

(No Model.)

2 Sheets—Sheet 1.

C. WICKSTEED.

TUBE EXPANDER.

No. 346,251.

Patented July 27, 1886.

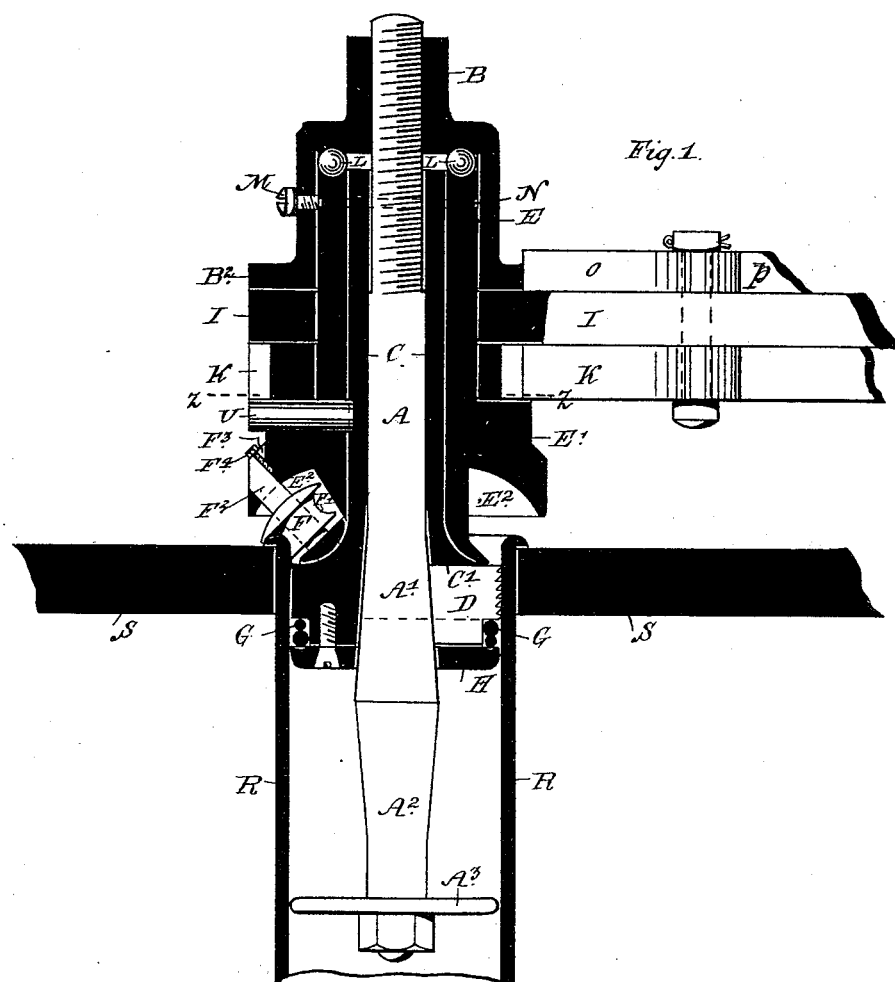


Fig. 1.

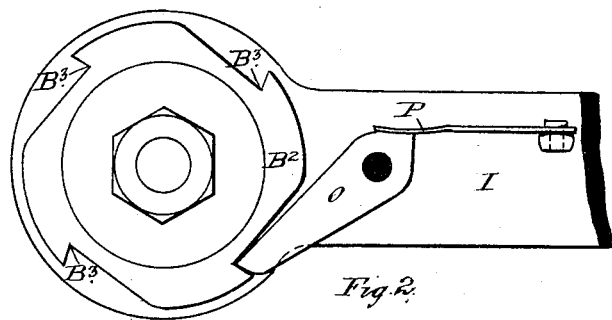


Fig. 2.

