D. BUSHOR.

Tube-Expander.

No. 213,321 Patented Mar. 18, 1879.

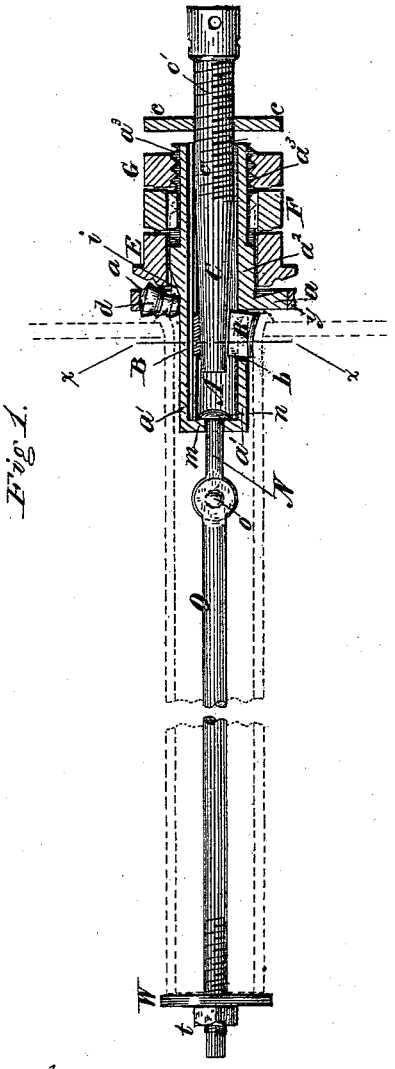

Fig. 1.

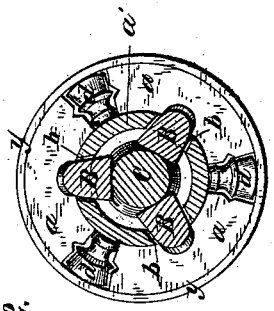

Fig. 2.

Witnesses

Harry L. King

William Blackstock.

Inventor.

Dennis Bushor.

By L. Hill

His Atty.

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

DENNIS BUSHOR, OF EFFINGHAM, ILLINOIS.

IMPROVEMENT IN TUBE-EXPANDERS.

Specification forming part of Letters Patent No. **213,321**, dated March 18, 1879; application filed August 24, 1878.

To all whom it may concern:

Be it known that I, DENNIS BUSHOR, of Effingham, in the county of Effingham and State of Illinois, have invented a certain new and Improved Tube-Expander; and I do hereby declare the following to be a full and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a longitudinal vertical section of my invention applied to a tube; and Fig. 2 is a transverse section taken in the line *x x*, Fig. 1.

Like letters of reference in the several figures denote the same parts.

The object of this invention is to produce, for the use of manufacturers of steam-boilers and other similar machinery, a simple and efficient instrument whereby the connection of the tubes to the flue-sheet can be effected more conveniently and perfectly than heretofore.

To this end I make use of the principle of expanding the end of the tube by means of a revolving tool having lateral expanding-blocks, and turning down or beading the end of the tube by means of revolving rollers attached to said tool and pressed down upon the end of the tube; and my invention consists, first, in connecting such tool through or around the tube to a bearing at the opposite end thereof, so as to exert the upsetting pressure by the draft of the connecting rod or rods; secondly, in making such connection adjustable, so that the upsetting pressure can be perfectly regulated and controlled; and, thirdly, in the various sub-combinations of mechanism which co-operate to render the instrument effective in practical operation.

In the drawings, A represents the main stock of the tool, having a circumferential flange or collar, *a*, on one side of which, as shown at a^1, the stock is preferably cylindrical, while on the other side it is substantially cylindrical at a^2, and is cut with a screw-thread at a^3, the stock being hollow throughout. The end a^1 is designed and adapted to enter loosely into the end of the tube, and the collar *a* is designed to rest upon the extreme end of the tube. Three (more or less) openings, *b b b*, are provided through the stock in the part a^1 immediately adjacent to the collar, for the purpose of accommodating the expanding-blocks B, which are made in the proper shape (preferably as shown in Fig. 1) and are dropped into the interior of the stock, and after being lodged in their appropriate apertures *b* are forced outward by the tapering or conical wedge C. The wedge is driven down with a hammer, and when it is to be removed it may be started by means of a screw-nut, *c*, which rests against the upper end of the stock and screws up and down on the thread *c'* of the wedge.

