

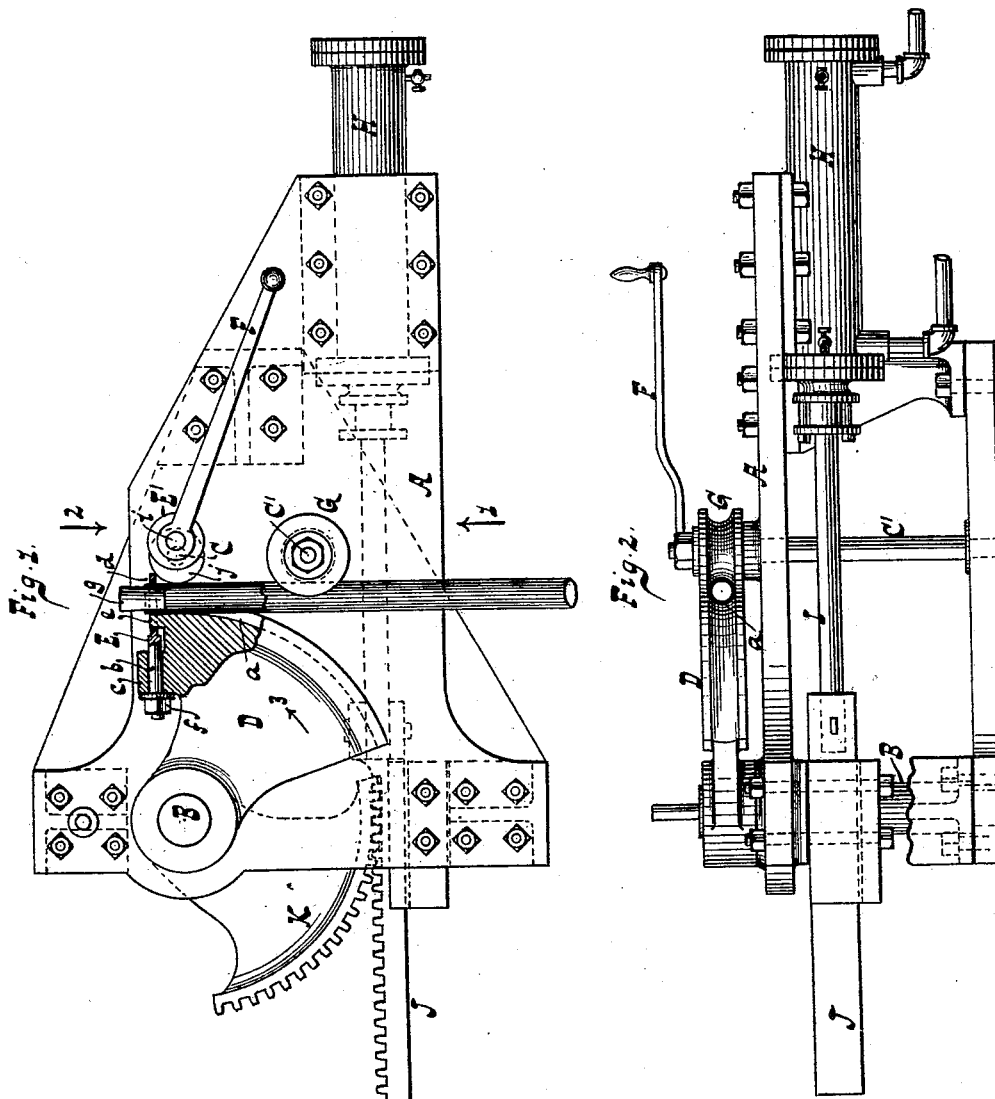
(No Model.)

2 Sheets—Sheet 1.

A. STIRLING.  
MACHINE FOR BENDING TUBES.

No. 493,390.

Patented Mar. 14, 1893.