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his atty

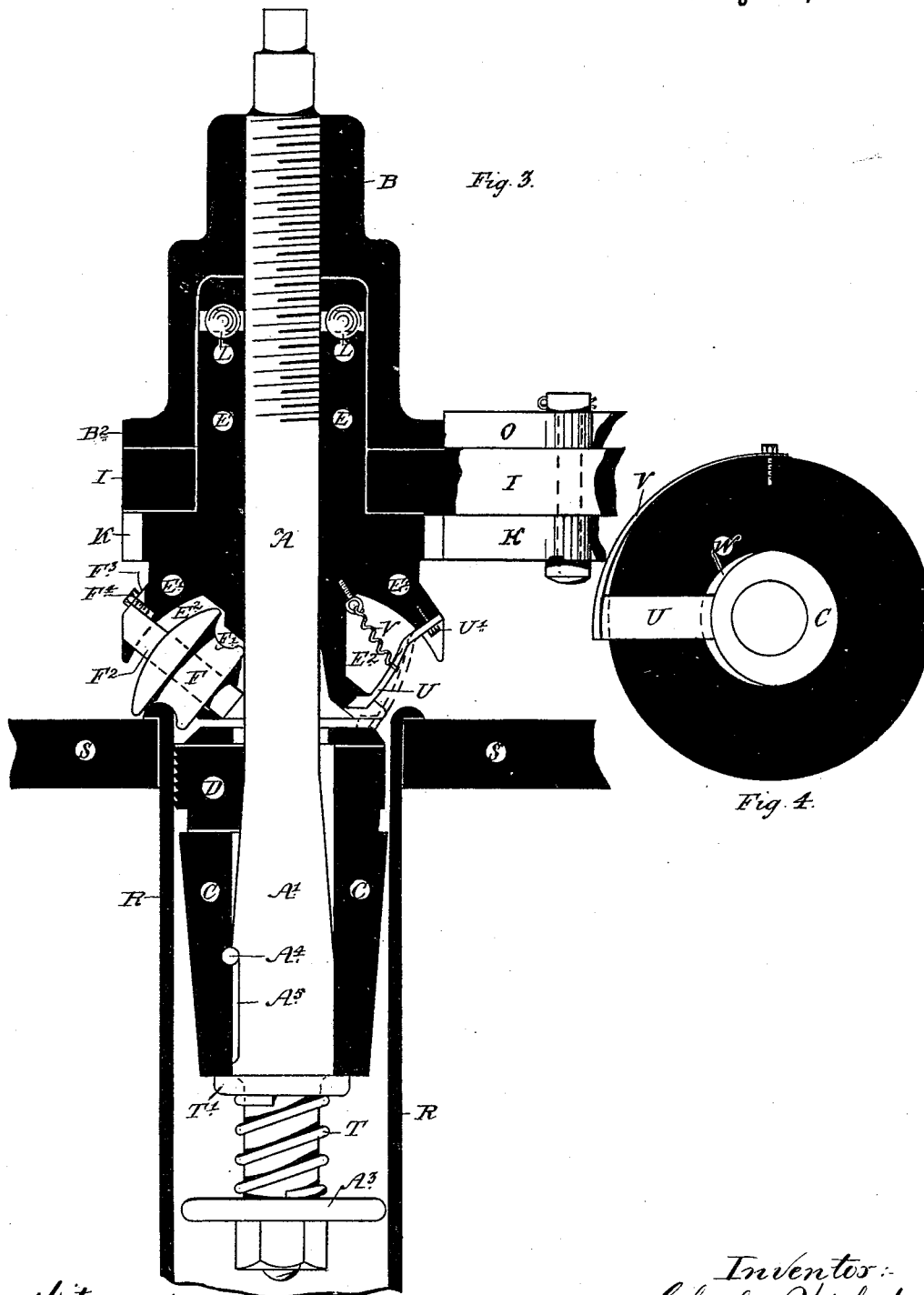
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C. WICKSTEED.
TUBE EXPANDER.

2 Sheets—Sheet 2.

No. 346,251.

Patented July 27, 1886.



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UNITED STATES PATENT OFFICE.

CHARLES WICKSTEED, OF KETTERING, COUNTY OF NORTHAMPTON,
ENGLAND.

TUBE-EXPANDER.

SPECIFICATION forming part of Letters Patent No. 346,251, dated July 27, 1886.

