

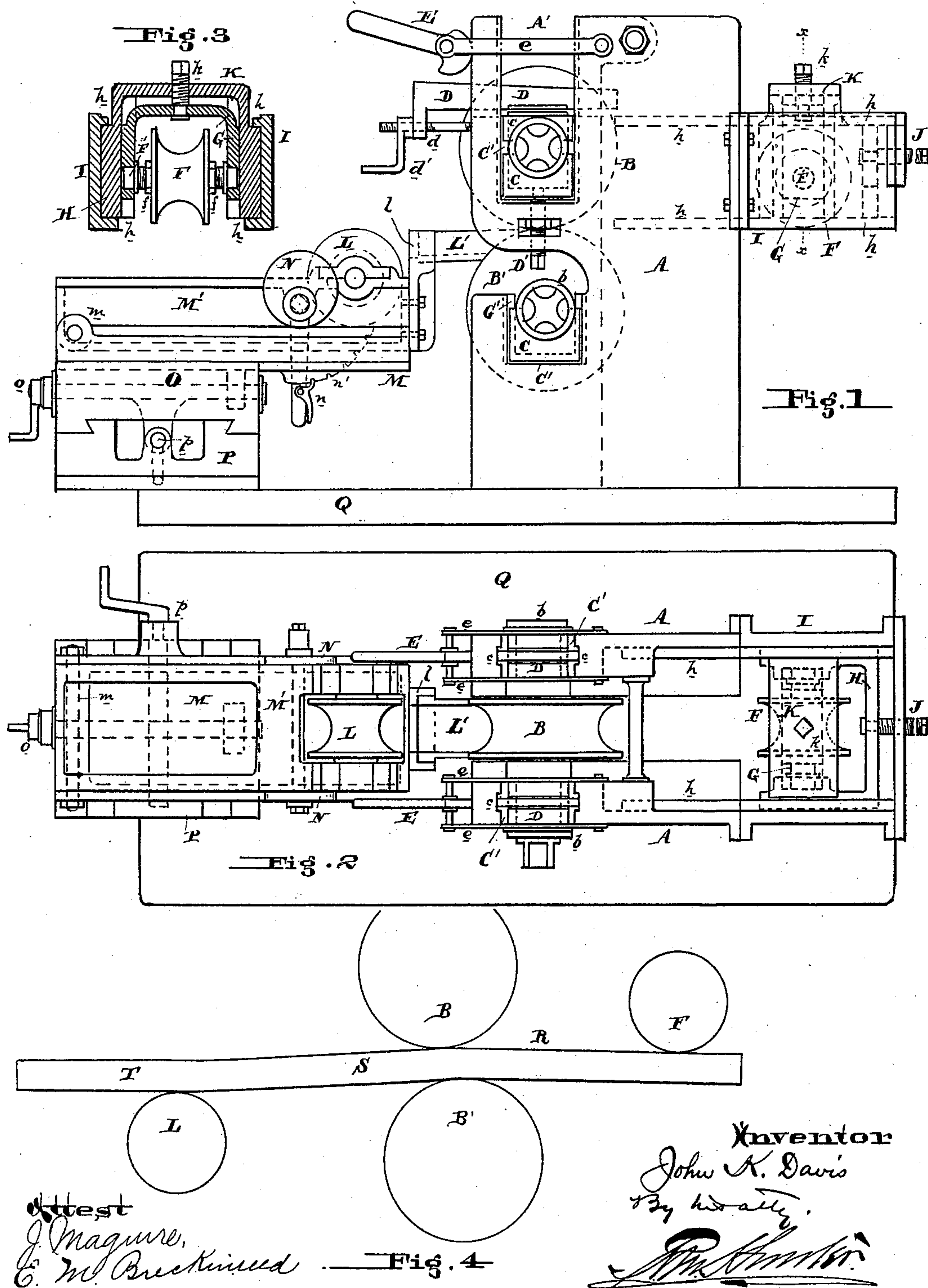
(No Model.)

J. K. DAVIS.

MACHINE FOR SIZING, STRAIGHTENING, AND FINISHING TUBES.

No. 336,899.

Patented Mar. 2, 1886.



UNITED STATES PATENT OFFICE.

JOHN K. DAVIS, OF PHILADELPHIA, PENNSYLVANIA.

MACHINE FOR SIZING, STRAIGHTENING, AND FINISHING TUBES.

SPECIFICATION forming part of Letters Patent No. 336,899, dated March 2, 1886.

Application filed October 20, 1885. Serial No. 180,391. (No model.)

To all whom it may concern:

Be it known that I, JOHN K. DAVIS, of the city and county of Philadelphia, and State of Pennsylvania, have invented an Improvement in Machines for Sizing, Straightening, and Finishing Tubes, of which the following is a specification.

My invention has reference to tube sizing, straightening, and polishing machines; and it consists in certain combinations of rolls and their appendages, by which the tube while being rolled in the cold condition and sized is first bent out of shape and then into shape, insuring the simultaneous actions of straightening, sizing, and cold-rolling, and in details of construction, all of which are fully set forth in the following specification, and shown in the accompanying drawings, which form part thereof.