WITNESSES:

*William Miller*  
*Edward Wolff*

INVENTOR:

*Allan Stirling*

BY

*Van Bentvoord & Smith*  
ATTORNEYS

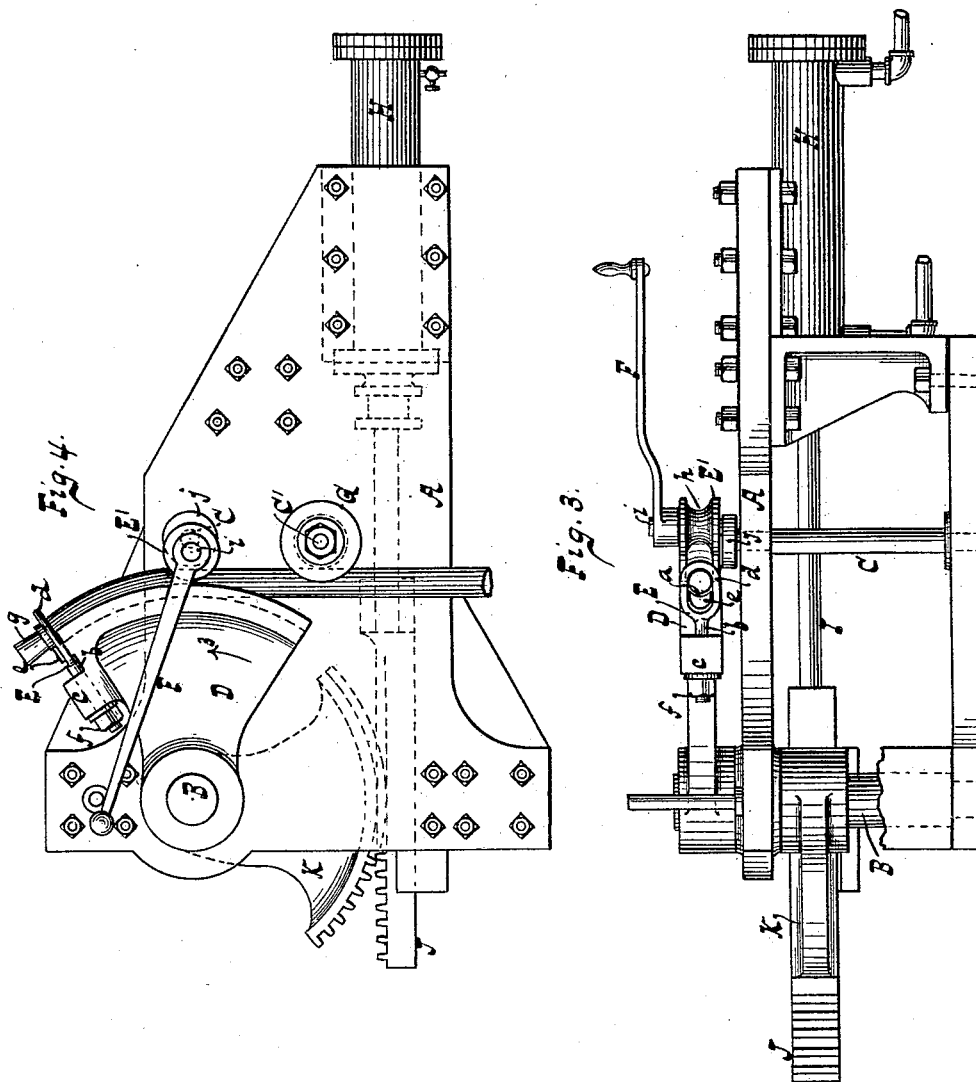
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2 Sheets—Sheet 2.

A. STIRLING.  
MACHINE FOR BENDING TUBES.

No. 493,390.

Patented Mar. 14, 1893.



