it is obvious that the same is susceptible of various changes in the form, proportion, and minor details of construction, and the right is therefore reserved to modify or vary the invention as falls within the spirit and scope of my invention.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

In a tube-expander, the combination with a tubular handle; of a head thereto having a recess in the end thereof, a tubular expander proper having slots therein extending from the inner end thereof, a head at one end of said expander proper extending over the ends of the slots, rollers adapted to be inserted longitudinally under the head and into the slots, said head being fitted in the recess in the handle whereby longitudinal movement of the rollers is prevented, means for locking the head in the recess, a mandrel extending through the handle and the expander proper, and means for revolving the handle.

In testimony whereof I affix my signature in presence of two witnesses.

ELLSWORTH L. KNIGHT.

Witnesses:

E. L. STAFFORD,
N. H. FRANKLIN.