

No. 769,134.

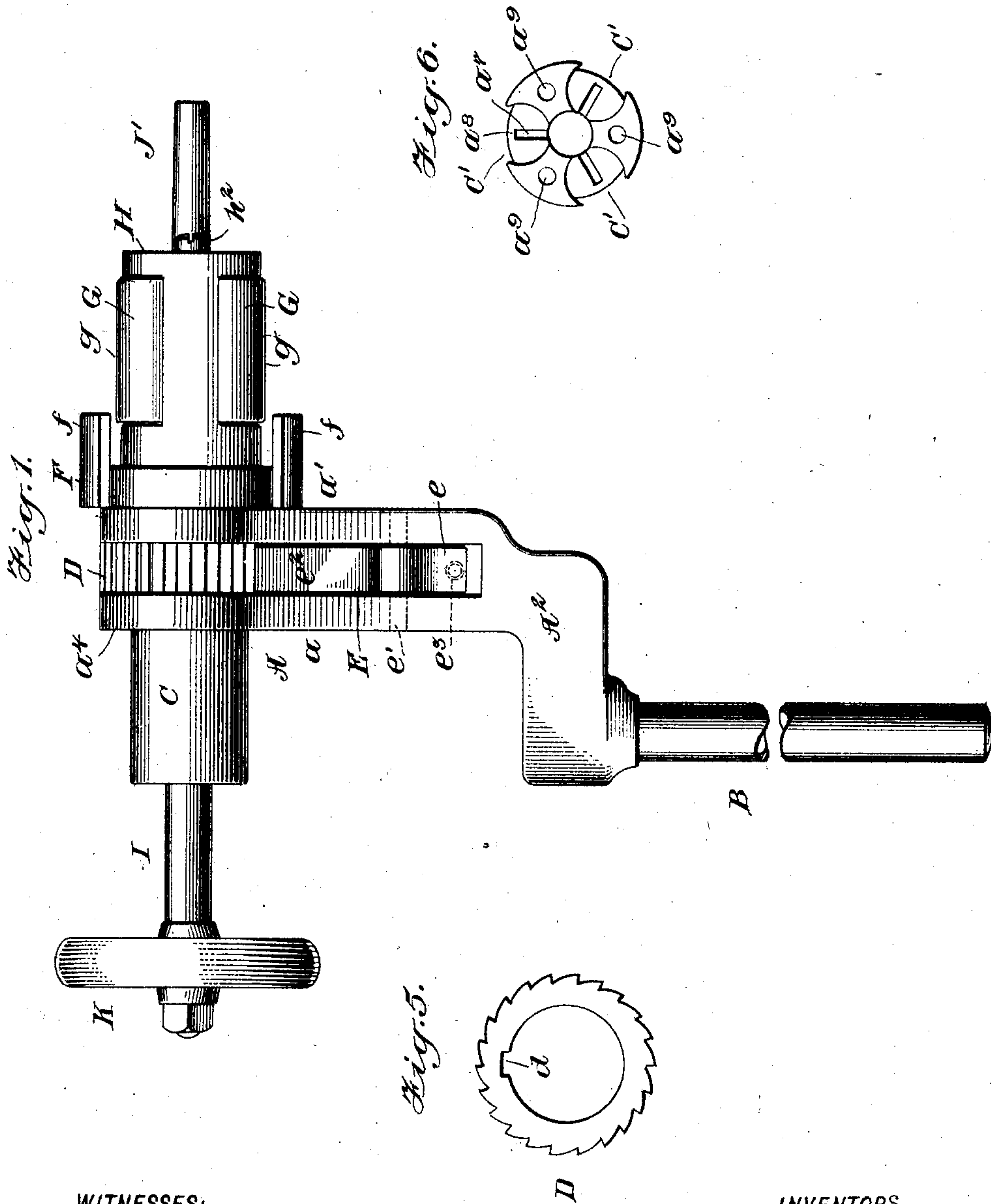
PATENTED AUG. 30, 1904.

