(No Model.)

S. A. ROSS.

PIPE EXPANDER AND CUTTER.

No. 384,080. Patented June 5, 1888.

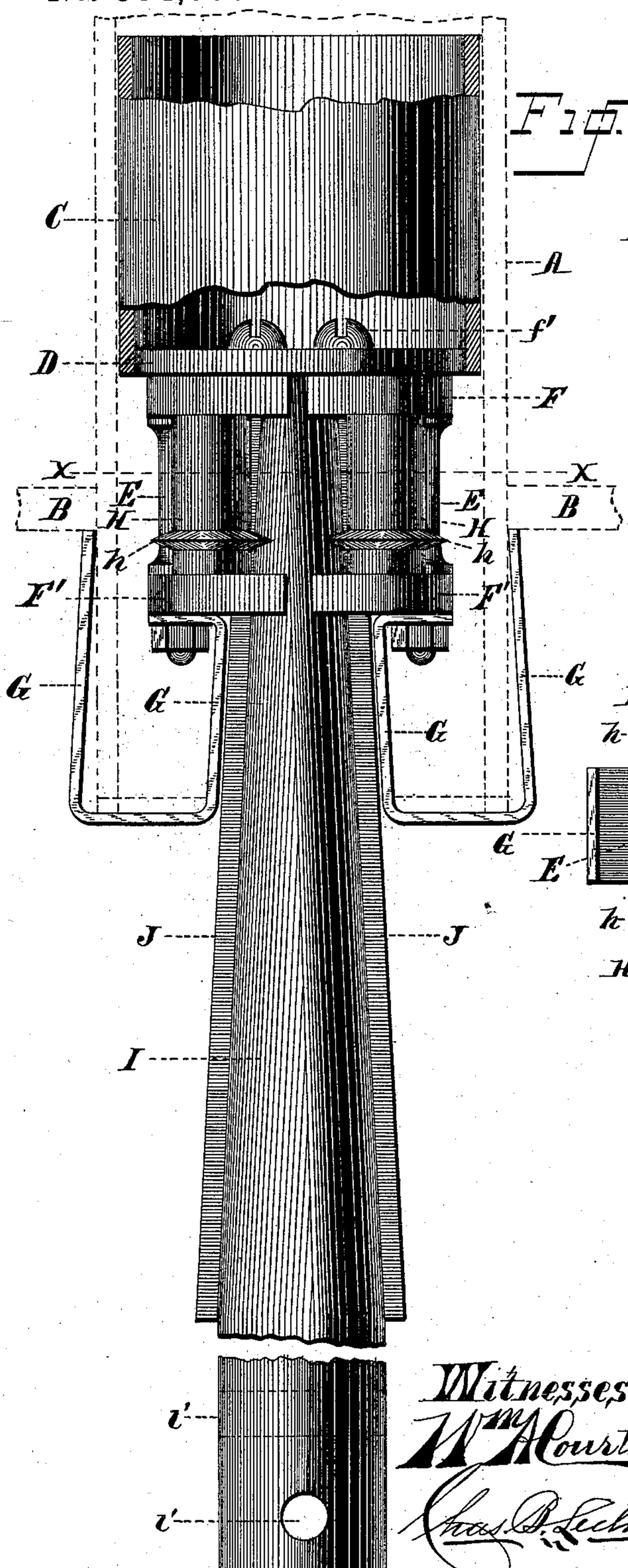

Fig. 1.

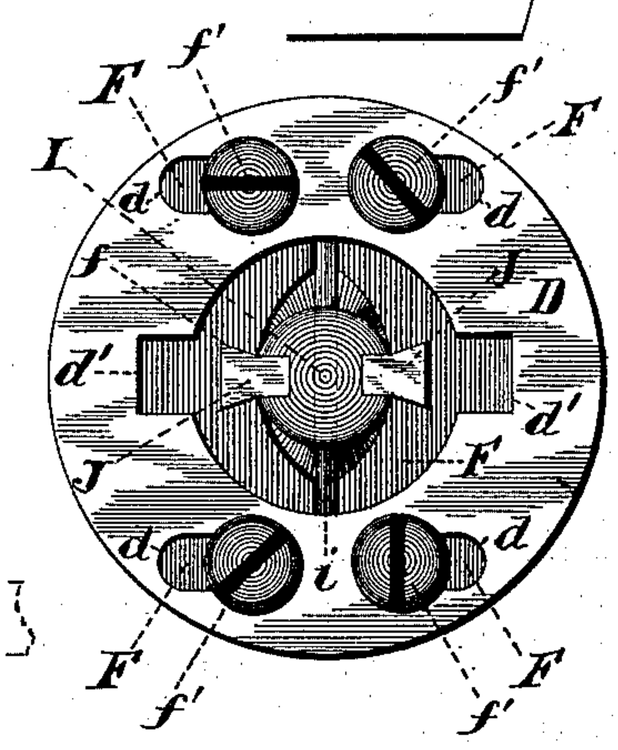

Fig. 2.

