(No Model.)

J. H. RICHARDS & E. HUBER.

TUBE EXPANDER.

No. 376,485. Patented Jan. 17, 1888.

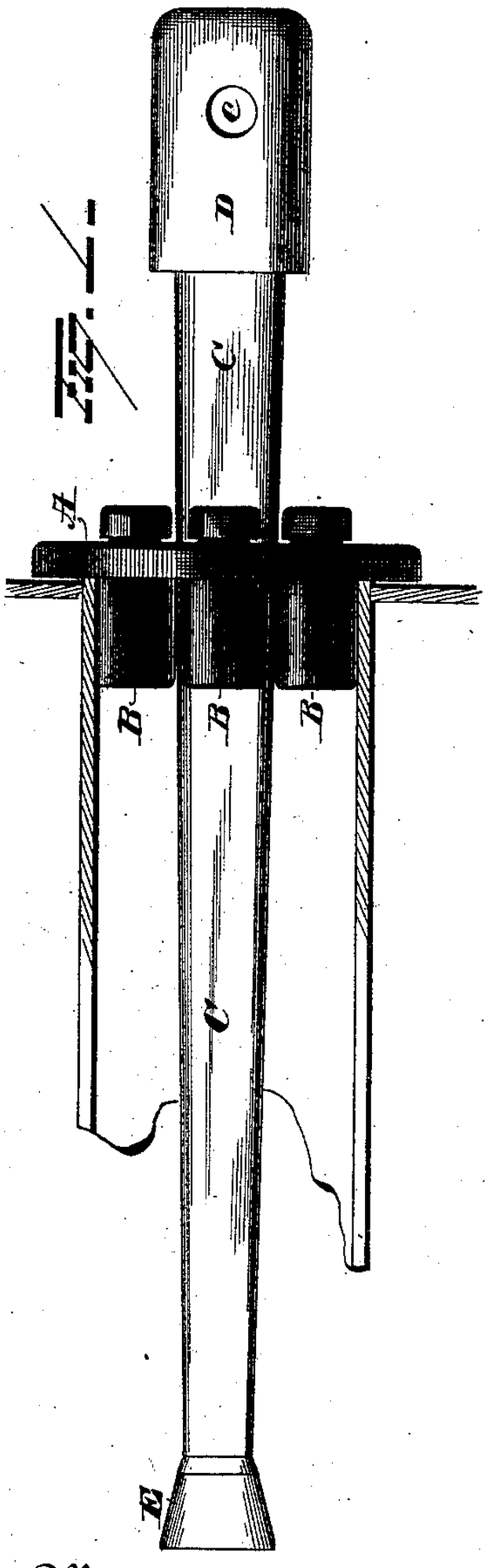

Fig. 1.

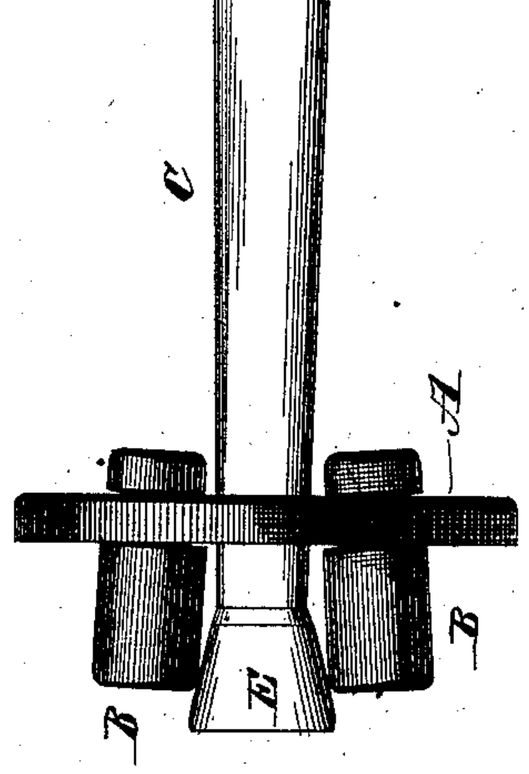

Fig. 3.

