(No Model.) 3 Sheets—Sheet 1.

W. A. McCOOL.

MACHINE FOR STRAIGHTENING METAL BARS, TUBES, &c.

No. 395,400. Patented Jan. 1, 1889.

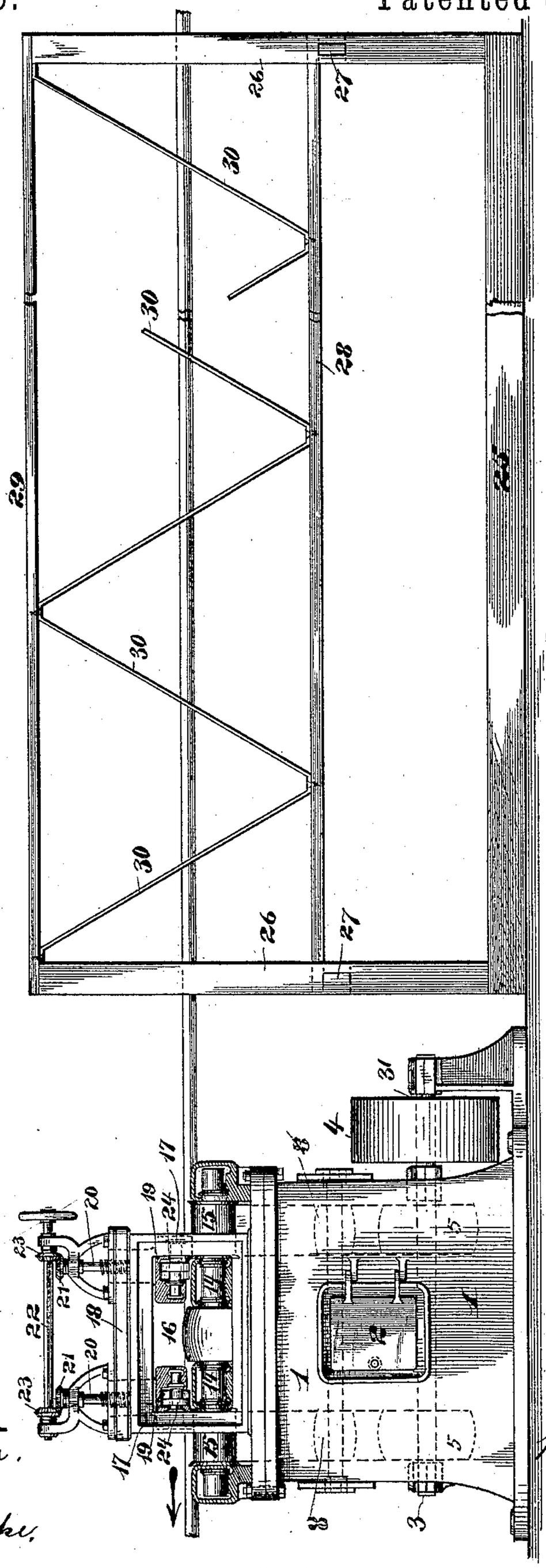

FIG. 1.

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(No Model.) 3 Sheets—Sheet 2.

