

E. P. FOLLETT.

MACHINE FOR BENDING TUBES AND PIPES.

No. 301,106.

Patented July 1, 1884.

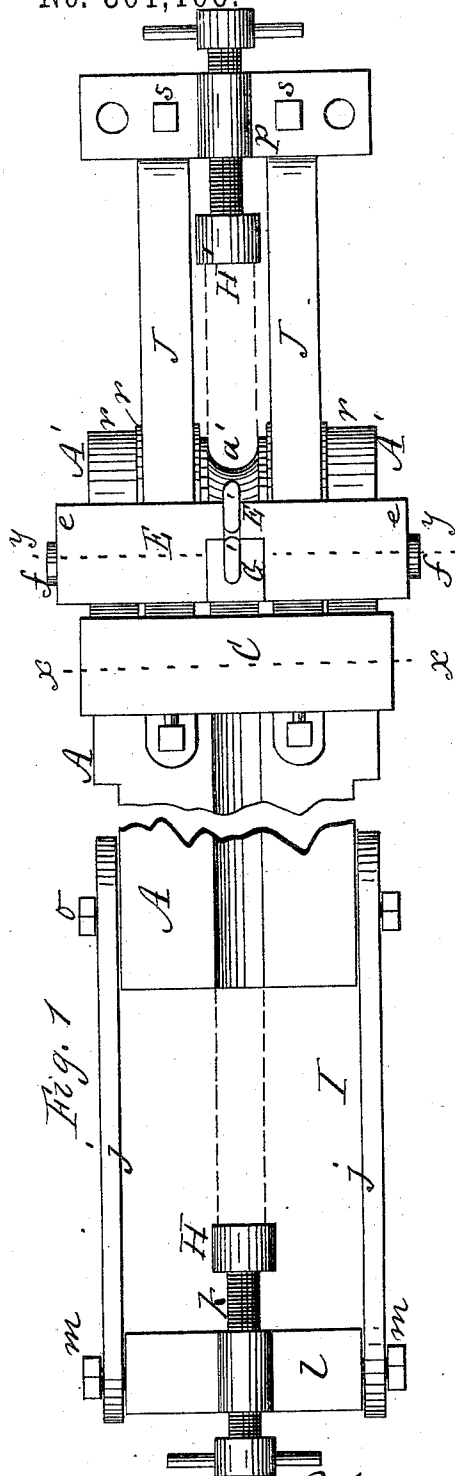


Fig. 1

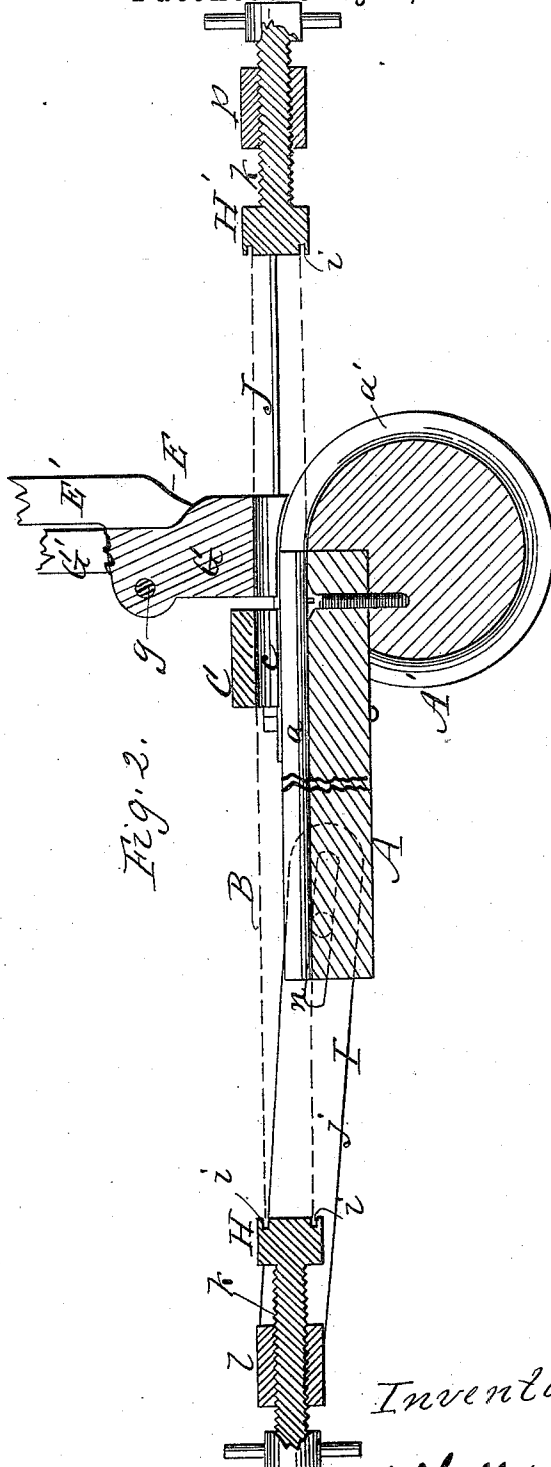


