G. WIEDEKE, Sr.

TUBE EXPANDER.

APPLICATION FILED MAY 4, 1908.

901,271.

Patented Oct. 13, 1908.

2 SHEETS—SHEET 1.

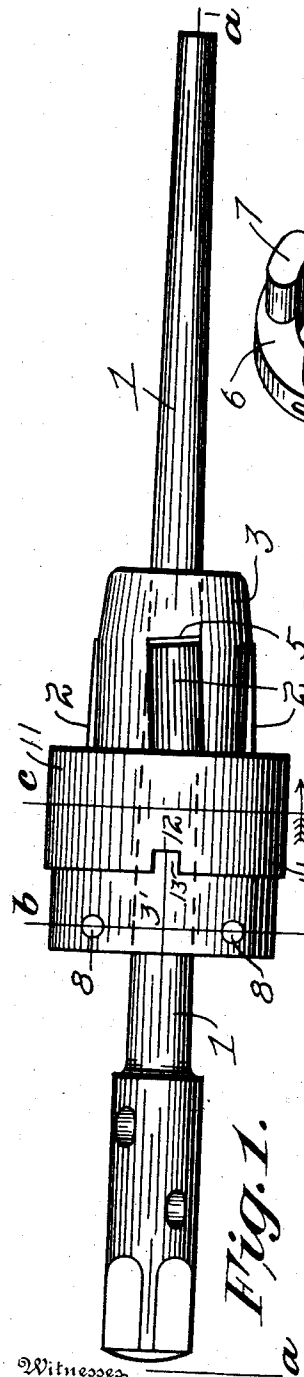


Fig. 1.

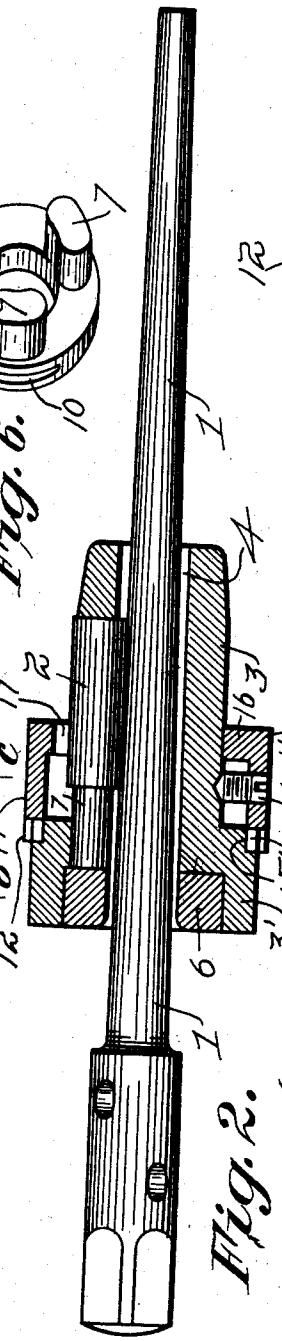


Fig. 2.

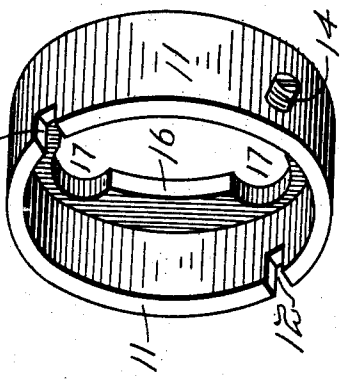


Fig. 5.

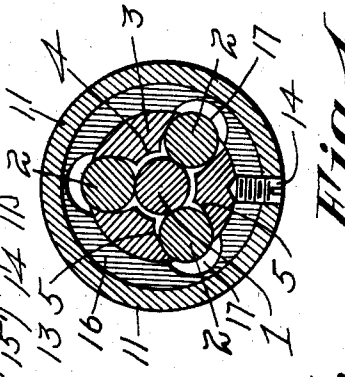


Fig. 4.

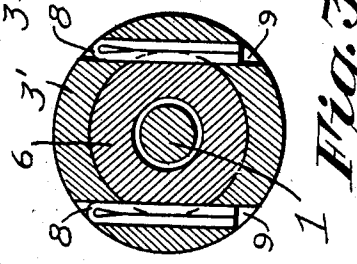


Fig. 3.