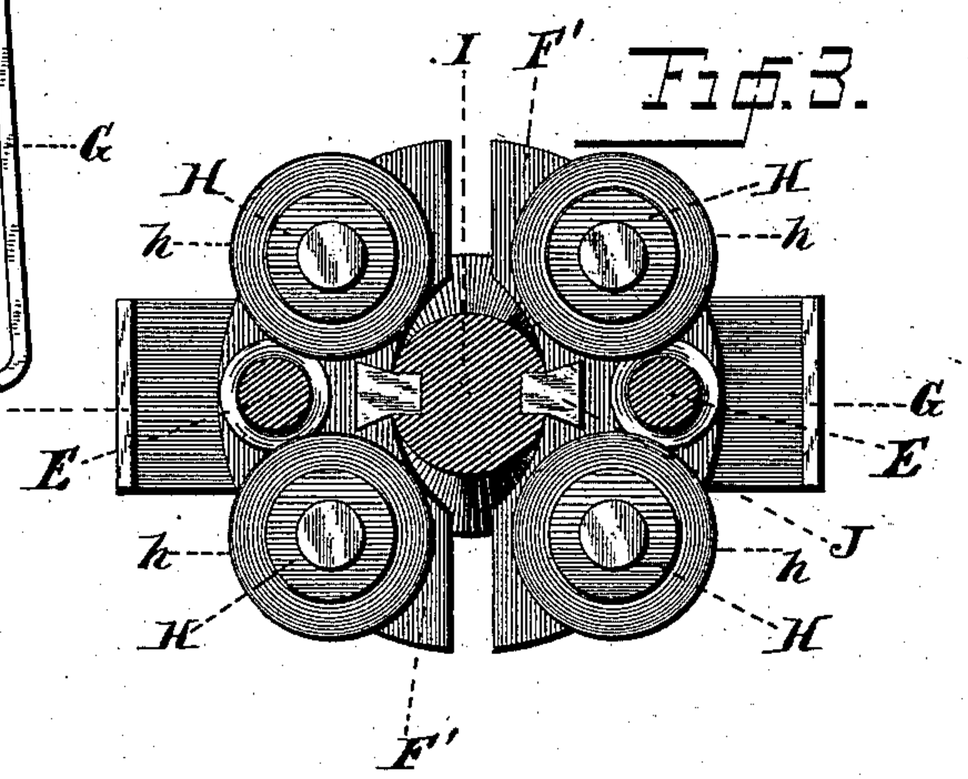

Fig. 3.

Witnesses.
Wm Courtland.
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UNITED STATES PATENT OFFICE.

SAMUEL A. ROSS, OF ERIE, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO H. R. BARNHURST, OF SAME PLACE.

PIPE EXPANDER AND CUTTER.

SPECIFICATION forming part of Letters Patent No. 384,080, dated June 5, 1888.

Application filed September 27, 1887. Serial No. 250,850. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL A. ROSS, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Steam-Boiler-Tube Cutters and Expanders; and I 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.

This invention relates to devices for cutting and expanding the ends of steam-boiler tubes; and it consists in certain new and useful improvements in the construction thereof, as will be hereinafter set forth, and pointed out in the claims.

My device is illustrated in the accompanying drawings as follows:

Figure 1 is an elevation. Fig. 2 is an elevation of the front end of the machine with the tubular part C removed. Fig. 3 is a transverse section on the line *x x* in Fig. 1, looking down or toward the rear end of the machine.

A marks the boiler-tube, and B the flue-sheet of the boiler, which parts are shown by dotted lines in Fig. 1. The fixed part or frame of the machine consists of the short tubular part C and the head D. The tubular part C fits into the tube to be cut or expanded, and is of sufficient length to give a proper bearing upon the tube A to keep the machine square to its work. The head D is fixed firmly to the tubular part C. The head D has therein four slots, *d d d d*, which are near its upper and lower sides and are parallel with its horizontal radius. It also has a larger central opening with lateral offsets *d' d'*.