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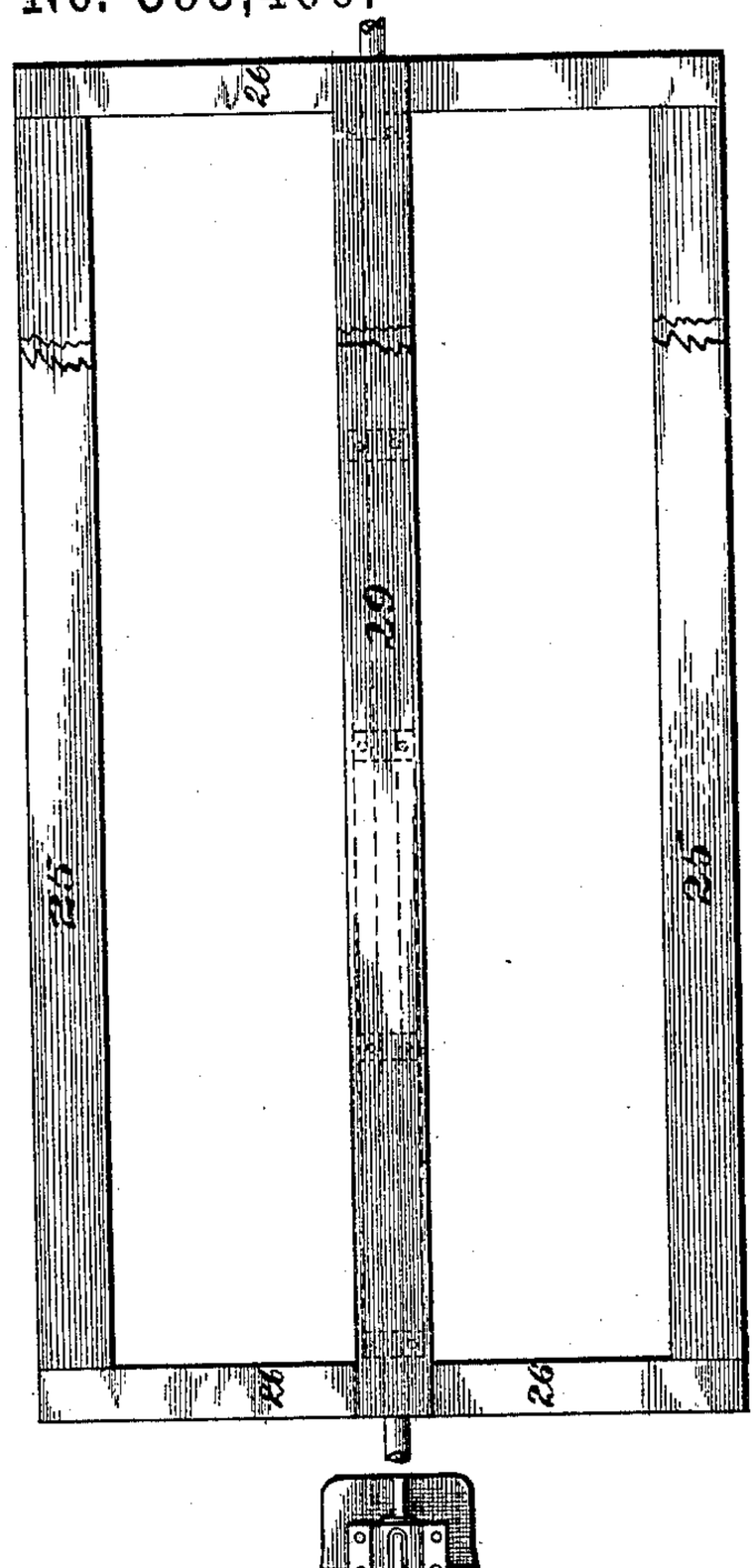


