

No. 761,518.

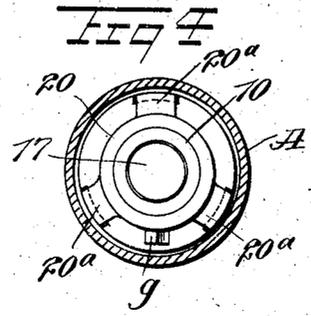
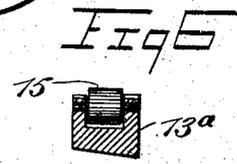
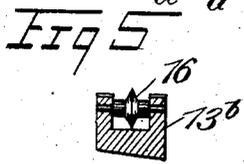
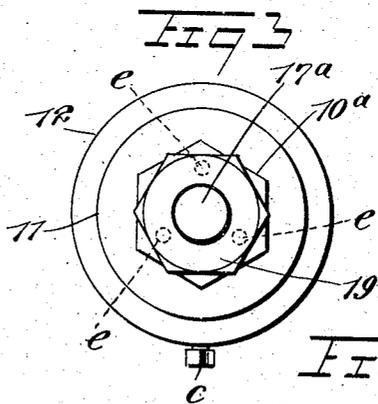
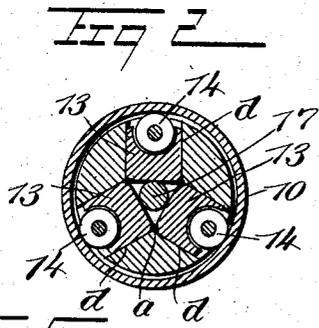
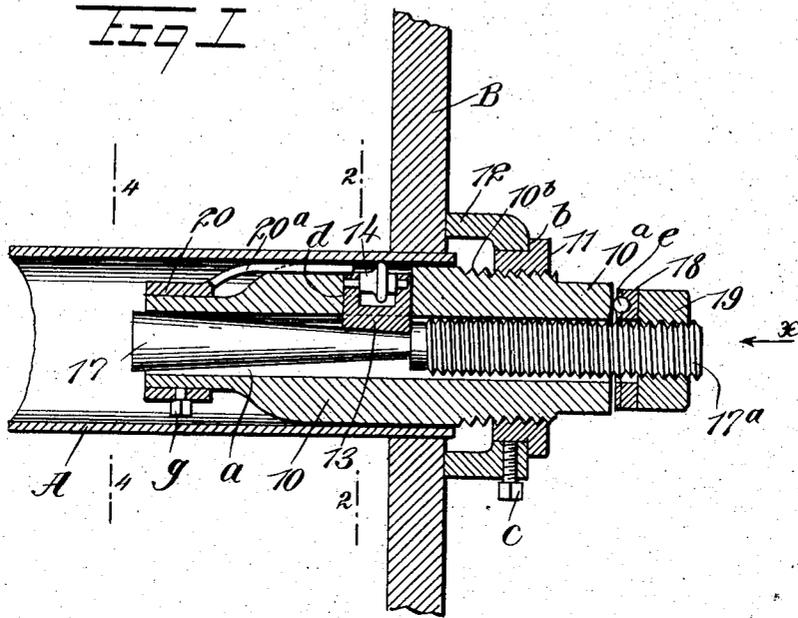
PATENTED MAY 31, 1904.

H. G. LYKKEN.

TUBE EXPANDING, BEADING, AND CUTTING TOOL.

APPLICATION FILED AUG. 19, 1903.

NO MODEL.



WITNESSES:
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UNITED STATES PATENT OFFICE.

HENRY G. LYKKEN, OF GRAFTON, NORTH DAKOTA.

TUBE EXPANDING, BEADING, AND CUTTING TOOL.

SPECIFICATION forming part of Letters Patent No. 761,518, dated May 31, 1904.

Application filed August 19, 1903. Serial No. 169,999. (No model.)

To all whom it may concern:

Be it known that I, HENRY G. LYKKEN, a citizen of the United States, and a resident of Grafton, in the county of Walsh and State of North Dakota, have invented a new and Improved Tube Expanding, Beading, and Cutting Tool, of which the following is a full, clear, and exact description.

The object of this invention is to provide novel details of construction for a tool of the character indicated which adapts it for convenient and reliable service, facilitates the exchange of parts to effect the expansion, beading, or cutting off of a flue or tube while in place, and affords a simple practical implement at a moderate cost.

The invention consists in the novel construction and combination of parts, as is hereinafter described, and defined in the appended claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional side view of the improved tool applied as a beading implement. Fig. 2 is a transverse sectional view substantially on the line 2 2 in Fig. 1. Fig. 3 is an end view of the device seen in direction of the arrow *a* in Fig. 1. Fig. 4 is a transverse sectional view substantially on the line 4 4 in Fig. 1. Fig. 5 is a sectional side view of a cutter-supporting bracket-block and a rotary cutter thereon; and Fig. 6 is a similar view with Fig. 5, but showing an expanding-roller mounted on the bracket-block in place of the cutter.