Application filed February 12, 1884. Serial No. 155,749. (No model.) Patented in England June 3, 1884, No. 8,551; in Belgium December 29, 1884, No. 67,356; in France December 30, 1884, No. 166,171, and in Germany December 30, 1884, No. 33,519.

To all whom it may concern:

Be it known that I, CHARLES WICKSTEED, a subject of the Queen of England, residing at Kettering, in the county of Northampton, England, have invented certain new and useful Improvements in Tube-Beaders, (for which I have obtained Letters Patent in the following countries: in England, No. 8,551, dated June 3, 1884; in France, No. 166,141, dated December 30, 1884; in Belgium, No. 67,356, dated December 29, 1884, and in Germany, No. 33,519, dated December 30, 1884;) and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention will be best understood by reference to the accompanying drawings, in which like letters of reference represent like parts.

Figure 1 is a vertical section through the beader and part of the tube-plate and tube, and Fig. 2 is a plan of the tool. Fig. 3 shows the tool with socket C reversed, and Fig. 4 is a section on line Z Z of Fig. 1.

A is the drift or mandrel, which passes entirely through the beader and carries the cap-nut B on its outer end, its inner end being thicker and tapered up, as shown at A'.

The extension A² carries the guide-plate A³, which serves to set the tool square with the plate previous to working.

C is a long tube or socket, which terminates in a head, C', and carries the grips D, of which there are two or more, but preferably three.

E is a larger tube or socket, which fits upon C. It has also a head, E', recessed all round at E², and carrying the beading-rollers F, of which there are, by preference, three, though the number may be varied. Separate recesses E³, one for each roller, may be provided, if desired, the rest of the head being solid; but the arrangement above described is preferred. The grips D are kept from falling out by the coiled spring G and plate H, as will be readily understood.

The beader is operated by the brace-handle I, which takes hold of E in any suitable manner, as by an ordinary ratchet and pawl, K, as shown. Friction-balls L are placed in annular recesses between the cap-nut B and the end of socket E, so as to minimize the friction between those parts when the pressure is on. One or more set-screws, M, whose ends take into the groove N, which extends round E, serve to maintain the relative positions of the cap-nut B and socket E, and to keep the balls L in place. The grooves F' in the rollers F are shaped to suit the end of the tube when beaded, and the rollers themselves do not nearly fit the recess E², there being room therein for them to slide up and down on their spindles F², and adapt themselves to the varying sizes of tubes within the limits of the recess. The spindle F² is fitted firmly in, and a portion, F³, is riveted over into a recess in the head E', and a set-screw, F⁴, is screwed in, as shown, so as to keep the spindle F² from turning round or dropping out.

Referring to Fig. 2, it will be seen that the flange B² is notched or recessed at B³. The number of these notches may vary; but I find that four is the most convenient number, as will presently appear. The pawl O, pivoted to the handle I, is adapted to engage with these notches B³, the spring P serving to keep it pressed up against the flange B³.

The operation is as follows: The beader is placed into the end of the tube R, as shown in Fig. 1, the nut B being partly unscrewed and the mandrel A slacked back sufficiently to allow the grips D to slide into the tool, so as to enter the tube when the tool is in place. The nut B is screwed up, drawing out the mandrel A, and forcing out the grips D, which then take a firm hold upon the tube, which is prevented from opening out or splitting by the support of the tube-plate S. It will be seen that as the mandrel A forces the grips D into the tube it also tightens the rollers F against the end of the socket E. Thus the greater pressure on the end of the tube R the greater the grip also to hold the tool in the tube. To get the requisite pressure considerable power must be brought to bear upon the nut B, and this is accomplished by means of the pawl O

acting in one of the notches B³, and being operated by handle I. The socket E is now revolved by the ratchet action already described, the rollers F pressing the end of the tube outward and over as they revolve, and, finally, beading it, as somewhat shown in Fig. 1. When more pressure is required upon the rollers, a longer stroke of the handle I is taken, so as to cause the pawl O to engage with the next notch B³, and so give a further part turn to the nut and increased pressure upon the rollers. Except when more pressure is being applied, as above, the pawl O slides backward and forward upon the flange B² of nut B between two notches, and I find that by having four notches equally spaced round the flange a sufficiently long space is provided for this purpose, a slight increase in the length of the stroke being sufficient to engage the pawl in the next notch. The screw-thread upon the mandrel A is preferably of a rather fine pitch, so that the part revolution of the nut may not put on too much pressure. When the beading is finished, the pawl O is first turned back, then the nut B is slacked back with an ordinary spanner, and the mandrel A driven in to disengage it from the grips D, when the whole tool can at once be removed.