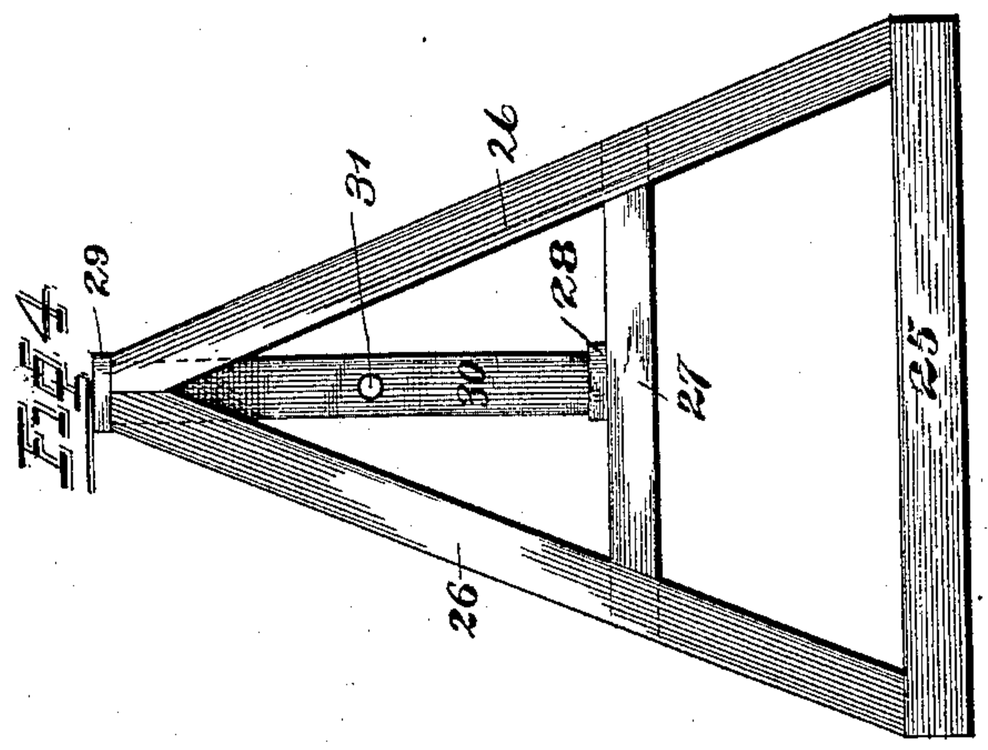


FIG. 2.

