

(No Model.)

C. W. UMHOLTZ.
TUBE EXPANDER.

No. 521,742.

Patented June 19, 1894.

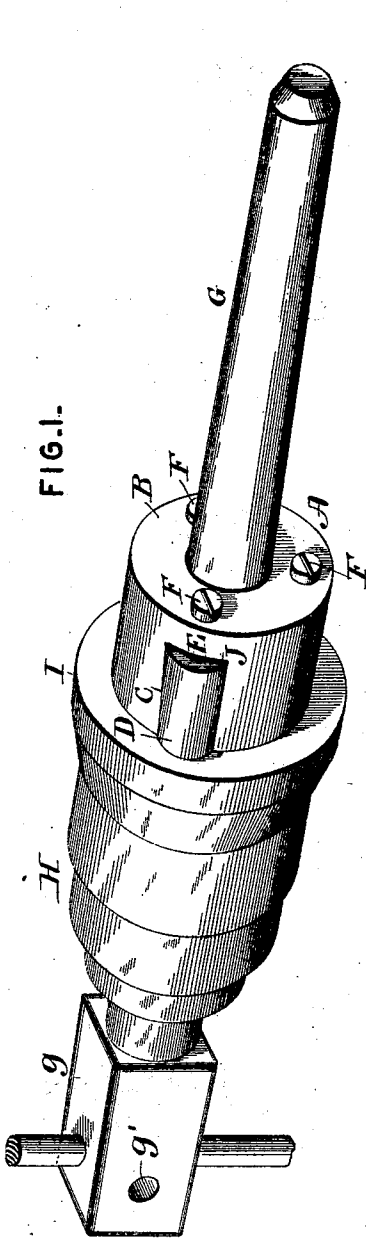


FIG. 1.

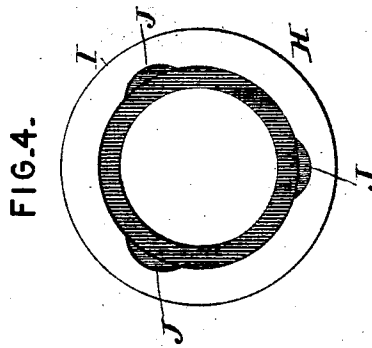


FIG. 4.

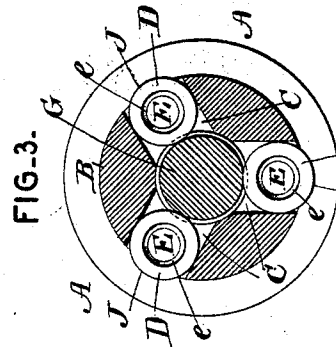


FIG. 3.

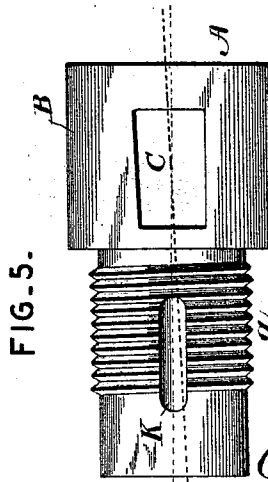


FIG. 5.

