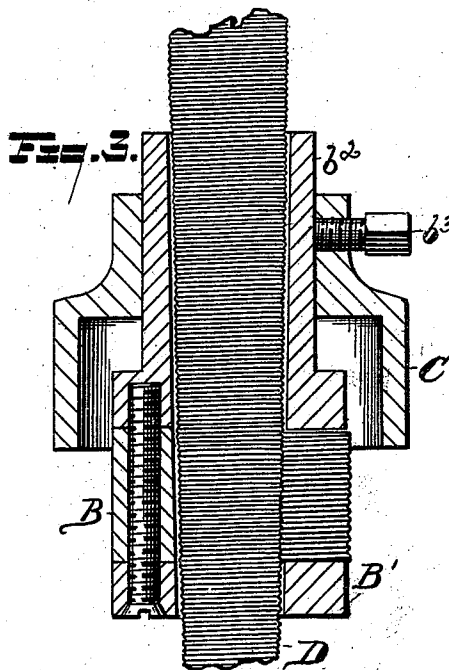
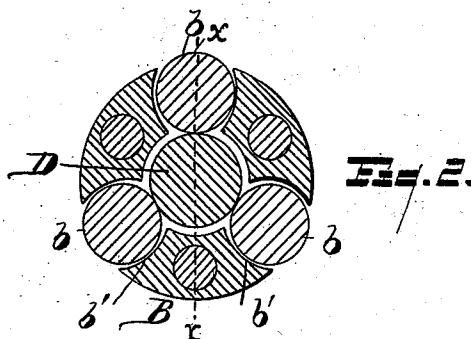
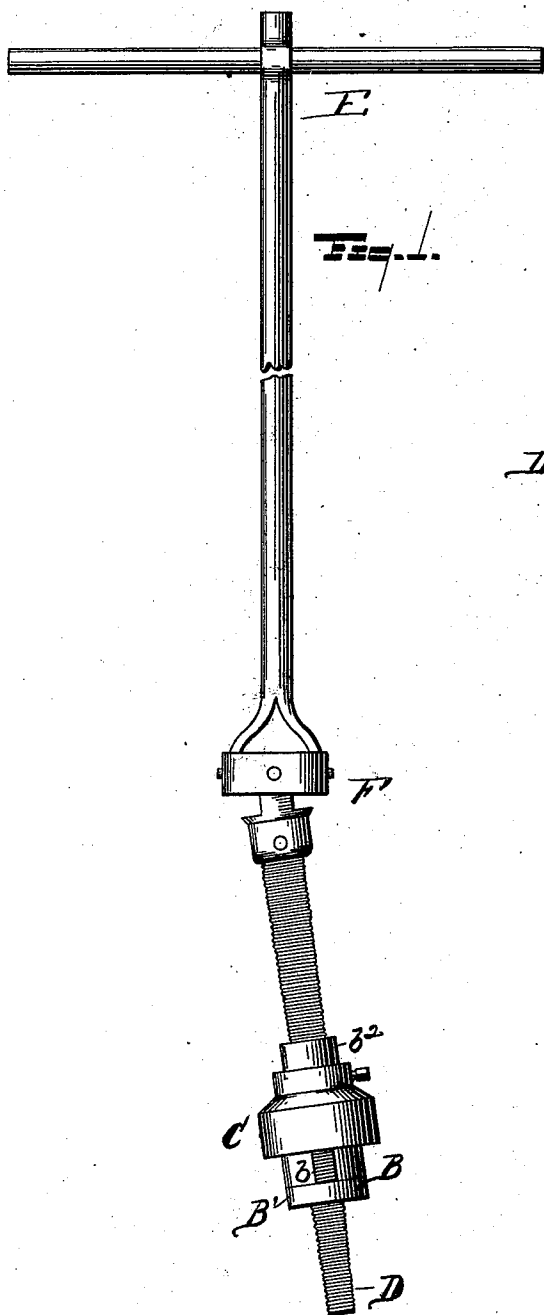


(No Model.)

H. L. HOPKINS.
TUBE EXPANDER.

No. 511,526.