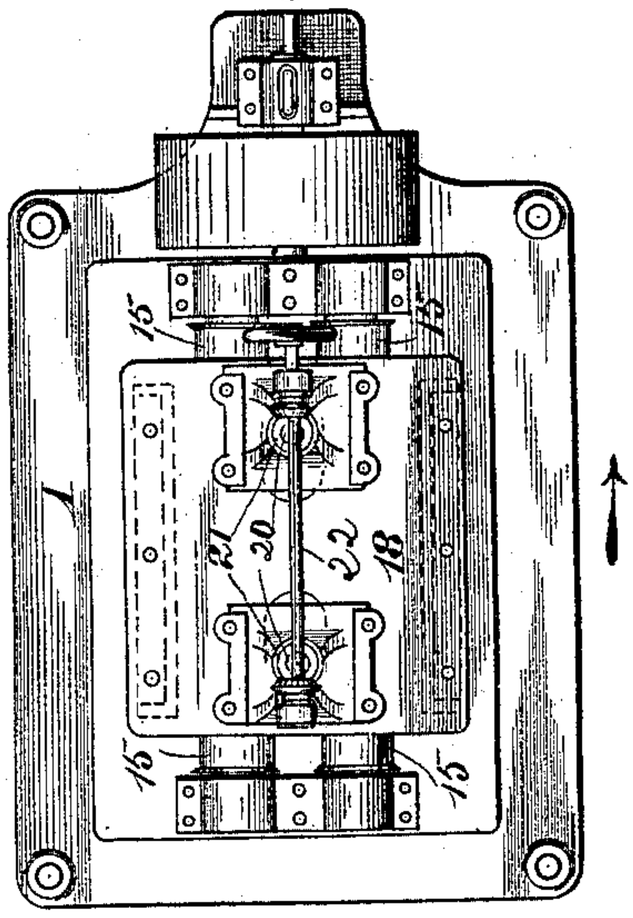
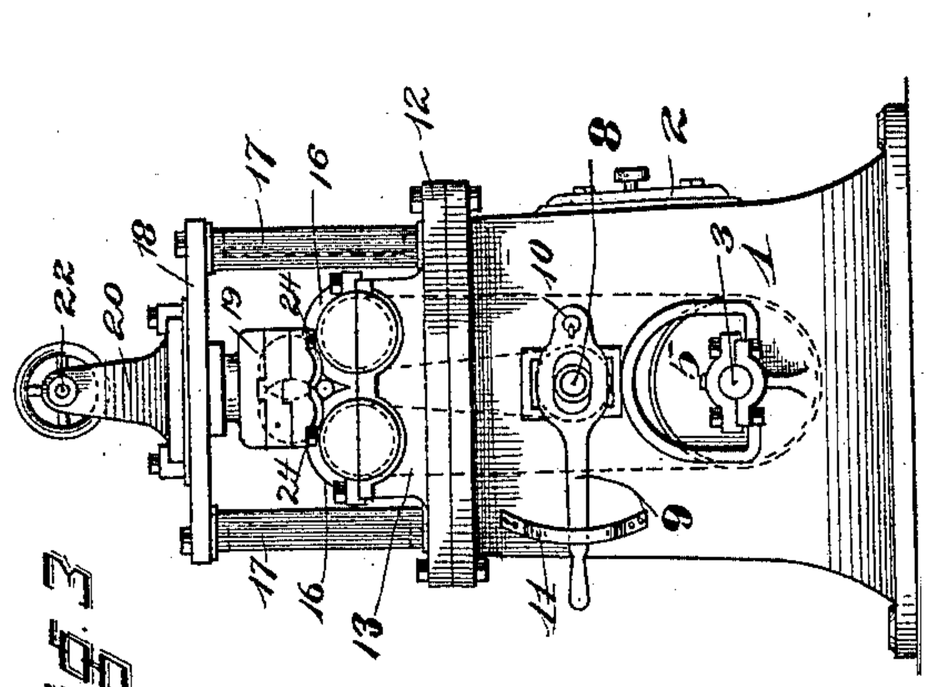