Heretofore in making tubes the skelp has been rolled upon a mandrel into the tubular shape, and has been then straightened by rolling between rollers which revolve at substantially right angles to the length of the tube, whereby the tube is given a longitudinal as well as a rotary motion in passing between the straightening-rolls. This method, however, did not insure the outside diameter of the tube being uniform, and great objection was raised to it when the tubes were required for special purposes. The same general idea as that used in straightening wire by bending it first out of line and then into line is carried out in the case of tubes, only with certain necessary modifications. The tube must not be bent much out of shape, but the slight bending enables the rolls B B' to effect the object of properly forming each successive ring or metal of which the tube may be conceived as being composed. A tube when first welded is more or less irregular and full of small bends or crooks, just as wire becomes bent. The tubes as they come from the tube-mill are run through this machine in the cold condition, and the result claimed is attained.

The object of this invention is to provide suitable means by which the tubes formed in the usual manner may be simultaneously straightened, made uniform in diameter throughout their entire length, and to have a certain amount of cold-rolled finish.

In the drawings, Figure 1 is a side elevation of a machine embodying my improvements. Fig. 2 is a plan view of same. Fig. 3 is a cross-section of a part of same on line *x x*; and Fig. 4 is a diagram illustrating the principle involved in the treatment of tubes of this machine.

A is the housing of the machine for supporting the main pressure or sizing rolls B B', which are provided with bearings *b*, and are arranged one above the other, but one of which (preferably the upper one) is arranged a little in the rear of the other, so that as the tube is moved along between the said rolls there is a tendency to bend it downward to a slight degree. These rolls are grooved upon their peripheries, so as to be of the exact shape necessary to be given to the tube. One end of the shafts of the rolls B B' is shown with the usual star construction adapted for coupling to a revolving shaft, as is customary in all rolling-mills. These rolls B B' are driven in opposite directions in any suitable manner customary in rolling-mills. The bearings of these rolls are supported in brasses C, which in turn are supported in cast-steel castings C', which are provided with tongues *c*, which fit into corresponding grooves in the housings, which housings are provided with the bearing-receiving slots A'. The bearing of the lower roll, B', simply rests in its slot, while the adjustment is made in the bearing to the upper roll by means of the adjusting-screws D', which raise the said bearing and the wedges D, which hold the said bearings down, and which wedges are operated by the screws *d* and crank-nut *d'*. By this means the adjustment of the rolls B B' may be accurately determined. To strengthen the upper end of the slot A', owing to the necessity of the use of the wedge, the links *e* and the clamping cam-lever E are provided, the links being fastened to the main part of the housing and the cam-lever adapted to press upon the outer face of that portion of the housing on the other side of the slot, as shown in Fig. 1. By making the links *e* and the cam E as shown they may be thrown back when it is desired to insert a new brass or roll or remove a defective one.

F is a guide-roller, also having a groove to

receive the tube, and is supported in a vertically-adjustable frame, G, which slides in a horizontal adjustable frame, H, and is adjusted vertically by means of the screw *k*, which
 5 passes through a strap or frame, K, formed upon the upper part of the frame H. This frame H is made adjustable in the frame I, bolted to the housing A, and is guided between the horizontal ribs or rails *h* and is moved by
 10 the screw J. In place of using screws J and *k* to adjust these parts any other form of adjusting device may be employed—as, for instance, a rack and pinion, wedge, &c. This guide-roller F has an axle, F', upon which it
 15 is made laterally adjustable, being secured in the positions in which it is placed upon the shaft or axle by lock-nuts *f*.

The guide-roll L is located in the rear of the pressure or sizing rolls and is made adjustable
 20 vertically and horizontally, substantially as in the case of the roll F, above described. This roller is arranged below the plane of contact of the sizing-rolls B and B', and is journaled in a frame, M', which is pivoted at *m* to
 25 a longitudinally-sliding frame, M, and upon which it may be raised or lowered by cams or eccentrics N, made adjustable by lever *n* and notch-segment *n'*, secured to the frame M'. Any other mechanism for raising this frame
 30 M' may be used, if desired.

l is a bracket for the tube, and is secured to the end of the frame M', and is located between the sizing-rolls and roller L, and is adapted to receive a guide-trough, L', one end of which rests
 35 upon the lower sizing-roll, B', and guides the tube upon the roller L. The frame M slides longitudinally upon the frame O, being made adjustable by a screw, *o*, as is common in slide-rests of lathes, and this second frame O is in
 40 turn adjustable laterally upon the frame P by adjusting-screw *p*. By this means the roller L is enabled to have a motion in three directions, or in reality a universal motion, to properly adjust it before the sizing-rolls to enable
 45 it to perform its function correctly. The adjustability of the rollers F and L is designed to cause the tubes to be fed through and delivered from the sizing-rolls B B' and be
 50 guided in a direct line, and also to enable the amount of bend given to the tube in the process of straightening to be increased or decreased. The vertical adjustability is also
 55 necessary when changing the diameters or sizes of the guide-rollers F L for tubes of different sizes.