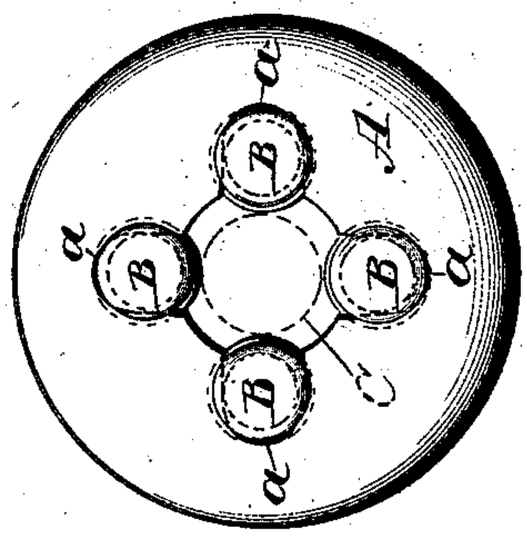

Fig. 4.

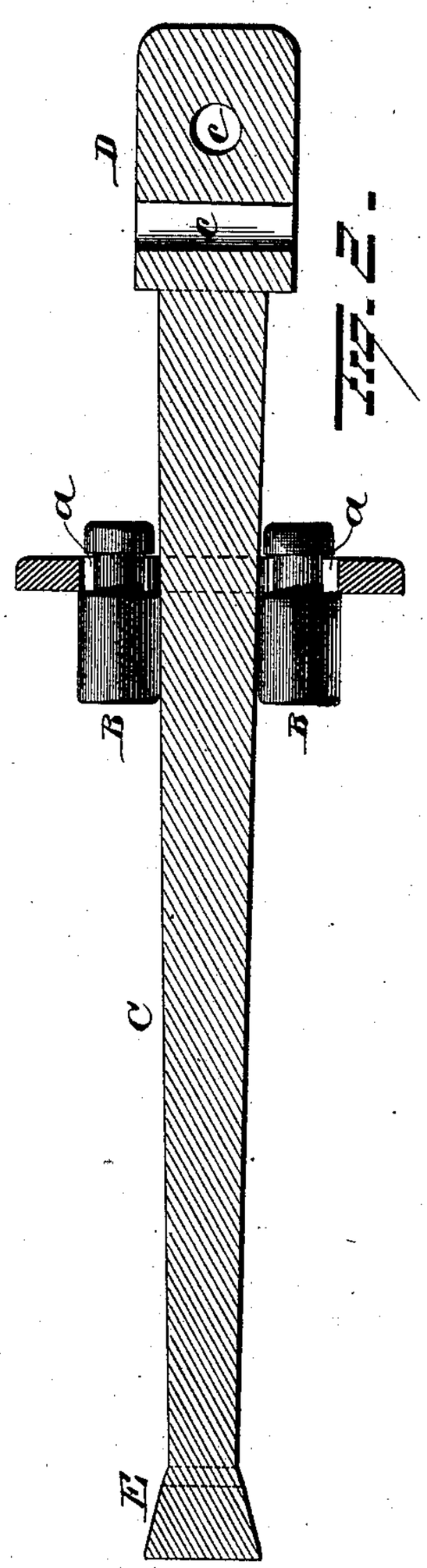

Fig. 2.

Witnesses
W. Mottinghamm
G. F. Downing.

Inventor
J. H. Richards
E. Huber.

By their Attorney
Leggett & Leggett.

UNITED STATES PATENT OFFICE.

JAMES H. RICHARDS AND EDWARD HUBER, OF MARION, OHIO.

TUBE-EXPANDER.

SPECIFICATION forming part of Letters Patent No. 376,485, dated January 17, 1888.

Application filed August 16, 1887. Serial No. 247,095. (No model.)

To all whom it may concern:

Be it known that we, JAMES H. RICHARDS and EDWARD HUBER, of Marion, in the county of Marion and State of Ohio, have invented certain new and useful Improvements in Tube-Expanders; and we do hereby 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.

Our invention relates to an improvement in tube or pipe expanders, the object being to provide a device of that type of simple form and few parts, that are easily operated and that remain connected as a compact tool when it is removed from a tube or flue to be placed in another one which it is necessary to operate upon.

With these objects in view our invention consists in certain features of construction and a novel combination of these parts, that will be fully described in the following specification and pointed out in the claims.

Referring to the drawings making a part of this specification, Figure 1 is a side perspective view of the tube-expander in position in a boiler-flue. Fig. 2 is a longitudinal section of the tube-expander, taken through the center of the mandrel. Fig. 3 is a rear face view of the tube-expander plate and rollers with the mandrel removed. Fig. 4 is a view of the device with the expander-head in contact with the conical inner end of the mandrel.