H. GREATOREX & A. HOH.  
TUBE EXPANDER.

APPLICATION FILED SEPT. 24, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES:

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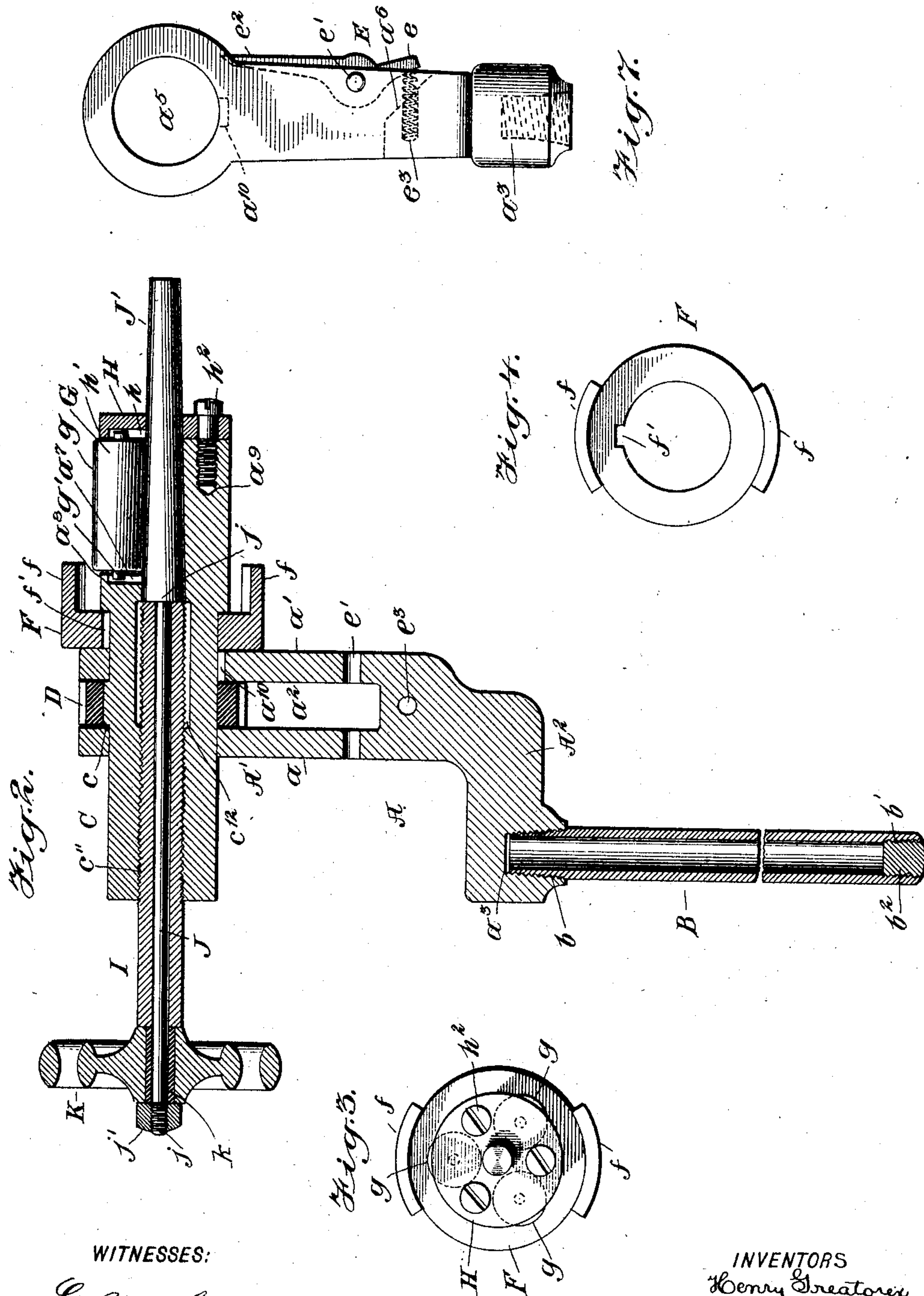
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# UNITED STATES PATENT OFFICE.

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## TUBE-EXPANDER.

SPECIFICATION forming part of Letters Patent No. 769,134, dated August 30, 1904.

Application filed September 24, 1903. Serial No. 174,400. (No model.)