A movable frame-work, consisting of the crescent-formed parts F F and F' F' and the studs E E, is secured to the head D by bolts *f' f' f' f'*, which pass through the slots *d d d d*. The crescent-formed parts F F and F' F' have therein dovetail notches *f*, in which fit the dovetail splines J J on the conical expanding mandrel I, and also journal-boxes for the rollers H H H H. By observing the drawings it will be seen that as the mandrel I is moved from or toward the head the movable frame just described will be moved inward or outward laterally in a horizontal plane, and the rollers H, which are journaled in said frames, will be carried therewith.

The splines J J are firmly fixed on or formed integral with the mandrel, and as they are dovetail in form and fit in dovetail notches *f* in the frame-pieces F and F' the movable frames carrying the rollers H will be moved outward and inward positively as the mandrel is moved longitudinally. It will also be observed that if the mandrel is revolved on its longitudinal axis all the parts of the machine will be carried with it, and if the movable frames have been extended laterally, so as to bring the rollers H in contact with the tube A, they will be revolved on their axis as they move around in an orbit the axis of which is the axis of the mandrel. The rollers H are made with smooth hardened-steel surfaces, and near the rear ends cutters *h* are formed thereon. When it is desired to cut a tube, the machine is inserted into the tube far enough to bring the cutters to the point where the tube is to be cut, and then the mandrel is driven in, so as to extend the movable frames and bring the cutters against the tube when the mandrel is revolved, and the operation of extending and revolving is continued until the tube is severed. When the operation of cutting off the tube is complete, the machine may be withdrawn for the purpose of discharging the part cut off. The dovetail spline then serves to draw the frames together and permit the part cut off to be removed from the front end of the machine. This also occurs when a tube is to be removed from a boiler by cutting it off inside the flue-sheet, as in the case of a locomotive-boiler tube, the cutters being drawn in by the dovetail spline to permit the withdrawal of the machine. After the tube is cut off, as above described, and it is desired to expand the tube, the operation may be continued either continually or after removing the part of the tube cut off, as above stated. In the expanding operation the smooth surfaces of the rollers will be forced against the inner wall of the tube with such force as to gradually expand the tube.

G G are gages, which are attached to the movable frames, extend back along the mandrel, and then out laterally, and then forward along the outside of the tube to a point just forward of the cutters *h*. These gages regulate

the position of the machine in the tube as they strike upon the flue-sheet of the boiler and hold the machine against inward thrust when the mandrel is driven in.

At the small end of the mandrel there is a pin, *i*, which prevents it from being drawn entirely out of the head, and at the large end there are openings *i'*, through which an operating-lever can be put.

What I claim as new is--

1. In an apparatus for cutting and expanding steam-boiler flues, the combination, substantially as described, of a head fitting within the tube, sliding frames moving laterally on said head, rollers H, with cutters *h*, journaled in said frames, a splined tapering mandrel movable longitudinally within said head and between said frames, and grooves on said frames to receive the splines on said mandrel.

2. In an apparatus for cutting and expanding steam-boiler flues, the combination, substantially as described, of a head fitting within the tube and having a tubular extension, C, forming an elongated bearing, sliding frames movable laterally on said head, rollers H, with cutters *h*, journaled in said head, a splined tapering mandrel movable longitudinally within said head and between said frames, and grooves on said frames to receive the splines on said mandrel.

3. In an apparatus for cutting and expanding steam-boiler flues, the combination, substantially as set forth, of a head fitting in said tube, a tapering mandrel movable longitudinally in said head and having thereon dovetail-formed splines, and frames carrying the expanders and cutters, movable laterally on said head, and having dovetail-formed grooves embracing the splines on said mandrel.

4. In an apparatus for cutting and expanding steam-boiler flues, the combination, substantially as set forth, of a head fitting in said tube, a tapering splined mandrel movable longitudinally in said head, laterally-movable frames carrying the expanders, and cutters adjusted on said head and having grooves fitting said splines, and gages attached to said frames which extend over the end of the tube and bear upon the flue-sheet of the boiler.

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

SAMUEL A. ROSS.

Witnesses:
JNO. K. HALLOCK,
WM. A. COURTLAND.