A is a disk or round plate of metal, preferably steel. It is of sufficient diameter to form a retaining-flange for the cylindrical steel rollers B B, &c., preferably made of steel and rendered true cylinders with slightly-rounded free ends by turning them in a lathe. These rollers are of suitable length and diameter to afford a proper bearing upon the interior surface of flues or tubes of boilers or other devices in which tubes are expanded or set in a flue-sheet. The disk A has a central perforation of proper diameter made through its body, and at spaced intervals notches *a a*, &c., having rounded bottoms, are formed in the disk to intersect this central perforation. The notches *a a* are preferably four in number, and are designed to afford bearings for the four rollers B B, &c., which have their bodies made of less diameter where they enter these notches, the journals thus formed being of such a length and thickness as to loosely fit the notches in the disk A and permit their shoulders to have a rocking contact with the side surfaces of this disk.

A round mandrel, C, is provided, which is of such proportionate length and tapering form of body as to readily enter the center hole of the disk A and be adapted to properly and regularly force the rollers B B, &c., against the inner surface of a flue or tube into which the device is placed, the face of the flange having a bearing contact with the end of the flue or the flue-sheet into which these tubes are being "set" or expanded.

The outer end of the mandrel C is enlarged to produce a hub or short cylinder, D, which is perforated at two or more points to receive the end of a lever by which the expander is revolved, the shoulder of this hub preventing the mandrel from being forced through the flange A. At the opposite taper end of the mandrel C an enlargement, E, is formed, that is of such a diameter as to prevent the mandrel from being removed entirely out of the expander-head, which consists of the rollers and disk that have been described.

The enlarged end E of the mandrel C is preferably tapered inwardly or toward the expander-head, the rollers of which it will bear upon when the head is moved toward this conical collar E. The conical collar E is an important feature of this invention, as it is evident that the provision of this enlarged end of the mandrel C will hold the parts of the device intact and prevent displacement and possible loss of the connected parts of the "expander-head" when the tool is placed with other implements in a boiler-maker's chest for transportation from one point where work is to be performed to another, as this tool is specially intended to form part of a boiler-maker's outfit; and it is an obvious fact that the simplicity of its construction and provision made to prevent displacement of working parts constitute it an eminently practical tool for the work it is designed to perform.

The operation of the tool is as follows: The mandrel is inserted in the flue or boiler-tube and the rollers of the expanding-head caused to bear on the inner surface of the tube, the disk bearing on the face of the flue-sheet. The man-

drel is revolved with a lever that is inserted in the holes *c c* that transversely perforate the hub D. The mandrel is pushed inwardly while it is being rotated. Its tapered body bearing on the inner surface of the rollers B B, &c., they will be made to have forcible contact with the surface of the flue and stretch its body, so as to cause the tube to tightly fit the hole in the flue-sheet. In some instances it is desirable to additionally secure the flue or tube in its place by expanding it at the inner edge of the flue-sheet to form a swell at that point in the tube, this swell or continuous groove forcing the tube-wall against the inner edge of the flue-sheet to tighten the joint and produce a bead or shoulder, to prevent the dishing of the flue-sheet and consequent loosening of the flues. In order to produce the groove or bead with this tube expander, it is only necessary to pull the mandrel forcibly against rollers of the expander-head and rotate the mandrel. This will make the steep inclined surface of the conical end E bear against the free ends of the rollers B B and press the tube-surface to expand it into a shallow groove, thus enlarging the diameter of the tube immediately inside the flue-sheet and producing the rib or swell, which is in some cases desired. This provision renders the tool universal in its application, as it may be used at will as a plain expander or a beading-expander to form a bead or swell on the inner surface of the tube against the flue-sheet, as has been explained.

Having fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a pipe-expander, the combination, with a flat disk centrally perforated and provided with radial grooves to form seats for cylindrical rollers, of a set of rollers having shouldered journals that fit the grooves, and a tapered cylindrical mandrel having a perforated head and a conical end forming a wedge for separating the free ends of the rollers, substantially as set forth.

2. In a pipe-expander, the combination, with a flat disk perforated centrally and having four radial slots cut into the central hole, and four cylindrical rollers having journals which fit the grooves of the disk and collars that bear loosely on the sides of the disk, of a tapered cylindrical mandrel having a cylindrical hub on one end, which is perforated to receive a lever, and a conical end forming a wedge for separating the free ends of the rollers, substantially as set forth.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

JAMES H. RICHARDS.
EDWARD HUBER.

Witnesses:
J. E. DAVIDS,
T. SEARCH.