*To all whom it may concern:*

Be it known that we, HENRY GREATOREX and AUGUST HOH, citizens of the United States, and residents of the borough of Brooklyn, city  
5 and State of New York, have invented certain new and useful Improvements in Tube-Expanders, of which the following is a specification.

This invention relates to tube-expanders,  
10 and has for its more prominent objects great facility and convenience for interchanging the roller-carrying part of the tool to adapt the latter for service in connection with an extended range of varying diameters of tubes  
15 and at the same time provide for positively and securely retaining the roller-carrying part in position when adjusted.

With the above and other purposes in view the improved tube-expander embodies generally a roller-carrying sleeve supporting a  
20 guide-ring for receiving the end of the tube to be expanded, and a bifurcated head swingingly mounted on said sleeve and provided with a pawl engaging a ratchet-wheel located  
25 within the head bifurcation and in spline-and-groove engagement with the roller-carrying sleeve, whereby upon the oscillation of the head through the medium of a suitable handle the pawl will intermittently rotate the  
30 ratchet-wheel to turn the roller-carrying sleeve, and thereby move the rollers around within the interior of the tube for uniformly expanding the latter. Grooves or keyways in both the guide-ring and contiguous portion  
35 of the swinging head are so peculiarly related that the roller-carrying sleeve can only be disengaged or engaged when the spline-and-groove engagement of the ratchet-wheel with said sleeve is in alinement with the groove in  
40 the guide-ring and the swinging head has been turned to an abnormal position to bring its groove in register both with the groove of the ratchet-wheel and that of the guide-ring.

There are other important features connected with the invention, which, in addition to those alluded to, are clearly set forth in the subsequent detailed description.

In the accompanying drawings, forming part of this specification, Figure 1 is a side

view of a tube-expander embodying our invention. Fig. 2 is a vertical longitudinal sectional view of the tool disclosed in Fig. 1. Fig. 3 is an end view of the roller-carrying sleeve and the guide-ring. Fig. 4 is a detail view of the guide-ring. Fig. 5 is an end view  
55 of the roller-carrying sleeve, the rollers and their retaining-plate being omitted. Fig. 6 is a detail view of the ratchet-wheel, illustrating the portion of the spline-groove therein with reference to the contiguous ratchet-teeth. Fig. 7 is a view of the swinging head detached and at a right angle to the position  
60 it is represented in in Figs. 1 and 2.

Similar reference characters are employed to designate corresponding parts throughout  
65 the several figures of the drawings wherein they occur.

A head A, preferably in a single piece, presents the upper extended bifurcated portion A', embodying the two vertical members  
70  $a$   $a'$ , between the inner flat parallel faces of which is an intermediate recess  $a^2$ . The lower part of the head is in the form of a longitudinally-disposed horizontal offset A<sup>2</sup>, slightly contracted at its under side, where it has a  
75 slightly-tapering threaded socket  $a$  (dotted lines, Fig. 7) for the reception of the correspondingly-shaped threaded end  $b$  of a handle B, which can be a section of pipe of suitable  
80 length and diameter and closed at its lower interiorly-threaded end  $b'$  by a plug  $b^2$  to provide a satisfactory butt.

The upper end portion  $a^4$  of the members  $a$   $a'$  are laterally enlarged and of somewhat circular configuration for the location of  
85 longitudinally-alined openings  $a^5$ , adapted for the snug bearing of a sleeve C of the extended character most clearly indicated in Fig. 2. It will be comprehended that the bearing relation of the sleeve within the head  
90 is such as to permit the oscillation of the head upon said sleeve, with the latter as a fulcrum.

When the parts are in the position indicated in Fig. 2, a spline  $c$  on the sleeve C snugly engages between the members  $a$   $a'$ , thereby  
95 preventing longitudinal movement of the sleeve. A ratchet-wheel D, occupying the upper portion of the recess  $a^2$  of the head, has



a spline-seat  $d$ , by which it is mounted in positive engagement upon the sleeve for transmitting to the latter any rotating movement imparted to said wheel.