Fig. 2

Attest.

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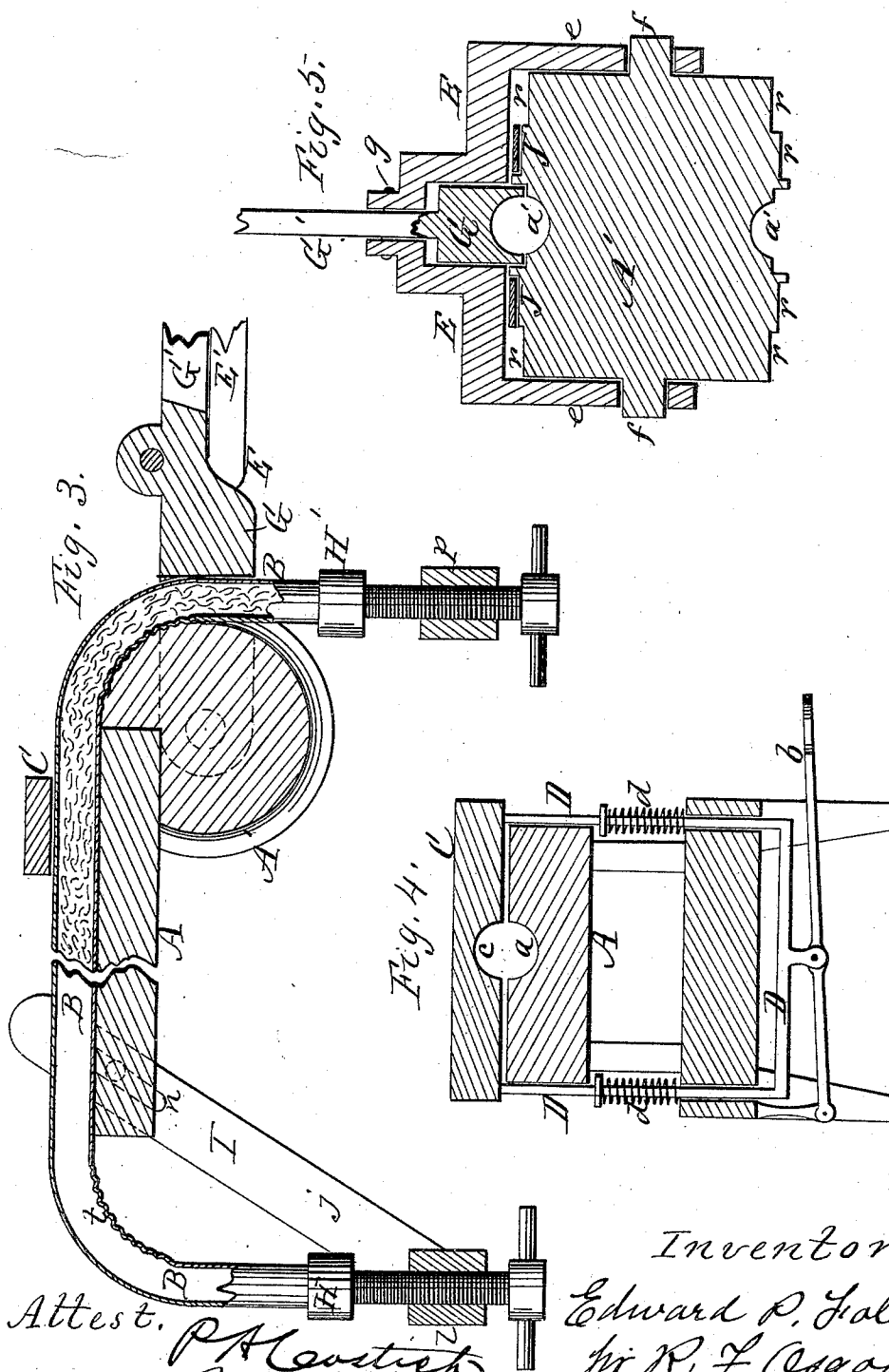
*Edward P. Follett,*  
*per R. F. Osgood*  
*att'y.*