It is self-evident that the rolls B and B' might be arranged one above the other, and that the rollers L and F might be arranged
 50 higher or lower than a line drawn at right angles to a plane through the axes of rolls B B' to accomplish the same effects as are attained by locating the upper roller, B, slightly to the
 55 rear of the lower roll, B', the only necessity being that the rollers must be so located that the tube is first bent downward, then upward, or vice versa, in the act of passing between

them, as is clearly indicated by the diagram, Fig. 4. The rollers may be arranged horizontally, if desired.

In operation the tube is first fed under the roller F, by which its rearward end is held
 70 down while the tube is passing through the sizing-rollers B B', where it is made absolutely correct in diameter and at the same time given a cold-rolled finish. While the tube passes
 75 between the rollers B B' it is bent downward and is received upon the guide L' and then upon the roller L, which latter bends it upward, the reverse bending action imparted to the tube insuring its being accurately straight-
 80 ened.

It is self-evident that the details of construction may be greatly modified without in any
 85 wise departing from the essential feature of this invention.

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

1. In a machine for straightening and sizing tubes, the combination of two sizing-rolls with
 90 two guide-rolls, one being arranged in front and one in the rear of said sizing-rolls, and so located that the tube in passing between said sizing-rolls is bent first out of line and then
 95 straightened, substantially as and for the purpose specified.

2. In a machine for straightening and sizing tubes, the combination of two sizing-rolls with
 100 two adjustable guide-rolls, one being arranged in front and one in the rear of said sizing-rolls, and so located that the tube in passing between said sizing-rolls is bent first out of line and then straightened, substantially as and for the purpose specified.

3. In a machine for straightening tubes, a
 105 series of rolls between which the tube must pass, the said rolls being arranged out of line sufficient to cause the tube to be first abnormally bent and then straightened, substantially as and for the purpose specified.

4. In a machine for straightening and sizing tubes, a pair of sizing-rolls, in combination
 110 with a guide-roller so arranged with reference to the sizing-rolls that the tube after leaving the latter is bent by said guide-roller, and
 115 means to adjust said guide-roller vertically and to or from said sizing-rolls, the said adjustments being independent of each other, substantially as and for the purpose specified.

5. In a machine for straightening and sizing
 120 tubes, a pair of sizing-rolls, in combination with a guide roller so arranged with reference to the sizing-rolls that the tube after leaving the latter is bent by said guide-roller, and
 125 suitable means, substantially as set forth, to adjust said guide-roller vertically and laterally, substantially as and for the purpose specified.

6. In a machine for straightening and sizing tubes, a pair of sizing-rolls, in combination
 130 with a guide-roller located at some distance from the sizing-rolls, and so arranged with ref-

erence to the sizing-rolls that the tube is held in one lateral direction while it is bent by the action of the sizing-rolls, substantially as and for the purpose specified.

5 7. In a machine for straightening and sizing tubes, a pair of sizing-rolls, in combination with a guide-roller located at some distance from the sizing-rolls, and so arranged with reference to the sizing-rolls that the tube is
10 held in one lateral direction while it is bent by the action of the sizing-rolls, and suitable means, substantially as set forth, to adjust said guide-roller vertically and to or from the sizing-rolls, substantially as and for the purpose
15 specified.

8. The combination of rolls B B' with rollers F and L, adapted to act on opposite sides of the tube, substantially as and for the purpose specified.

20 9. In a machine for sizing and straightening tubes, adjustable guide-rollers for the tube, in combination with compressing and bending rolls arranged between said guide-rollers and adapted to cause a reverse bending action on
25 said tube during its passage through said rollers, substantially as and for the purpose specified.

10. The combination of housing A, having bearing-slots with cast-steel cases C', bearings
30 C, adjusting-screw D', wedges D, links e, cams E, and rolls B B', substantially as and for the purpose specified.

11. The combination of rolls B B' and their housing with roller F, frames G H and their
35 adjusting-screws k J, and roller L, substantially as and for the purpose specified.

12. The combination of rolls B B' and their

housing with roller F, frames G H and their adjusting-screws k J, roller L, frames M, M', O, and P, and means, substantially as de- 40 scribed, to adjust said frames, substantially as and for the purpose specified.

13. The combination of rolls B B' with roller L, longitudinally-adjustable frame M, hinged frame M', carrying said roller L, transversely- 45 adjustable frame O, and stationary bed-frame P, substantially as and for the purpose specified.

14. The combination of rolls B B' with roller L, longitudinally-adjustable frame M, hinged 50 frame M', carrying said roller L, transversely-adjustable frame O, stationary bed-frame P, and cam devices to adjust the frame M' upon frame M, substantially as and for the purpose specified.

15. In a tube straightening and sizing machine, the combination of two compressing or sizing rolls, one of which is arranged a little to the rear of the other, and a guide to hold the tube while being fed through said rolls, 60 whereby the tube is bent out of line in passing through the same, substantially as and for the purpose specified.

16. The combination of the compressing or sizing rolls with a front guide-roller, L, made 65 adjustable vertically, laterally, and longitudinally, substantially as and for the purpose specified.

In testimony of which invention I hereunto set my hand.

JOHN K. DAVIS.

Witnesses:

HARRY S. MOULTON,
R. S. REED.