5 That part of the head A constituting the bottom of the recess  $a^2$  is beveled, as indicated by dotted lines  $a^6$ , Fig. 7, to conform generally to the contiguous edge of the depending portion  $e$  of a pawl E of the shape generally  
10 illustrated by both full and dotted lines in the figure last mentioned, said pawl being pivotally mounted upon a pin  $e'$ , bearing in the members  $a a'$  near their base and adjacent to those edges nearest the beveled surface  $a^6$ .  
15 This arrangement provides for the compact attachment of the pawl to the head and in such manner that its upper extended nose  $e^2$  will always be maintained in effective operative relation with the teeth of the wheel D  
20 by means of a coiled expanding-spring  $e^3$ , seated in a transverse horizontal pocket in the beveled bottom of the recess  $a^2$  and normally exerting its thrust against the portion  $e$  of the pawl.

25 Upon the sleeve C, immediately external to the member  $a'$ , is mounted a ring F, having upper and lower forwardly-projecting segments  $f$  for adapting this ring to serve as a guide for receiving the end of the tube to be  
30 expanded, as will be readily understood by those familiar with this class of tools.

Within that portion of the sleeve C, which projects forward of the ring F, are longitudinal pockets  $C'$ , three being shown and equi-  
35 distantly located, said pockets being approximately cylindrical in outline and open at the surface of the sleeve. These pockets are adapted for the reception of hard-steel cylindrical rollers G, a peripheral portion  $g$  of each of  
40 which projects beyond the open side of its pocket. The end trunnions  $g'$  of these rollers extend within recesses  $a^7$ , radially located in the sleeve C, and a circular plate H, respectively, offsets  $a^8 h'$  at the periphery of said sleeve  
45 and plate overhanging the outer ends of the recesses for the purpose of limiting the outward movement of the rollers. Screws  $h^2$ , passing through the plate and bearing in threaded openings  $a^9$  in the end of the sleeve C, inter-  
50 mediately of the pockets  $C'$  thereof, provide for firmly securing said plate on the end of the sleeve.

The opening in the ring F, in which the sleeve C bears, is intersected at its top by a  
55 groove  $f'$  of dimensions suitable for the passage of the spline  $c$  of said sleeve, while a similarly-sized groove  $a^{10}$  in the member  $a'$  intersects the corresponding opening therein in the member  $a'$  at its bottom when the head  
60 occupies its normal pendent position.

A comparatively elongated tubular stem I is externally threaded from its inner end to a point well beyond its mid-length, said stem  
65  $c^{11}$  of a longitudinal passage centrally within

the sleeve. A succeeding section  $c^{12}$  of said passage is slightly enlarged and without threads. The passage of the stem communicates at its front end with a passage in the  
70 projecting part of the sleeve, said sleeve-passage moderately tapering toward its front end and intersecting the roller-pockets  $C'$ . It will be noted that the end of the sleeve-passage immediately communicating with the section  
75  $c^{12}$  of the stem-passage is of slightly less diameter than the latter for a purpose that will presently appear.

Snugly bearing within the stem I is a spindle J, integrally provided with a mandrel J', tapering to closely conform within the sleeve-pas-  
80 sage. The inner and larger end  $j$  of this mandrel is rigidly held against the forward end of the stem by means of a nut  $j'$  engaging the threaded extremity  $j^2$  of the rod and firmly clamping a hand-wheel K against the outer  
85 end of the stem, all of which will be clearly apparent. A suitable bushing  $k$  will preferably be interposed between the spindle I and the hub of the hand-wheel.

The functions and operations of the im-  
90 proved tool will be readily comprehended. The tool is applied so that its projecting roller-carrying portion will be introduced within the tube end, the latter being received within the guide-ring. The hand-wheel is then ro-  
95 tated to revolve the stem I, so that the same will travel inwardly in the sleeve, forwardly feeding the mandrel J, the conical shape of which will result in the radial expansion of the rollers to an extent that will expand the  
100 tube at the points where such rollers bear. With the parts thus conditioned the head A is oscillated through the medium of its handle, which, through its pawl engagement with the ratchet-wheel D, occasions the intermittent  
105 rotation of the sleeve C, so that the rollers are carried around in a circular path within the tube and effect the uniform expansion of the same to firmly set the same in position and without the presence of any internal ridges  
110 or other irregularities.