FIG. 3.



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3 Sheets—Sheet 3.

MACHINE FOR STRAIGHTENING METAL BARS, TUBES, &c.

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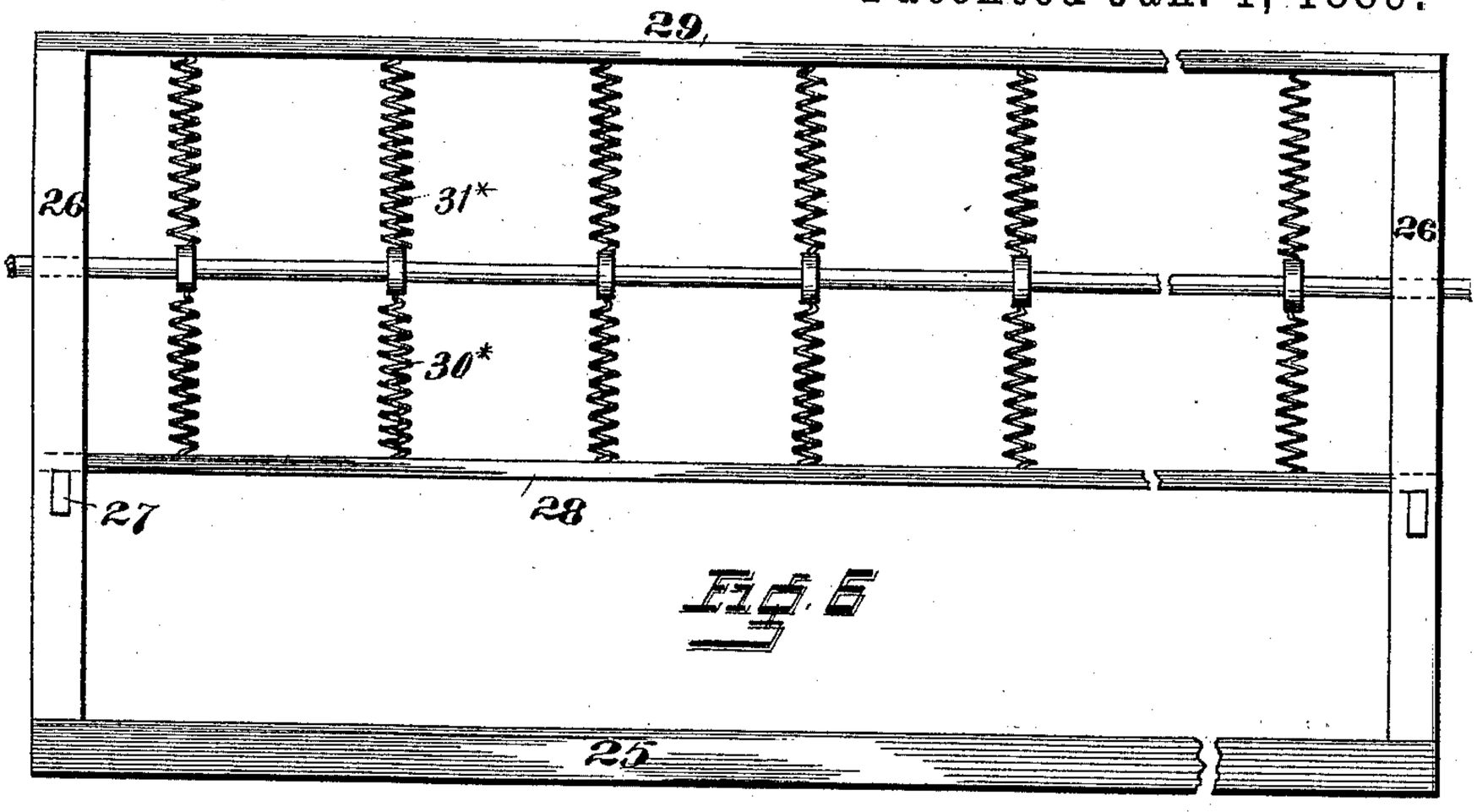