The improved tool, that is adapted to serve the purpose of a tube-cutter, a tube-expander, and a tube-beader, as occasion may require, is extremely simple, strong, light, convenient to place and remove while in use, and adapted for service in close proximity to the sides of a fire-box or smoke-box or a stationary or locomotive boiler, as will appear from the subjoined description.

The body portion 10 of the implement is a cylindrical mandrel of proper dimensions for effective service, an axial bore *a* extending therethrough, as shown in Fig. 1.

Upon one end of the mandrel 10, that may be somewhat reduced in diameter as compared with the middle portion thereof, a preferably hexagonal formation 10^a is produced, it being understood that any other angular peripheral form may be given to this integral portion of the mandrel which may be adapted for engagement therewith of a suitable wrench, (not shown,) whereby the mandrel 10 may be rotated.

Upon the exterior of the mandrel 10, adjacent to the angular formation 10^a, a thread 10^b is formed, and upon said thread an interiorly-threaded hub 11 is screwed and adapted for adjustment along the same.

A cupped flange 12 is mounted upon a slightly-reduced peripheral portion of the hub 11, abutting upon a radial shoulder *b*, that is produced by the diametrical reduction of the hub, and said flange is held in place by the set-screw *c*, as indicated in Fig. 1. In the wall of the hollow mandrel 10 three rectangular openings *d* of equal size are formed, these apertures being equally spaced apart.

In the openings *d* three sets of bracket-blocks 13, 13^a, and 13^b are fitted, each set of these similar blocks being designed as supports for three beading-rollers 14, a like number of expanding-rollers 15, and a similar number of cutter-wheels 16, respectively.

Each of the blocks 13 is transversely recessed in its upper side, leaving end walls standing thereon, which walls are oppositely perforated to receive the journal ends of a beading-roller 14, said rollers, of the usual or any preferred form, being held to rotate in the recesses of the blocks, as indicated in Figs. 1 and 2.

A coniform wedge 17 is preferably formed integral with an elongated adjusting-screw 17^a and is axially coincident therewith, the smaller end of the wedge joining one end of the screw, as shown in Fig. 1.

The coniform wedge 17 and adjusting-screw 17^a are introduced within the bore *a* of the mandrel 10 and have such a relative position as will permit the bracket-blocks 13 to seat upon the smaller portion of said wedge, and to adapt the blocks 13 to have proper bearing on the wedge the contacting surfaces of said

blocks are sloped, so as to conform with the taper of the coniform wedge, as shown for one block in Fig. 1.

Upon the end portion of the adjusting-screw 5 17^a which projects exterior of the mandrel 10 a washer-block 18 is loosely mounted, said block being adapted to loosely hold in recesses formed in one side face thereof a proper number of bearing-balls *e*, that project 10 sufficiently to have contact with the adjacent end of the mandrel.

An adjusting-nut 19 is screwed upon the portion of the screw 17^a that extends beyond the plain surface of the block 18 and in service 15 has contact with said surface, so that the block 18 serves as an antifriction-washer for the nut.

At the opposite end of the mandrel 10, which is somewhat reduced in diameter, a sleeve 20 20 is mounted and held in place by the set-screw *g*. A set of three spring keeper-arms 20^a project from one end of the sleeve 20 toward the openings *d* and are equally spaced apart, said arms loosely occupying longitudinal 25 channels formed in the periphery of the mandrel 10.

As shown for one block 13, the spring keeper-arms have bearing contact upon the upper surfaces of said blocks, respectively, 30 thus insuring a contact of the latter with the coniform wedge 17.

In Fig. 5 the bracket-block 13^b shown is the counterpart of the block 13 (shown in Figs. 1 and 2) and is one of a set of three bracket- 35 blocks which rotatably support three similar cutters 16, that are circular and V-shaped in section, as is usual in this style of tube-cutters, and it will be seen that the blocks 13 may be readily removed by a longitudinal displacement of the keeper-arms 20^a and the 40 blocks 13^b be introduced within the openings *d* for service.

In Fig. 6 is shown one of a set of three expanding-rollers 15, rotatably supported on a 45 bracket-block 13^a, similar to the bracket-blocks 13 13^b, these expanding-rollers having either a cylindrical form, as shown, or any other peripheral shape that may be best adapted for their service.

In Fig. 1 is represented an application of 50 the improved tool to form a bead upon a boiler-tube, A representing the tube and B the flue sheet, through which the end of the tube or flue is inserted and wherein said tube end is 55 to be affixed by use of the improvement.

As shown, the mandrel 10 is introduced within the tube A, the latter being in proper position in a perforation in the tube or flue sheet B, the degree of insertion being accurately 60 determined by contact of the true edge of the cupped flange 12 upon the exterior surface of the tube or flue sheet B, and it will be apparent that by an adjustment of the hub 11 on the threaded body of the mandrel 10 the beading-rollers 14 may be exactly located within 65

the tube A to form a projecting bead on said tube at the inner side of the flue or tube sheet B.