WITNESSES:

*William L. Hill*  
*Edward Wolff*

INVENTOR:

*Allan Stirling*

BY

*Van Santvoord & Hauck*  
ATTORNEYS

# UNITED STATES PATENT OFFICE.

ALLAN STIRLING, OF NEW YORK, N. Y.

## MACHINE FOR BENDING TUBES.

SPECIFICATION forming part of Letters Patent No. 493,390, dated March 14, 1893.

Application filed September 1, 1892. Serial No. 444,770. (No model.)

*To all whom it may concern:*

Be it known that I, ALLAN STIRLING, a citizen of the United States, residing at New York, in the county and State of New York, have invented new and useful Improvements in Machines for Bending Tubes, of which the following is a specification.

This invention relates to certain improvements in machines for bending metal tubes, such as boiler tubes made of wrought iron or of steel.

The improvements which constitute my invention, are pointed out in the following specification and claims and illustrated in the accompanying drawings in which:

Figure 1 represents a plan or top view showing the parts in position before the operation of bending has commenced. Fig. 2 is a side elevation looking in the direction of arrow 1 (Fig. 1). Fig. 3 is a side elevation looking in the direction of arrow 2 (Fig. 1). Fig. 4 is a plan, or top view showing the parts in position while the bending operation is progressing.

In the drawings the letter A designates a frame which forms the bearings for three arbors B, C, C'. On the upper end of the arbor B is firmly mounted the bending die D which in the example shown, consists of a segment provided in its periphery with a semicircular groove *a*, the diameter of which corresponds with the diameter of the tubes to be bent. For tubes of different diameters different bending dies must be provided. With the bending die is combined a bridle E which serves to secure the end of the tube to be bent in the semicircular groove *a*. In the example shown in the drawings, this bridle consists of an eyebolt, the shank *b* of which extends through a lug *c* connected to the bending die (Figs. 1 and 4) while the eye *d* of said eye bolt is oblong (Fig. 3) so that it can embrace the end of the tube to be bent and also a lip *e* which projects from the front edge of the bending die and serves as a support for the front end of the tube. The shank *b* of the eye bolt is provided with a screw thread and with a nut *f* and by screwing up this nut, the end of the tube can be firmly clamped on the bending die. In order to prevent the end of the tube from being crushed, a plug *g* may be inserted.

On the arbor C is eccentrically mounted

the retaining die E' and a handle F serves to turn the arbor C. If this handle is turned to the position shown in Fig. 1, the retaining die E is moved away from the bending die D so that the tube can be conveniently introduced between the two dies and if the handle F is moved to the position shown in Fig. 4 the retaining die is brought to bear upon the tube so as to hold the same in the semicircular groove *a* of the bending die. The retaining die is provided in its circumference with a semicircular groove *h* (Fig. 3) corresponding in its diameter to the semicircular groove *a* in the bending die so that when the two dies are brought together, the grooves *a* and *h* embrace the tube. In the example shown in the drawings, the retaining die E' is mounted loosely upon a wrist-pin *i* which is secured eccentrically in a disk *j* mounted firmly upon the arbor C and the handle F is firmly mounted upon the outer end of eccentric wrist pin *i*.

Behind the retaining die E' is situated the stop G to prevent the tube from flapping as the operation of bending progresses.

In the example represented by the drawings, I have shown a cylinder H containing a piston to which motion is imparted by hydraulic pressure. The piston rod I carries a rack bar J which engages a toothed segment K mounted on the arbor B.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a machine for bending tubes, the combination with the bending die D, of the bridle E having an oblong eye *d* a lip *e* projecting from the bending die into this oblong eye and means for imparting to the bending die a rotary motion, substantially as described.

2. In a machine for bending tubes, the combination with the bending die D and the bridle E, of a roller E' mounted eccentrically on an arbor C, a handle for turning this arbor and means for imparting to the bending die a rotary motion, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ALLAN STIRLING.

Witnesses:

MARGARET A. STIRLING,  
ALISON B. STIRLING.