The collar *a* is for the double purpose of holding the tool properly in the end of the tube and of providing seats for the conical upsetting or beading rollers *d d*, of which there may be three, more or less. As these rollers are subjected to considerable pressure it is not desirable to journal them, and accordingly I drop them into seats or beds, which allow their lower edges only to project down through the collar. I then secure them in that position by means of a sliding ring, E, above the collar *a*, and free to turn around the stock.

Inasmuch as the upper surface of the collar is slightly dishing to hold the rollers in position, I make recesses *i* in the walls of the stock to accommodate the ends of the rollers, so that their lower operating inner ends may not be projected too far from the body of the tool. The ring E is held down on the rollers by means of a sliding but non-revolving ring, F, which is "feathered" upon the stock above it, and the ring F is adjusted down with any required degree of force by means of a screw-nut, G, which works upon the screw-thread a^3.

In the construction of the collar *a* it may be made in one piece with the stock, or may be made separate and suitably secured thereto, although the former mode of construction is recommended. It may, likewise, be made of continuous metal or hooped, as shown at *y y*.

The interior cavity of the stock is substantially of uniform diameter from the upper end to a point near the lower end, where an internal annular flange, *m*, is provided, which nearly closes the end, and furnishes a seat for the nut or head *n* of a swiveling rod, N, to rest upon.

The rod N is of any required length, and is preferably jointed, as shown at *o*, to another section of rod, (represented at O,) there be-

ing as many intermediate sections as may be desired. The lower section, O, is, at its end, cut with a screw-thread, and provided with a screw-nut, *t*, and a washer, W, large enough to span the end of the boiler-tube to be operated upon.

The rods N O and their intermediate sections, where the same are employed, constitute a swiveling adjustable connection, by which the tool is held in place and tightened up in the boiler-tube; and this mode of holding and tightening the tool has been found to have many practical advantages over the old modes, as it enables the tool to be easily adjusted and operated with greater power, and leaves the exposed portion of the tool unencumbered while at work.

It will be readily perceived that the connection might be effected by two or more rods extending outside of the boiler-tube; but this would be only an inferior equivalent for the central rod-connection herein shown and described, and it is not recommended where the central rod can be used.

The mode of operation is as follows: The nut and washer *t* W are removed, and the rods N O passed through the boiler-tube until the collar *a* rests upon the end of the tube to be joined to the flue-plate, and the screw-thread at the end of the part O projects from the opposite extremity of the tube. The washer is then applied upon the rod O, and the nut is placed on and screwed up. The wedge is driven down and the nut G adjusted. The tool is then ready for operation, and is operated by placing a wrench upon the feathered ring F and turning the whole tool with it until the work is done, or till the nuts and wedge need further tightening up. The joint produced by the operation of the tool is as perfect as is possible to be made in this way.

It is evident that the upsetting-tool will perform its functions without the expanders, or the latter without the upsetting-rollers; but generally these operations are to be performed together, and therefore they are herein described together.

Having thus described my invention, I claim as new—

1. A tube expanding and upsetting tool having a swiveling connection with a plate adapted to rest against the opposite end of the tube, whereby the tool is clamped in place for its work, substantially as described.

2. The stock A, with its swiveling connection, in combination with the laterally-expansible blocks B and downwardly-adjustable upsetting-rollers, substantially as described.

3. The stock A, with its swiveling connection, in combination with the blocks B, upsetting-rollers, wedge C, rings E F, and nut G, substantially as described.

4. The flange *a*, with the rollers loosely seated in it, as described, in combination with the loose sliding and revolving ring E, the feathered ring F, and the screw-nut G, substantially as described.

DENNIS BUSHOR.

Witnesses:
E. N. RINEHART.
DANIEL LIND.