Fig. 6

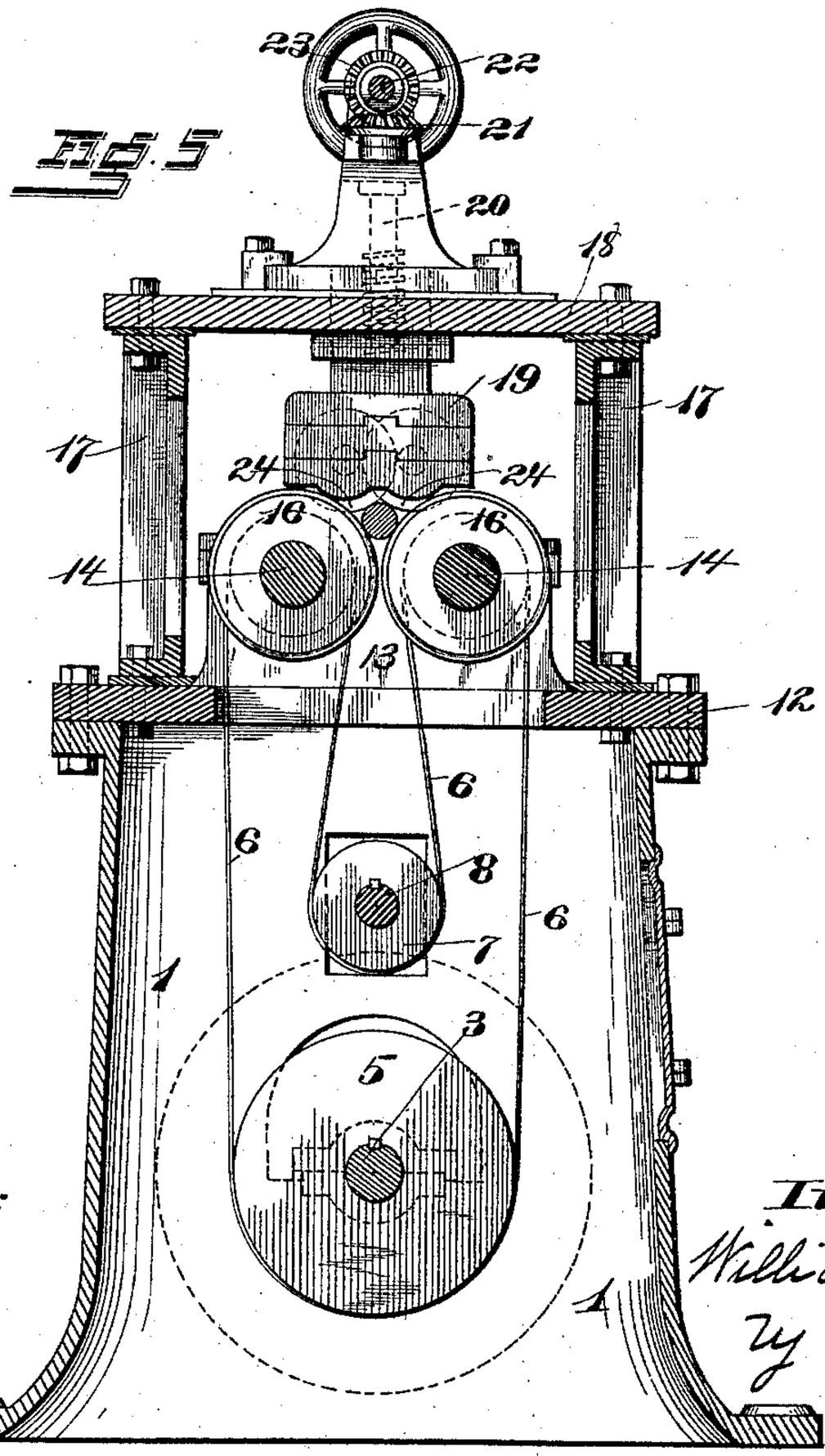

Fig. 5

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UNITED STATES PATENT OFFICE.

WILLIAM A. McCOOL, OF BEAVER FALLS, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO H. W. HARTMAN, OF SAME PLACE.

MACHINE FOR STRAIGHTENING METAL BARS, TUBES, &c.

SPECIFICATION forming part of Letters Patent No. 395,400, dated January 1, 1889.

Application filed October 1, 1888. Serial No. 286,836. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. McCOOL, a citizen of the United States, residing at Beaver Falls, in the county of Beaver and State of Pennsylvania, have invented certain new and useful Improvements in Machines for Straightening Metal Bars, Rods, or Tubes; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, wherein—

Figure 1 is a side elevation of a machine embodying my invention, partly in section. Fig. 2 is a plan view of the machine. Fig. 3 is an end view of the main frame and straightening or polishing mechanism, looking in the direction of the arrow, Fig. 1. Fig. 4 is a similar view of the rod or bar guide, and Fig. 5 is an enlarged vertical transverse section of the straightening mechanism. Fig. 6 is a view of a modified construction of the flexible, yielding, or spring guide.

Like symbols of reference indicate like parts wherever they occur.

This invention relates to the construction of machinery employed for straightening or polishing or straightening and polishing rods, bars, tubes, and like metallic articles in order to fit the same for use as shafting, piston-rods, and various other uses in the arts to which said rods and tubes in the rough and bent state in which they are originally produced are not adapted.

My present invention relates especially to that class of straightening or polishing machines wherein the rod operated on travels through the rolls in a line parallel with the axes of the rolls (or endwise) and is caused to travel by the action of the rolls or equivalent straightening or polishing mechanism, and has for its first object to apply the straightening or polishing force on lines directly opposite to but at one side and not against the points of support, whereby the spring of the rod is utilized, less power is required, and the tendency of the rod or tube to fly or to cramp in the machine is avoided. To accomplish this I combine with centrally-arranged rotary supports, whose axes of rotation are parallel with each other and with the line of feed, a series of rotary pressure-surfaces arranged on both sides (or in front and rear) of the central supports, said pressure-surfaces also having their axes parallel with each other and with the line of feed of the machine.