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*P. H. Mestrich*  
*R. E. White*

*Inventor.*  
*Edward P. Follett,*  
*per R. F. Osgood,*  
*atty.*

# UNITED STATES PATENT OFFICE.

EDWARD P. FOLLETT, OF ROCHESTER, N. Y., ASSIGNOR TO THE FOLLETT LANTERN AND MANUFACTURING COMPANY, OF SAME PLACE.

## MACHINE FOR BENDING TUBES AND PIPES.

SPECIFICATION forming part of Letters Patent No. 301,106, dated July 1, 1884.

Application filed October 22, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD P. FOLLETT, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Apparatus for Bending Tubes and Pipes; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a plan of the apparatus. Fig. 2 is a central longitudinal vertical section. Fig. 3 is a view similar to Fig. 2, but showing a tube in place and in the act of being bent. Figs. 4 and 5 are vertical cross-sections, respectively, in lines *xx* and *yy* of Fig. 1.

My improvement relates to means for bending tubes and pipes without crushing by placing the same on a grooved bed or die having a circular head, resting the ends against stay-blocks, and then producing the bend by sweeping a grooved die over the circular head, all as hereinafter described.

In the drawings, A is a flat bed, provided with a longitudinal groove, *a*, which is a half-circle in cross-section.

A' is a circular head at one end of the bed, having also a groove, *a'*, in its periphery, which is a continuation of the groove in the bed. The tube or pipe B is placed in the groove *a*, its end projecting over and beyond the circular head for the purpose of bending.

C is a block forming a clamp, which rests above the grooved bed, said block also having a half-circular groove, *c*, on its under side. This block is simply for clamping the tube fast on the bed to hold it while the bending operation is performed. It is operated by any suitable means, that shown in the drawings being a yoke, D, having at its bottom a foot-treadle, *b*, and provided with reacting-springs *d d*. By pressing on the treadle the clamp will be brought down on the tube, and by removing the pressure the clamp will be released.

E is a yoke having arms *e e*, which turn on journals *f f* of the circular head A'.

G is a die which rests within the yoke, being pivoted at *g*, and provided with a groove on its under side resting over the groove in the circular head. As the yoke is turned the die sweeps around the circular head A' and bends the tube, as shown in Fig. 3.

E' is a lever attached to the yoke, by which it is turned, and G' is a lever attached to the die, by which the latter is turned on its pivot and caused to bear against the tube. These two levers stand one in advance of the other, and when seized by the hand the first action is to cause the die to clamp the pipe and then the two move down together, the die bearing on the pipe all the way, while the yoke simply acts as a carrier. In the back motion the die releases from the pipe.

H H' are two heads at opposite ends of the machine for holding the ends of the pipe, the heads having circular grooves *i i*, in which the ends of the pipe rest, and by which they are held during the bending operation. These heads have screw-shafts *k k*, resting in bearings, by which the heads may be moved forward or back to fit the ends of the tube.

I is a frame at one end of the machine, carrying the head H, said frame consisting of two side pieces, *j j*, and an end piece, *l*, secured together by screws *m m*, so that as the frame is swung down, as shown in Fig. 3, the end piece, *l*, can still be adjusted to any desired position either horizontally or vertically. The opposite ends of the side pieces, *j j*, are slotted, as shown at *n*, through which pass set-screws *o o*, securing them to the side of the bed-piece, by which means the frame may be adjusted in or out to meet the pipe. The opposite head, H', has its bearing in a cross-piece, *p*, attached to two connections, J J, which are in the nature of steel straps attached to the bed and resting over the top of the circular head A'. As the yoke is turned it wraps the connections around the circular head, and as said connections carry the guide-head H', the latter will be turned with the bending of the pipe, and will always hold the end of the latter in position. The circular head is provided on its periphery with two or more offsets or steps, *r r*, of different diameters, and the springs J J are changeable from one to the other by means of set-screws *s s*, for a purpose presently to be described.

