(No Model.)

T. B. SHARP.

APPARATUS FOR MANUFACTURING METAL TUBES.

No. 600,681. Patented Mar. 15, 1898.

FIG. 3

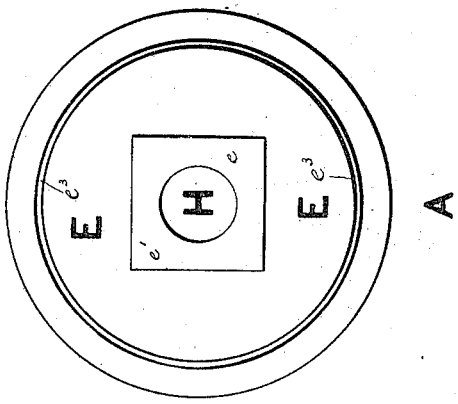


FIG. 1

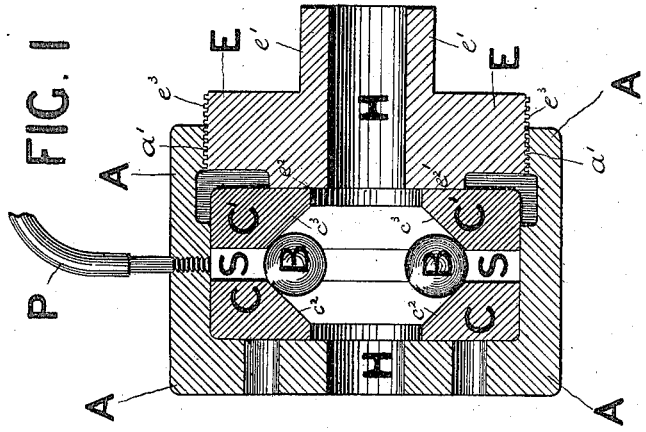


FIG. 2

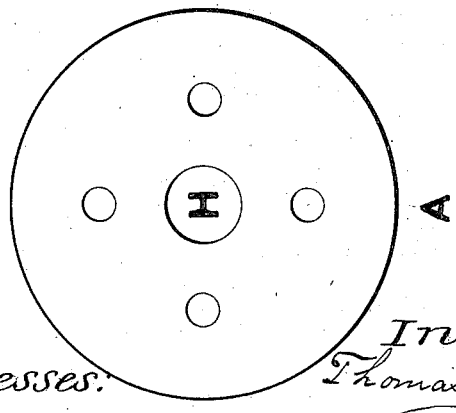
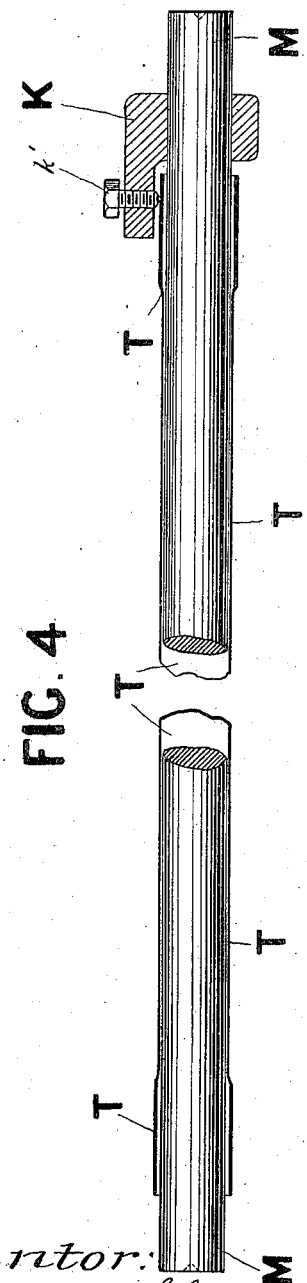


FIG. 4



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UNITED STATES PATENT OFFICE.

THOMAS BUDWORTH SHARP, OF BIRMINGHAM, ENGLAND.

APPARATUS FOR MANUFACTURING METAL TUBES.

SPECIFICATION forming part of Letters Patent No. 600,681, dated March 15, 1898.

Application filed October 19, 1897. Serial No. 655,744. (No model.) Patented in England August 6, 1897, No. 18,307.

To all whom it may concern:

Be it known that I, THOMAS BUDWORTH SHARP, engineer, a subject of the Queen of Great Britain, residing at County Chambers, Martineau street, Birmingham, in the county of Warwick, England, have invented certain new and useful Improvements in or Appertaining to the Manufacture of Steel, Copper, or other Metal Tubes and in the Apparatus Employed in the said Manufacture, of which the following is a specification.

This invention has been patented in England under date of August 6, 1897, No. 18,307.