Patented Dec. 26, 1893.



WITNESSES
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UNITED STATES PATENT OFFICE.

HIRAM L. HOPKINS, OF HOMER, MICHIGAN.

TUBE-EXPANDER.

SPECIFICATION forming part of Letters Patent No. 511,526, dated December 26, 1893.

Application filed February 2, 1893. Serial No. 460,798. (No model.)

To all whom it may concern:

Be it known that I, HIRAM L. HOPKINS, a citizen of the United States, residing at Homer, county of Calhoun, and State of Michigan, have invented a certain new and useful Improvement in Tube-Expanders; and I 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 pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to expanders for boiler flues, and consists in improved means for forcing the expansion.

In the drawings, Figure 1, is a view showing the expander, and the handle for operating the same. Fig. 2, is an end view of the expander proper showing the rollers. Fig. 3, is a sectional view on line $x-x$ of Fig. 2.

In the drawings, B, is a shell adapted to fit in the end of the tube. This portion B, has its walls of sufficient thickness to accommodate the rollers b , which are placed loose in the recess portion b' , in the wall. This recess b' , is preferably made from the inner end of the portion B, and is of sufficient size to allow the rollers a movement in and out, so that they may extend outside of the portion B, and be forced against the tube. They also extend within the portion B, so that they may be forced outward from the inside. The rollers are held in the walls of B by a cap B' . The portion B has its outer end b^2 , turned down, and on which is mounted the gage C, having the portion c , extending around and over the portion of B containing the rollers. This gage C, is held in place by the set screw b^3 , and the whole can be adjusted lengthwise of the portion B, so as to cover more or less of the rollers.

D, is a cone-shaped mandrel, adapted to enter the portion B, and be passed between the rolls b , and force them outward through the wall and against the tube. The power with which the rolls can be forced against the tube depends upon the power that can be employed to enter the mandrel D, between the rolls. To arrange for entering this mandrel between these rolls with great force, I provide

the mandrel D, with a fine screw thread, and preferably make the mandrel of tempered steel for the purpose of giving strength and stability to this thread. I also prefer to provide the rollers b , with a threaded or serrated surface to engage the threads of the mandrel D, and assist in drawing the same forward between the rollers.

The mandrel D, I turn by means of the handle E, connecting the mandrel with the knuckle or tumbling rod joint F. Any universal joint may be used for connecting these parts that will permit their operation when out of parallel. The object of this construction is to permit the device to be entered into each of the boiler flues from the furnace door, and permit the operator to stand outside. By means of this construction the operation of expanding the flues can be performed without extinguishing the fires, and while the flues are hot.

The operation of my device is as follows:—The collar or gage C, is adjusted over the portion B, so as to leave the rollers extending beyond the gage a distance equal to the distance that the tube is to be expanded from the end. The portion B, is then inserted in the tube up to the gage C, and the mandrel D, entered through it forcing the rollers outward against the tube. By means of the handle E, the mandrel D, is rotated, thus forcing it inward, causing it to engage with the rolls b , and rotating them. By this means the rolls are in turn caused to travel around the inside of the tube and press against it. The object of my invention is to provide for drawing the mandrel inward between the rolls with a greater force than can be exerted through the handle, and this I accomplish by the threaded conical mandrel.

I am aware that a similar device has been employed using a smooth conical mandrel in combination either with rolls or expansive cheeks, but I am not aware that a threaded conical mandrel has ever been employed, either in combination with rolls or expansive cheeks; neither am I aware that an expander has been used employing a handle provided with a knuckle joint.

What I claim is—

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1. In a tube expander, the combination of the portion B, the serrated rollers *b*, and the threaded cone-shaped mandrel, substantially as described.

5 2. In a tube expander, the combination of a mandrel provided with fine threads and a series of serrated expanding rolls whereby the serrations on the rolls act as a thread to

receive and advance the mandrel, substantially as described. 10

In testimony whereof I sign this specification in the presence of two witnesses.

HIRAM L. HOPKINS.

Witnesses:

LEVI J. FICK,
C. M. FISK.