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1,550,135

R. D. WING

FLUE EXPANDER

Filed March 24, 1925

FIG. 1.

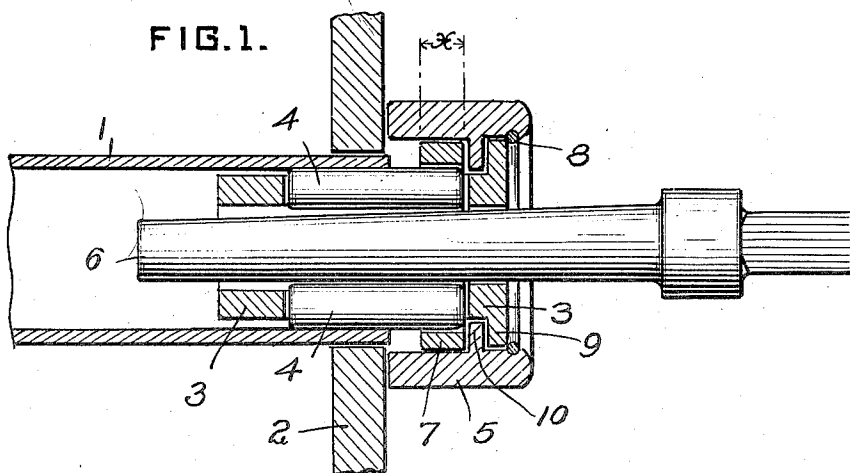


FIG. 2.

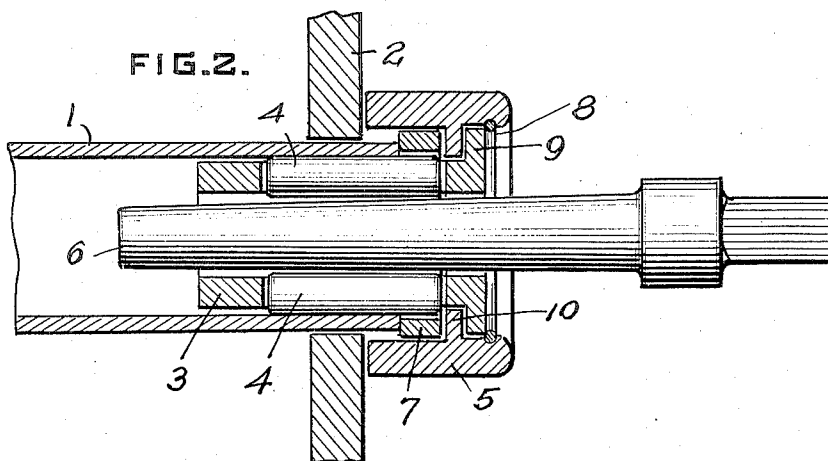
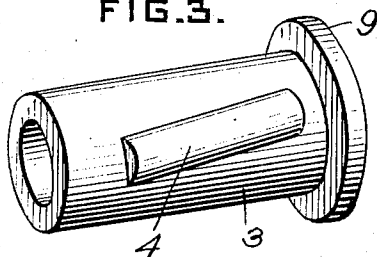


FIG. 3.



INVENTOR

INVENTOR
Ray S. King
by
James C. Bradley
attorney

UNITED STATES PATENT OFFICE.

ROY D. WING, OF MAGNA, UTAH, ASSIGNOR OF ONE-HALF TO JOHN W. BREWER, OF
MAGNA, UTAH.

FLUE EXPANDER.

Application filed March 24, 1925. Serial No. 17,949.

To all whom it may concern:

Be it known that I, ROY D. WING, a citizen of the United States, and a resident of Magna, in the county of Salt Lake and State of Utah, have made a new and useful invention in Improvements in a Flue Expander, of which the following is a specification.

The invention relates to flue or tube expander of the roller type. It has for its principal objects the provision of an improved expander of this type, (1) by the use of which the flues are set or positioned and expanded in the same operation, (2) by whose use the labor and time involved in setting and rolling the flues are reduced to a minimum, (3) which provides that all the tubes of a set project the same distance through the flue sheet, thus insuring uniform beads, (4) which may be easily adjusted to give any desired degree of tube extension beyond the flue sheet to provide for beads of any desired size, and (5) which may be used either with or without the adjusting feature to meet requirements. One embodiment of the invention is illustrated in the accompanying drawings wherein:

Figure 1 is a longitudinal section through the expander in one position of use. Fig. 2 is a longitudinal section with the device in another position. And Fig. 3 is a perspective view of the roller cage.

Referring to the drawings, 1 is a boiler tube which is being set and expanded in the flue sheet 2 by means of the improved expander. The expander comprises a roller cage 3; a set of rollers 4, 4, 4, mounted in the cage and free to move radially in the recesses of the cage in which they are positioned; a collar 5, a mandrel or wedge 6, a stop ring 7, and a retaining snap ring 8, which releasably holds the collar and cage in assembled relation. The cage has at its rear end the flange 9 adapted to engage the inwardly projecting flange 10 of the collar.