My invention has for its object improvements in or appertaining to the manufacture of steel, copper, or other metal tubes and in the apparatus employed in the said manufacture, and is intended to produce metal tubes of variable thickness in a practically-finished condition and ready for working into such forms as cycle, motor-car, and other frames, as well as for boiler-tubes and many other purposes, in a readier, cheaper, and better manner than has hitherto been employed. I am quite aware that to a limited extent tubes thickened at the ends have been produced by "jumping up;" but such methods have been costly.

In order that my invention may be clearly understood and more easily carried into practical effect, I have appended hereunto a sheet of drawings illustrating an example of my apparatus and the mode of manufacture or its application, which will enable others to apply the invention to the various cases within practice.

Figure 1 is a sectional elevation of one of my casings or reducing-boxes A ready for placing over the tube and mandrel before the operation of reduction is commenced. Fig. 2 is an elevation of the left-hand end of the casing or reducing-box A. Fig. 3 is an elevation of the right-hand end of the reducing-box A. Fig. 4 is a part section and part elevation of a tube T which has been reduced according to my invention and from which the reducing-box A has been removed; but the tube is still on the mandrel M. From this form it will be seen that the tube is held tightly upon the mandrel and is prevented from turning, except with the mandrel, by the set-screw k', which is mounted in the holder K. This holder may be permanently fixed upon any part of the mandrel M. There are many other ways of holding the tube from turning upon the mandrel—such, for instance, as a notch or notches in the end of the tube, taking into a projection on the mandrel, or by a set-screw run through the tube, or the tube may be allowed to bind itself by friction.

The casing or reducing-box A has an open end with a screw-thread a', into which the adjusting end E screws with its corresponding screw-thread e^3 by means of the nut $e^{3'}$, solid with the end E, which also is formed with a facing-piece e^2 at its inner end for the purpose of operating truly against the sliding cone C', the opposite cone C being in the example shown stationary at the left end of the box, as shown upon the drawings. It will be seen that the cone C is first placed in the box, which is then threaded over the tube T on the mandrel, when the balls B are put into position. The back cone C' is then placed in position and the end E adjusted so as to bring the desired pressure upon the balls B, which is due to the two inclined surfaces c^2 and c^3 of the cones, which are designed in this particular manner so as to best operate upon the tube to be reduced. The mandrel and tube are passed through the openings H in each end of the box. Soap and water or other lubricant may be conveyed to the box by the pipe P as required. The mandrel M, carrying its tube T and reducing-box A, is now placed in the lathe or machine, when the mandrel, with its tube, is rotated at a suitable speed, while the box A is held and traversed over that portion of the tube it is required to reduce in thickness. The reduction may be done by traversing the box A once over the tube or by doing so any number of times or with a reciprocating action, the tightening of the balls upon the tube being increased by screwing up the end E upon the cone C' or by other equivalent adjustment.

In preparing tubes for such purposes as the building of cycle-frames I take a tube, say, for instance, eighteen inches long and one and one-eighth inches external diameter and, say, one thirty-second thick. I then arrange the travel of the box so as to reduce the

thickness of the tube, say, fourteen inches of its middle length, leaving two inches at each end not reduced. When the box has been traversed once or reciprocated any desired number of times along the center portion, it will be found that the length of the tube is increased and the thickness decreased until the desired thinness and length are reached. If the tube is now examined, it will be found that the metal at the reduced portion is greatly consolidated and improved in texture, and we shall have a thick-ended tube very light but very strong on account of the peculiar treatment it has received by the apparatus and process hereinbefore described. Such a tube is suitable at its thick end for uniting to sockets or junctions either by brazing or by any other known means, and when so mounted in a frame the frame will be found much stronger and more reliable than frames made either from tubes of parallel thickness or from tubes staved up at the ends by the awkward means hitherto adopted in an experimental and limited degree. If it is desired to have the shoulders of the tube inside at the ends, this may be accomplished by external pressure at the ends under dies or by a Ryder hammer or similar tool.

Small friction-wheels with rounded faces may be applied instead of the balls; but the action is not so good as the balls, which are free to adapt themselves in any direction to this peculiar work.

Though I have hitherto spoken of reducing tubes at the center only, the process and tool herein described are equally applicable to reducing tubes their entire length and are included in my invention. Tubes so manufactured are both stronger and lighter and better adapted for their work and more economical in every respect.

Having now particularly described and ascertained the nature of said invention and in what manner the same is to be performed, I declare what I claim is—

In combination, the reducing-box A having one open side, the bearings C C′ located therein with a space between, the balls located between the bearings, the adjusting-screw E threaded into the open side of the reducing-box, the facing-surface e^2 carried by the adjusting-screw and adapted to bear against the cone C′ and the lubricator-feed pipe communicating with the space between the cones, substantially as described.

In testimony that I claim the foregoing as my own I affix my name in the presence of two witnesses.

THOMAS BUDWORTH SHARP.

Witnesses:

GEORGE LESTER,

FREDERICK BUCKLEY.