Witnesses:

M. Liebler.

C. M. Theobald.

Gustav Wiedeke, Sr.

Inventor

By R. J. McCarty

his Attorney

THE NORRIS PETERS CO., WASHINGTON, D. C.

G. WIEDEKE, SR.

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2 SHEETS—SHEET 2.

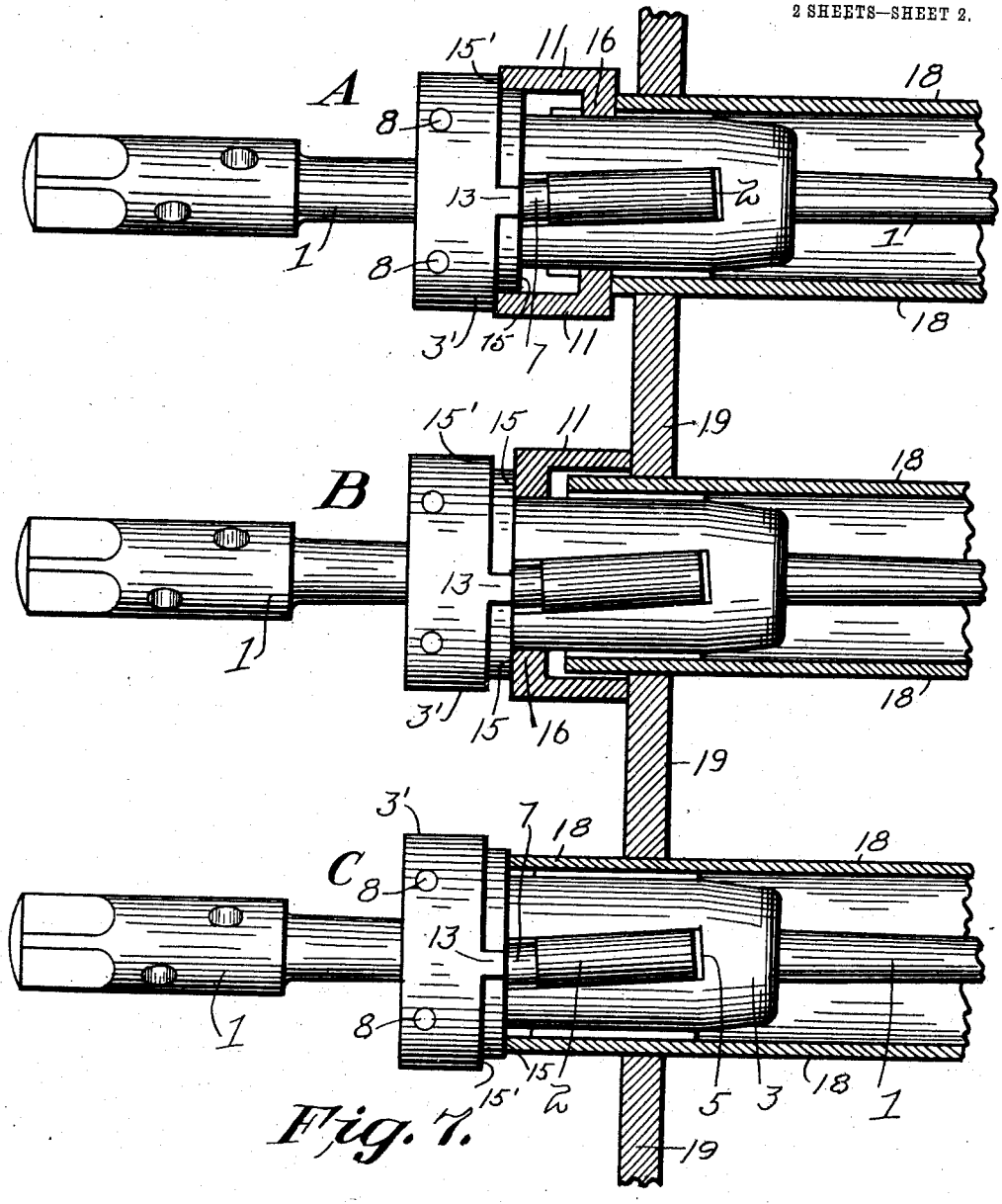


Fig. 7.