The stop ring 7 fits loosely over the rolls in the cage, as indicated in Figs. 1 and 2, and its dimension x governs the amount which the end of the tube projects through the tube sheet 2, when such tube is finally fixed in position. This projecting length of tube in turn determines the size of the bead which is formed when the projecting end is beaded over in a further operation and by the use of a different tool. By the use of a series of rings, therefore, the device may be

adapted to provide any desired length of tube projection and any desired size of bead. If a smaller bead is desired, a ring with a greater dimension x is employed, or if a larger bead is desired, a ring with a less dimension x is used. The device may also be used without the stop ring when the tube projection is such that its end reaches the flange 10 on the collar. Under these conditions, the tube will still be expanded clear to its end, since the rollers 4 are located so that their rear ends lie opposite the forward face of the flange 10. The interior diameter of the ring is such that it does not interfere with the outward movement of the rollers 4, 4, 4 during the expanding operation.

In operation, the parts are assembled as indicated in Fig. 1, and the mandrel driven in and rotated. The rollers, by reason of their inclination, tend to pull the cage 3 and collar 5 to the left and the tube 1 to the right, and since the collar bears against the tube sheet and cannot move, the tube is drawn into it until its end abuts the stop ring 7, as indicated in Fig. 2. The tube is thus positioned or set, and a further inward movement of the mandrel and rotation thereof, causes the expanding of the tube, so that it is rigidly fixed in position in the tube sheet.

When the collar 5 is brought up tightly against the flue sheet, any movement of rotation, which it may have had up to that time, is stopped, and this in turn stops any rotation of the ring 7 and the tube 1, the friction between the ring and the flange 10 of the collar stopping the movement of the ring, and the friction between the end of the tube and the ring in turn stopping the rotation of the tube. The parts 3, 7 and 1 are, therefore, held stationary during the expanding operation, the only turning parts being the cage 3, the mandrel 6 and the rollers 4, 4, 4. The rotation of the mandrel rotates the rollers about their axes, so that they feed themselves around upon the interior of the tube carrying with them the cage 3, in which they are loosely journaled. The force required to rotate the mandrel under these conditions of rolling friction is much less than that required in constructions heretofore employed in which the collar, or the collar and stop member, turn with the roller frame or cage, as in such cases the added sliding friction between the collar

and the flue sheet and between the stop member and the end of the tube renders the labor of turning the mandrel much heavier.

- 5 The device thus acts to accurately position or set the tube and then expands it with a degree of projection beyond the tube sheet dependent upon the length of the stop ring, so that the tubes may be positioned uniformly thus insuring uniform beads on the set of tubes. By using a series of stop rings of varying length (dimension x), the same device may be used to set tubes having any desired degree of projection with respect to the tube sheet, and where the degree of projection is large, the ring may be removed still further increasing the range of usefulness of the device. The substitution of rings is a very simple matter so that the time lost in adjusting the device for use under varying conditions is reduced to a minimum. Other advantages incident to the simplicity and cheapness of the construction and to its ease of operation will be readily apparent to those skilled in the art.

What I claim is:

1. In combination in a tube or flue expander, a collar adapted to bear against a flue sheet, and provided upon its interior with an annular stop shoulder, a roller cage swivelled in the collar and provided with a plurality of inclined rollers free to move radially in the wall of the cage, a tapering mandrel extending through the collar and the cage and engaging the rollers, and a removable stop ring in the collar between said shoulder and the end of the tube to be expanded and fitting loosely over the cage and over the rear ends of such rollers when in its position of engagement with said shoulder.
2. In combination in a tube or flue expander, a collar adapted to bear against the flue sheet and provided upon its interior with an inwardly projecting flange, a roller cage mounted for rotation in the collar and provided at its rear end with a flange lying behind said inwardly projecting flange and with a plurality of inclined rollers free to move radially in the wall of the cage, a tapering mandrel extending through the

collar and the cage and engaging the rollers, and a removable stop ring in the collar between said inwardly projecting flange and the end of the tube to be expanded and fitting loosely over the cage and over the rear ends of said rollers when in its position of engagement with said shoulder.

3. In combination in a tube or flue expander, a collar adapted to bear against the flue sheet and provided upon its interior with an inwardly projecting flange, a roller cage mounted for rotation in the collar and provided at its rear end with a flange lying behind said inwardly projecting flange and with a plurality of inclined rollers free to move radially in the wall of the cage, a tapering mandrel extending through the collar and the cage and engaging the rollers, and a removable stop ring in the collar between said inwardly projecting flange and the end of the tube to be expanded and fitting loosely over the cage and over the rear ends of said rollers, the said rollers being located so that their extreme rear ends lie in approximately the same plane as the face of said inwardly projecting flange with which the stop ring engages.

4. In combination in a tube or flue expander, a collar adapted to bear against a flue sheet, and provided upon its interior with an annular stop shoulder, a roller cage swiveled in the collar and provided with a plurality of inclined rollers free to move radially in the wall of the cage and having their rear ends extended back to a point substantially in alinement with said stop shoulder, a tapering mandrel extending through the collar and the cage and engaging the rollers, and a removable stop ring in the collar engaging said shoulder and overlying the rear ends of the rollers with a clearance space outside the periphery of said rollers to permit the expansion of the rollers without interference from the stop ring.

In testimony whereof, I have hereunto subscribed my name this 14th day of March, 1925.

R. D. WING.