The operation is as follows: The tube or pipe to be bent is first crimped at the point where the bend is to be made, as shown at *t*, Fig. 3, so that the metal will upset at that point. The straight tube or pipe is then laid

in the groove on the bed, under the clamp C and die G, its ends resting in the grooves in the heads H H', which are turned up firmly against them. In some cases the tube is filled with sand or other suitable material, and in others it is not necessary. The clamp C is then drawn down to secure the pipe, and the yoke E and die G are then swept around the circular head, bending the pipe as they move around. The die clamps down on the tube and bears firmly thereon during the whole movement. At the same time the yoke bears upon the connections J J, wrapping them around the head and carrying the guide-head H' around as fast as the pipe is bent, and holding the end of the pipe in position during the whole sweep. This finishes the bending of one end of the pipe. In raising the yoke to remove the pipe the die releases its hold and the pipe can be taken out. If it is desired to bend both ends of the pipe, the pipe is shifted, as shown in Fig. 3, the frame I being turned down at any desired angle, and the block l being adjusted by means of the set-screws, so that the head H will stand in line with the bent end of the pipe. The other end is then bent in the same manner.

The connections J J perform an important function in this invention, as they gage and control the bending of the pipe. By shifting them from one to another of the steps or offsets r r on the forming-head they are raised or lowered above or below the center of the pipe. When raised above the center, they lessen the stretching action on top of the pipe and increase the upsetting action on the bottom of the pipe. When lowered below the center, they increase the stretching action and lessen the upsetting action. When adjusted to the center, the stretching and upsetting actions are equal. These variations are necessary in bending different kinds of pipes and tubes, as thick tube will stand much stretching and thin tube will not. There is also great difference in the stretching of different metals. By the adjustment above described the amount of stretching or upsetting can be adapted to the necessities of the case. The connections J J control the action by carrying the head H' concentrically around the forming-head at whatever elevation it is placed relatively to the pipe. These connections are preferably flat steel springs, as shown, as they will always recover their straight horizontal position when released; but they can be made effective if made of wire, rod, or cable. Any device that will answer the same purpose may be used.

A grooved friction-wheel might be employed in place of the die G, but would not be so effective in use.

The process of bending the tube or pipe as above described will form the subject-matter for another application for Letters Patent.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an apparatus for bending tube or pipe, the combination of a bed, upon which the tube is laid, a grooved forming-head, over which the tube is bent, a clamp for fastening the tube, a die which bears upon the tube and sweeps around the forming-head to produce the bending, and two heads at opposite ends of the machine to hold the ends of the tube, one being stationary, the other moving in unison with the die, to carry the end of the tube as it is bent, as set forth.

2. In an apparatus for bending tube or pipe, the combination, with a grooved forming-head, over which the tube is bent, and a grooved die for bending the tube, of two heads on opposite sides, for holding the ends of the tube, one head being stationary, the other moving concentrically around the forming-head in unison with the die to carry the end of the tube as it is bent, as set forth.

3. In an apparatus for bending tube or pipe, the combination, with a grooved forming-head, over which the tube is bent, and a grooved die for bending the tube, of connections which wind over the forming-head as the die progresses, and a head at the outer end of the connections for holding the end of the tube, as set forth.

4. In an apparatus for bending tube or pipe, the combination of a grooved forming-head provided with offsets or steps of different diameters, and connections which are changeable to the different offsets or steps, projecting outward beyond the forming-head, and carrying the head that supports the end of the tube, as and for the purpose specified.

5. In an apparatus for bending tube or pipe, the combination, with the grooved bed for holding the tube, of a frame pivoted to the bed, carrying at its outer end a head for receiving the end of the tube, said frame being adjustable vertically on its pivot to bring the head in position to receive the bent end of the tube preparatory to bending the opposite end of the tube, as set forth.

6. In combination with the grooved bed A, the frame I, attached to the frame by set-screws, and constructed with side pieces, j j, and an end piece, l, connected by set-screws, whereby said end piece may be changed in position, as the frame is adjusted vertically, as set forth.

7. In an apparatus for bending tube or pipe, the combination of the grooved forming-head A', the yoke E, turning on its axis, the springs J J, winding over the forming-head, and the die G, pivoted in the yoke, and provided with a groove corresponding with the groove in the forming-head, as shown and described, and for the purpose specified.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

EDWARD P. FOLLETT.

Witnesses:

R. F. OSGOOD,  
P. A. COSTICH.