Witnesses
M Seibler
C. M. Thestrald.

Gustav Wiedeke, Sr
Inventor

By R. J. McCarty
his Attorney

THE NORRIS PETERS CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

GUSTAV WIEDEKE, SR., OF DAYTON, OHIO, ASSIGNOR OF ONE-THIRD TO OTTO WIEDEKE, ONE-THIRD TO GUSTAV WIEDEKE, JR., AND ONE-THIRD TO HIMSELF, OF DAYTON, OHIO.

TUBE-EXPANDER.

No. 901,271. Specification of Letters Patent. Patented Oct. 13, 1908.

Application filed May 4, 1908. Serial No. 430,631.

To all whom it may concern:

Be it known that I, GUSTAV WIEDEKE, Sr., citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Tube-Expanders; and I do 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 the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to new and useful improvements in tube expanders.

The object of the invention is first—to provide in a tube expander means whereby a single tool is rendered capable of expanding boiler tubes under varying conditions which heretofore have required two or more tools to meet said varying conditions. These varying conditions are due to the boiler tubes being projected through the orifices in the boiler head unevenly or not uniformly. In other words, in applying the tube expander, it is often found that some of the tubes are projected through the orifices in the boiler head a greater length than others, and when such lack of uniformity is met with, it becomes necessary to gage the depth of insertion of the tool. The proper condition is that the tube be projected through an orifice only a sufficient distance to permit of the exposed end of said tube being expanded or enlarged in diameter so that said tube will be prevented from shifting inwardly. This condition, however, is not as a rule met with, but on the contrary, it is common to find boilers where the tubes are projected through to an unnecessary extent, and heretofore different tools were necessary to expand the tubes thus met with.

Secondly—the invention relates to improvements by means of which the mandrel is self-feeding; this feature obviates the necessity of forcing the mandrel longitudinally in contact with the expanding rollers while said mandrel is being rotated, and thus relieves the amount of power necessary in operating the tool.

Preceding a detailed description of the invention, reference is made to the accompanying drawings, of which—

Figure 1, is a longitudinal side elevation of my improved tube expander. Fig. 2, is a similar elevation with the roller cage and connected parts shown in section. Fig. 3, is a cross section on the line *b b* of Fig. 1. Fig. 4, is a cross section on the line *c c* of Fig. 1. Fig. 5, is a detached perspective view of the universal reversible gage collar. Fig. 6, is a view of the retaining cap removed from the tool, and Fig. 7, illustrates a portion of a boiler head or tube sheet showing several tubes projected different distances through said boiler head with my universal tube expander applied to each of such tubes.

In a detailed description of the invention, similar reference characters indicate corresponding parts.

1 designates the mandrel of tapered form by means of which the expanding rollers 2 are manipulated. These rollers are loosely mounted in a roller cage 3 having a longitudinal central bore 4 through which the mandrel passes and engages the inner sides of the rollers. The roller cage 3 is provided with a suitable number of roller slots 5 which are on an angle to the longitudinal bore 4 of the roller cage and likewise on an angle to the plane of the mandrel. Owing to this manner of mounting the expanding rollers, there is a wedge-like engagement between the expanding rollers and the mandrel; the effect of this engagement is to feed the mandrel inwardly when the same is rotated and to thus expand the rollers to their limit by rotating the mandrel. It is obvious that this self-feeding of the mandrel by simply rotating the same would not take place if the expanding rollers were parallel to the mandrel. The roller cage 3 has at one end a head 3′ which is recessed to provide a seat for a retaining cap 6 with an opening therein which registers with the bore of the roller cage. Projecting from this retaining cap 6 is a series of pins 7 corresponding in number with the expanding rollers 2 and engaging the ends of said rollers to prevent the same from dropping rearwardly from the cage when the mandrel is removed. The retaining cap 6 is held in position by means of detents 8 which are projected through openings 9 in the head of the roller cage and pass through slots 10 in the opposite sides of said retaining cap. The important feature of my invention which enables a single tool to be utilized in connection with tubes projected different distances through the boiler

head as shown on Sheet 2 of the drawings, is the reversible gage collar 11, which fits over the roller cage and is reversible in two positions of the tool and is removable from the tool in the third position of said tool. This reversible gage collar 11 has oppositely-disposed notches 12 in one end which receive lugs 13 projecting from the outermost annular shoulder 15′ of the head 3′ of the roller cage, and thus said gage collar is enabled to be properly centered in placing it on the tool in one of its positions. Means are provided for locking the gage collar 11 to the roller cage comprising a set screw 14 which penetrates the side of said collar and enters an indentation in the body of the roller cage, see Fig. 6.