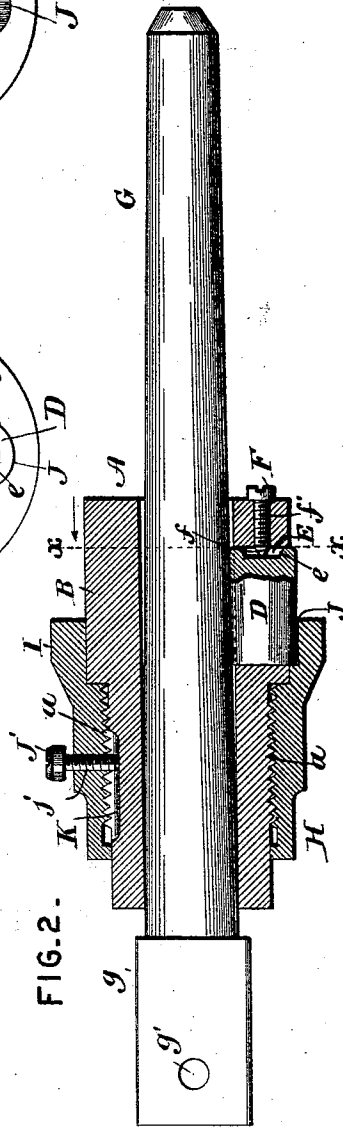


FIG. 2.

Inventor

Witnesses

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UNITED STATES PATENT OFFICE.

CHARLES W. UMHOLTZ, OF BRISTOL, VIRGINIA.

TUBE-EXPANDER.

SPECIFICATION forming part of Letters Patent No. 521,742, dated June 19, 1894.

Application filed September 21, 1893. Serial No. 486,099. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. UMHOLTZ, a citizen of the United States, residing at Bristol, in the county of Washington and State of Virginia, have invented a new and useful Tube-Expander, of which the following is a specification.

This invention relates to tube expanders; and it has for its object to provide certain improvements in devices of this character which are employed for expanding the ends of boiler-tubes in the tube-sheets.

To this end the main and primary object of the present invention is to construct a tube-expander of as few parts as possible without sacrificing the efficiency of the device.

With these and other objects in view, which will readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts hereinafter fully described, illustrated, and claimed.

In the drawings: Figure 1 is a perspective view of the tube-expander constructed in accordance with this invention. Fig. 2 is a central vertical longitudinal sectional view of the same. Fig. 3 is a cross-section on the line $x-x$ of Fig. 2. Fig. 4 is a detail elevation of the adjustable stop-collar or ring. Fig. 5 is a detail plan view of the expander stock and roller cage or hub at one end thereof.

Like letters of reference indicate corresponding parts in all the figures of the drawings.

Referring to the drawings, A represents the tubular stock or body of the expander, exteriorly threaded at one end, as at a , and terminating at its other end in a roller-hub B, in which are cut a series of longitudinally disposed bearing slots or openings C. The longitudinally-disposed bearing slots or openings C, in the hub-end of the stock or body A, are disposed at a slight angle or twist to the longitudinal center of the hub for the purpose to be presently noted, and are adapted to loosely receive the tapered swaging rollers D.

The swaging rollers D, which are mounted in the slots or openings C of the stock or body, are adapted to be radially adjusted within the slots or openings, and are provided in their outer ends with the circular bearing-recesses E, having beveled edges e , and which

are adapted to receive the inner pointed ends f of the retaining set-screws F. The retaining set-screws F are mounted in the threaded openings f' formed in one end of the tubular body, and are adapted to be set so as to have their inner ends project into the roller slots or openings in order to enter or extend into the circular bearing-recesses in one end of each of the swaging rollers D, thereby providing simple and efficient means for holding the said rollers in position within the tubular stock or body, while at the same time permitting the free turning and radial adjustment thereof, as well as their removal, for the purpose of repair or replacement.

The inner ends of the swaging rollers D are squared off so as to permit the ready radial adjustment of such rollers by means of the ordinary tapered expander mandrel G. The mandrel G is of the ordinary construction and sufficiently tapered so that, by the insertion thereof within the tubular stock or body of the expander, the several swaging rollers will be moved out radially against the inner sides of the boiler tube and may be turned in contact therewith, whereby such tube will be expanded onto the tube-sheet in which the same is inserted, and said tapering mandrel G is provided at its outer end with an operating-head g , in which are formed the holes g' , adapted to receive the usual twisting-rod, which is employed for turning the mandrel on its longitudinal axis, after the same has been inserted within the tubular stock.