In the case of beaders for small tubes there is not room for the socket C between the mandrel A and the rollers F. In such cases the socket C is reversed, as shown in Fig. 3. I prefer, however, to use the form as shown in Fig. 2, when there is room for it.

In the form shown in Fig. 3 the socket C is removed and placed upon the portion A' of the mandrel. A helical spring, T, is placed between the guide-plate A³ and the washer T', which presses upon C. This has the effect of always drawing the mandrel A out as far as the position of the nut B will allow, so that the grips D can recede into the tool. The pin A⁴ passes through C, bearing upon the flat A⁵ of the mandrel, which is thus kept from slipping around.

When inserting the tool to commence working, it is important that the grips D should not be so far into the tube R as to lose the support of the tube-plate S; but at the same time it is necessary that the grips D and tube C should be sufficiently clear of the tube E to allow the free closing action, which in making the bead necessarily takes place.

In fixing the tool, in order to obtain the proper relative positions of the two sockets C and E, the detent U rests upon the end of the socket E, forming a distance-piece between the two sockets E and C, as shown in dotted lines; but as soon as the socket E is revolved the friction of the detent U against the socket C causes it to fall into the notch in socket E, made for its reception, as shown in full lines in Fig. 3, the detent U being free to revolve upon its screw U', the spring V keeping it in its place, where it is entirely out of the way.

The sockets can then close up, as required. This arrangement is adapted for those tools constructed as in Fig. 3. For those made as in Fig. 1 the following arrangements for fixing the initial position of the grips may be made: The pin or detent U, Fig. 1, fits in the eccentric groove W, Fig. 4, formed partly round the socket C, the spring V serving to hold it in the groove. When in the groove, as shown, the grips D are in the proper position; but as soon as the tool is revolved the pin U is carried round in the groove, whose eccentricity carries the pin up to the level of the rest of the socket. As will be readily seen in Fig. 4, it cannot enter the groove again as it comes round, because the tube E, which carries pin U, has been caused to travel longitudinally upon C by the action of the nut B.

Having now described my invention, I claim, in a tube-beader—

1. The combination, substantially as herein described, of the mandrel A, screw-threaded at one end, and having a tapering portion, A', the nut B, and the grips or gripping-blocks D, loosely seated on said tapering portion of the mandrel, with the sockets or sleeves C E, the plate H, and spring G, for the purpose specified.

2. The combination, substantially as herein described, of the mandrel A, screw-threaded at one end, and having a tapering portion, A', the nut B, and the grips or gripping-blocks D, loosely seated on said tapering portion of the mandrel, with the sockets or sleeves C E, the plate H, spring G, and the guide-plate A³, substantially as and for the purpose specified.

3. The combination, with the header E', having recess F³, of the roller spindles F', having their ends riveted over into said recess, and the set-screw F⁴, for the purpose specified.

4. The combination, substantially as herein described, of the mandrel A, the sleeve or socket C, provided with grooves N, sleeve or socket E, the nut B, the ball-bearings L, and the screws M, said parts being constructed for co-operation, substantially as set forth.

5. The combination, substantially as herein described, with the mandrel A, the sleeve or socket C, having an eccentric groove, W, formed partly around its periphery, and the sleeve or socket E, having ratchet-teeth formed around its periphery, of the nut B, having a ratchet-flange, B², the lever I, pawls K O, the pin U, and spring V, said parts being arranged for co-operation, for the purpose specified.

In testimony whereof I have hereto set my hand in the presence of two subscribing witnesses.

CHARLES WICKSTEED.

Witnesses:

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