It will be observed that the head 3′ of the roller cage has two in-lying annular shoulders 15′ and 15 which provide abutments for the ends of the gage collar 11 in one or the other of the positions of said collar, for example, in the position shown at A Fig. 7, the outer shoulder 15′ provides an abutment for the flangeless end of said collar, while the inner annular shoulder 15 provides an abutment for the flanged end of said collar as shown at B Fig. 7. The end of the gage collar opposite that having the notches 12 is provided with an inwardly-lying laterally-disposed flange 16 flush with that end of said collar and provided with recesses 17 corresponding in number to the expanding rollers and which permit said rollers to be expanded when the gage collar is in the position shown at A.

Referring to Fig. 7 A, the boiler tube 18 is projected through the orifice in the boiler head or tube sheet the proper distance. The tube abuts against the flanged end of the gage collar 11 and is prevented from being drawn out while the tool is being operated. The tube in this case is expanded by the rollers 2 to firmly bind said tube to the tube sheet 19, and the gage collar 11 is shown with the flange 16 thereof providing a bearing for the tool against the end of the tube. If tubes were always projected through the tube sheet uniformly as at A Fig. 7, there would be no need for changing the position of the gage collar, but we have seen that this is not the case, for example, B Fig. 7, shows the boiler tube 18 projected through the tube sheet a greater distance, which necessitates the gage collar 11 to be reversed from the position at A in order that the end of the tube 18 may be projected into said gage collar and the tool be thus provided with a bearing against the tube sheet. In this position of the gage collar, the inner shoulder 15 of the roller cage provides an abutment for the flanged end of the gage collar. At C Fig. 7, the tube 18 is shown projected through the orifice in the tube sheet still further so as to necessitate the removal of the gage collar 11 altogether and the tool to find its bearing on the inner shoulder 15 against which the end of the tube bears directly. The outside surface of the inner shoulder 15 provides means that prevent the gage collar from having any rocking movement or play when the flanged end of said collar is against the tube sheet. It will thus be seen a single tool is rendered capable of meeting all these different conditions and to thus permit the tool to be uniformly inserted into the tubes the requisite distance in each case. This utility of the tool is due entirely to the universal reversible gage collar 11, which, by being reversed, meets two of the conditions and by being removed enables said tool to meet the third condition.

I claim:

1. In a tube expander, the combination with a roller cage having an enlargement at one end thereof providing two inwardly-lying annular shoulders, a series of expanding rollers mounted in slots in said roller cage, and a mandrel projected through a longitudinal bore in the roller cage and adapted to expand the rollers, of a reversible gage collar surrounding the roller cage adjacent to the enlarged end thereof, said gage collar having at one end an inwardly-lying annular flange flush with that end of said collar and adapted to be reversed in its position on the roller cage and to engage either of the inwardly-lying annular shoulders on the enlarged end of the roller cage.

2. In a tube expander, the combination with a roller cage having a series of expanding rollers mounted therein and one end thereof having two inwardly-lying annular shoulders, and a mandrel projected through the longitudinal bore of the roller cage, of a reversible gage collar, one end of which terminates in an inwardly-lying annular flange flush with that end of said collar, the end of the collar having said flange being adapted to abut against the innermost annular shoulder on the roller cage in one of the positions of said collar, and the other end of said collar being adapted to abut against the outermost annular shoulder on the roller cage and to rest against the outer face of the inner shoulder in the other position of said collar, and whereby means are provided for utilizing a single tool in expanding tubes whose ends are projected different distances through the orifices in a tube sheet, substantially as specified.

In testimony whereof I affix my signature, in presence of two witnesses.

GUSTAV WIEDEKE, Sr.

Witnesses:
MATTHEW SIEBLER,
C. M. THEOBALD.