The exteriorly-threaded end of the tubular stock or body A is adapted to adjustably receive the interiorly-threaded adjustable stop-collar H. The adjustable stop-collar H engages the exterior threads of the tubular stock or body, and is provided at its inner end with a stop-flange I, in the inner face of which are formed a series of semi-circular bearing sockets or notches J, which conform to the curvature of the inner squared ends of the swaging rollers D, and are adapted to receive such roller ends when the same are thrown out from the body of the stock by the tapered mandrel, and it is to be noticed that such semi-circular sockets or notches form bearings for one end of the swaging rollers and serve to retain the same properly in position. After adjusting the adjustable collar

or ring H according to the projection of the boiler tube from the tube-sheet, the same is held stationary in its adjusted position by means of the set-screw J, engaging a threaded opening *j*, formed in one side thereof, and adapted to be projected into the locking-groove K, formed in the stock or body A.

From the foregoing it is thought that the construction and operation of the herein described tube expander will be readily apparent to those skilled in the art. It will be observed that the stop collar H, can be adjusted to adapt the tube expander for insertion in the ends of the boiler tube irrespective of the distance the tube projects beyond the sheet, and it is to be also noted that the roller slots or openings C, are arranged to have their longitudinal centers disposed at an angle to the longitudinal central line of the hub B, whereby the tapered swaging rollers shall be so arranged as to provide for readily drawing the expander into the tube by turning the mandrel in one direction and for the easy withdrawal thereof by turning the mandrel in the opposite direction. It is to be understood that the rollers D, work sufficiently loosely in the slots or openings C, so that the same will readily adjust themselves against either the parallel or obliquely disposed sides of the slots or openings according to the direction in which the mandrel is turned, whereby the proper operation of the expander will be secured. It is to be further noted at this point that the mandrel is tapered reversely to the taper of the rollers and in a proper relation thereto whereby the said rollers, when adjusted outwardly and also when disposed within the slots or openings with their longitudinal centers or axes disposed at an angle to the axis of the hub, will have their outer contacting surfaces or portions disposed parallel with the tube to provide for expanding the same parallel with the hole or perforation in the tube sheet.

In Fig. 5 of the drawings, the disposition of the slots C, is clearly shown, it being illustrated that while one side or edge of the slots is parallel with the longitudinal center of the hub B, the opposite side of such slots is disposed at an angle to said longitudinal center, and thereby causes the central longitudinal line of the slots to be oblique or disposed at an angle to the longitudinal center of the hub. By reason of thus positioning the roller slots and therefore necessarily the rollers D

which work therein, it will further be understood that when the mandrel is turned in one direction in the expander, the swaging rollers will draw the tube tight against the collar, while a reverse turn of the mandrel will loosen up the rollers and provide for the easy removal of the expander, and it will of course be understood that the oblique disposition of the rollers provides means whereby the same tend to draw themselves into the tube until the collar strikes the end of the tube and prevents further insertion.

Changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

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

1. In a tube expander, the combination of the tubular stock or body having a series of slots or openings near one end, one side of said slots or openings being disposed parallel with the longitudinal bore of the stock or body, and the other side of said slots or openings being disposed at an angle to the longitudinal bore of the stock or body to dispose the central longitudinal line of said slots or openings at an angle to the longitudinal center of the stock or body, the stop collar mounted adjustably on the stock or body, the tapered rollers mounted in said slots or openings and having one end received within one end of said collar, and the tapered mandrel, substantially as set forth.

2. In a tube-expander, the combination of an exteriorly-threaded stock having a series of slots or openings near one end, a series of radially-adjustable swaging rollers loosely mounted in said slots or openings, an adjustable stop-collar engaging the threads of said stock and having at its inner end a stop-flange provided with a series of semi-circular bearing sockets or notches and adapted to receive one end of said rollers, and the tapered mandrel, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

CHARLES W. UMHOLTZ.

Witnesses:

JOHN A. FERG,
ALFRED W. UMHOLTZ.