When it is desired to equip the tool for operating with tubes of a greater or less range of diameters, as the case may be, the handle B is raised until the head A' is in a position  
115 the reverse of that represented in Figs. 1 and 2, and its groove  $a^{10}$  will then be brought in register with the groove  $f'$  in the guide-ring. If the spline  $c$  of the sleeve C is not in alignment with the grooves thus registering, the  
120 sleeve and ratchet-wheel can be appropriately rotated to attain such spline-alinement, after which the stem I can be revolved to longitudinally withdraw it, the spindle, and mandrel from the sleeve, whereupon the latter can be  
125 longitudinally withdrawn in a manner whereby the spline  $c$  passes successively from the groove in the ratchet-wheel and through the registering grooves in the head and guide-ring, and thus permitting the complete de-  
130



tachment of the roller-carrying sleeve. A substitute sleeve having a rear spline-carrying portion, as that of the sleeve previously removed by a complement of expanding-rollers of greater or less capacity, as may be required, is then inserted so that its spline passes through the registering grooves of the guide-ring and head and becomes engaged within the groove of the ratchet-wheel, after which the head A can be turned downward to positively lock said sleeve in position, as will be obvious. Should the character of the substitute rollers require a mandrel of greater or less expanding capacity than that of the mandrel removed, the internal bore of the substitute will vary to accommodate the longitudinal passage of the substitute mandrel from the rear, a threaded stem somewhat similar to the stem I being employed. The substitute mandrel and stem can then be clamped in their operative relation by the application of the hand-wheel and nut *j* to the threaded end of the spindle which carries the mandrel.

It may be here stated that in substituting one roller carrying sleeve for another, as above described, it will be found desirable in some instances to also employ a substitute guide-ring, the distance between the segments *f* of which will be proportionate with the diameter of the tubes with which the tool is to serve in its changed condition.

With a view of avoiding the possible longitudinal shifting of the sleeve when during the rotation of the same its spline arrives at a lowermost position adjacent to the groove *a*<sup>10</sup> in the member *a'* we locate the groove *d* in the ratchet-wheel D in such relation to the contiguous ratchet-teeth of the said wheel D that the normal swing of the head will result in such pawl engagement and partial turning of the ratchet-wheel that upon any pawl-escapement said wheel will remain in a position insuring a lack of registration between the spline *c* and the groove *a*<sup>10</sup> in the member *a'*. In other words, the spline either overlaps the end of the groove *a*<sup>10</sup> or moves entirely beyond the same during its movement in the vicinity of said groove.

From the foregoing description, it will be appreciated that the improved tube-expander is not only simple in construction and convenient in operation, but is capable in connection with readily-adjusted interchangeable parts for expanding tubes of an extended

range of different diameters, and thus performs work for which distinct expanding-tools of different capacities have heretofore been required.

Having now described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a tube-expander, the combination with a pawl-carrying head having a longitudinally-disposed bearing and a ratchet-wheel revoluble independently of the head and engaged by the pawl, of a sleeve in said head-bearing and having an expander portion but relatively revoluble with respect to the head, and provision for engaging said sleeve with the ratchet-wheel, said provision adapted to permit the disengagement and withdrawal of the sleeve, when the head assumes an abnormal position with regard to the sleeve.

2. In a tube-expander, the combination with a pawl-carrying head having a longitudinally-disposed bearing, with an intersecting groove and a ratchet-wheel revoluble independently of said head, having an internal groove and engaged by the pawl, of a sleeve in said head-bearing and having an expander portion, said sleeve provided with a spline engaged with the groove of the ratchet-wheel, and a guide-ring on said sleeve contiguous to the head-bearing and provided with a groove, normally out of register with that of the said bearing, the groove of the head-bearing adapted to be brought into alinement with that of the guide-ring to permit the disengagement of the spline from the ratchet-wheel, and complete withdrawal of the sleeve.

3. In a tube-expander, the combination with a pawl-carrying head having a longitudinally-disposed bearing with intersecting groove, and a ratchet-wheel revoluble independently of the head, having an internal groove immediately located relative to the contiguous ratchet-teeth, of a sleeve having an expander portion and provided with a spline engaging the groove of the ratchet-wheel.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

HENRY GREATOR EX.  
AUGUST HOH.

Witnesses:

WILLIAM PAXTON,  
PHILIP K. STERN.