In operation, assuming that the parts of the tool are arranged for forming a bead on the 70 tube A, the workman applies a suitable wrench upon the nut 19 and rotates it, so as to pull the coniform wedge 17 toward the outer end of the mandrel, thus causing pressure on the inner ends of the bracket-blocks 13. A wrench 75 is now placed upon the angular formation 10^a and the mandrel 10 is rotated therewith, which will cause the beading-rollers 14 to indent the inner surface of the tube A. After a few turning 80 movements of the mandrel 10 the wrench is again applied upon the adjusting-nut 19 and the latter is turned in a proper direction to again pull upon the coniform wedge 17, forcing the rollers 14 again into contact with 85 the flue or tube A, and thus adapt the subsequent rotation of the mandrel 10 by means of a wrench applied to the angular formation 10^a to produce a bead upon the exterior of the tube A in contact with the inner surface of 90 the sheet B.

It will be seen that by employment of the cupped flange 12, held in position by the adjustable hub-block 11, and the provision of the antifriction-washer 18 the frictional resistance to a turning movement of the implement, that in ordinary tools of its class is great, 95 may be overcome with ease and the work lightened correspondingly.

After the bead is formed the tool may be 100 withdrawn from the tube A by first turning the nut 19 in an opposite direction, so as to permit the insertion of the coniform wedge 17 farther into the bore *a* of the mandrel, which will dispose the bracket-blocks 13 opposite 105 the smallest portion of the wedge and permit the spring-arms 20^a to press the beading-rollers 14 out of the groove they have formed in the tube, and thus release the mandrel for its withdrawal from the tube A. A removal of 110 the beading-rollers 14 may now be effected, as before mentioned, to permit the substitution of the expanding-rollers 15 therefor, which when in position on the mandrel 10 may be disposed opposite the surface of the tube A that is opposite the wall of the circular orifice 115 occupied by the end of the said tube, this adjustment being readily effected by screwing the hub 11 farther on the mandrel, and thus reducing the distance of the rollers 15 therefrom. 120

When the set of expanding-rollers, one of which is shown in Fig. 6, are in position, they may be forced into engagement with the inner surface of the tube A by turning the screw 17^a so as to draw upon the wedge 17, 125 whereupon a rotation of the mandrel 10 will obviously expand the tube by rolling contact of the rollers 15 therewith.

In case the tool is to be employed for cutting off flues or tubes while in position within 130

a boiler or the like it is only necessary to substitute the bracket-blocks 13^b for the bracket-blocks 13 or 13^a if the latter occupy the openings *d*, which will place the cutters 16 in position for use, the cutters being embedded in the tube near the flue-sheet B by a longitudinal adjustment of the coniform wedge 17, as has already been explained for the outward movement of the beading-rollers and expanding-rollers, the circular cutters operating to cut off the tube when the mandrel 10 is rotated and the nut 19 turned at intervals to draw upon the coniform wedge 17.

It will be obvious that as there are no projections on the tool which will interfere with the side wall of a boiler fire-box or smoke-box flues or tubes may be "set" or cut off for removal along the outer rows of the same as positioned in the flue-sheets and the improved implement be employed for such work in a rapid easy manner.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A tool of the character described, consisting of a hollow mandrel having an angular outer end and provided with an external screw-thread adjacent to said end and with a plurality of radial openings, a coniform wedge in the mandrel and having formed integrally therewith and extending from the smaller end thereof, an adjusting-screw whose end projects through the mandrel, a washer on the projecting end of the adjusting-screw and having its inner face recessed, balls in the said recesses, a nut on the adjusting-screw beyond the washer, a plurality of tool-holding bracket-blocks in the openings of the mandrel and having beveled lower faces, a sleeve mounted on the inner end of the mandrel and provided with arms, the free ends of which engage the tool-holding bracket-blocks, an internally-threaded hub screwing on the mandrel and

provided with a peripheral shoulder, and a cupped flange secured upon the hub and abutting against the shoulder thereof, as set forth. 45

2. A tool of the character described, comprising a hollow mandrel having an angular outer end and provided with an external screw-thread near said end, and with radial openings, an internally-threaded hub screwing on the mandrel, a cupped flange secured to the hub, a plurality of tool-carrying bracket-blocks fitting in the openings of the mandrel and having beveled lower faces, spring-arms secured to the mandrel and having their free ends engaging the bracket-blocks, a coniform wedge in the mandrel and having an adjusting-screw formed integrally therewith, the said adjusting-screw projecting through the mandrel, a ball-carrying washer loose on the projecting end of the adjusting-screw, and a nut on the end of the adjusting-screw beyond the said washer, as set forth. 55

3. A tool of the character described, comprising a hollow mandrel provided with an external screw-thread and with radial openings, a hub screwing on the mandrel, a cupped flange secured to the hub, tool-holding bracket-blocks fitting in the openings of the mandrel, a sleeve on the inner end of the mandrel and provided with spring-arms engaging the bracket-blocks, a coniform wedge in the mandrel and having an adjusting-screw secured to its smaller end, said screw projecting through the mandrel, and a nut on the projecting end of the screw, as set forth. 65

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses. 75

HENRY G. LYKKEN.

Witnesses:

WM. MACKENZIE,
NEIL MCMURCHIE.