The second object I have in view is to so control and limit the vibration or spring of the free portion of the bar, rod, or tube operated on as to insure at all times the proper position of the rod, &c., in the machine, or with relation to the straightening devices thereof, and at the same time avoid any tendency of the rod to cramp, bind, or strain either itself or the straightening or polishing devices. This I accomplish by means of a flexible, yielding, or spring guide, preferably of such extent as to engage the rod at several different and distant points in its length.

There are other and minor features of invention, all of which will hereinafter more fully appear.

I will now proceed to describe my invention more specifically, so that others skilled in the art to which it appertains may apply the same.

In the drawings, 1 indicates a suitable frame or support for the straightening or polishing mechanism, which frame, if desired, may form a closed chamber to contain driving mechanism (indicated by dotted lines, Fig. 1) and be provided with a door, 2, for access thereto.

3 indicates a power-shaft journaled in said frame 1, provided with a band-wheel, 4, and two pulleys, 5 5, which, through belts 6 6, communicate motion to the rotary supports of the straightening or polishing mechanism. The belts 6 6 are loop-belts used to drive both rotary supports in the same direction. Said belts are passed around tightening-pulleys 7 7 on a movable shaft, 8, which shaft is controlled by a lever, 9, pivoted on the frame 1, as at 10, and provided with a locking or rack bar, as at 11, Fig. 3. In lieu of the above any suitable gearing may be used.

Bolted or otherwise secured to the top of frame 1 is the bed-plate 12 of the straightening or polishing mechanism, upon which at opposite ends are placed the pillow-blocks 13 13 for the bearings of the two rotary supports.

14 14 indicate two parallel shafts, each journaled at its ends in the pillow-blocks 13, provided at points near its journals with pulleys 15 15 for belts 6 6, and at its mid-length with a roll or rotary bar support, 16. These rotary bar or rod supports 16 16 are arranged side by side to form a groove or recess for the reception of the rod to be polished or straightened, and are preferably slightly convex to reduce their points of contact with the rod or bar operated on as well as to allow for the spring of the bar or rod without cramping it in the machine.

On opposite sides of the bed-plate 12 are pillars or vertical frames 17 17, which support a platform, 18, from which are adjustably suspended bearings 19, and in said bearings are journaled a series of pressure-rolls or rotary pressure-surfaces adapted to coact with the rotary supports 16, in either straightening or polishing the rod, bar, or tube.

20 20 indicate housing-screws for raising or lowering the suspended bearings 19, said screws provided with bevel-pinions 21 21 and coupled by shaft 22 and bevel-pinions 23 23; or any well-known or equivalent means for raising or lowering both the bearings 19 19 simultaneously may be substituted therefor if desired.

The bearings 19 19, it will be observed, are placed at opposite ends of the platform 18, so as to bring the rotary bar or rod supports 16, below and between the two sets of rotary pressure surfaces or rolls 24.

24 indicates the rotary pressure-surfaces, which are preferably two sets of narrow or disk rolls arranged with their axes parallel to the line of feed, said rolls so journaled in the suspended bearings 19 19 that the two rolls of a set lap over each other, as shown in full lines, Figs. 1 and 5, and dotted lines, Fig. 3.

While the rotary central supports, 16 16, are power-driven, as hereinbefore specified, and communicate motion to the rod or bar operated on, these rotary pressure-surfaces last described are not power-driven, and may be termed "idlers," as they receive their motion from the traveling rod-tube.

It will be noted on reference to Fig. 1 of the drawings that the central rotary supports, 16 16, form a fulcrum for the rod or tube, power being applied at two points distant therefrom by means of the pressure-surfaces 24 24, in consequence of which construction, or its equivalent, it results that though the portion of the rod or tube which has passed the fulcrum or rotary supports (see the arrow, Fig. 1) and been duly straightened thereby will revolve on a true axis the unstraightened portion or that not operated on will have considerable irregular vibration, which should be controlled, though not rigidly, as that would tend to cramp the machine, augment the power required to operate it, and risk the indenting of tubes, &c., operated on. The rod or tube guide for this and similar machines should therefore be one which will yield and had best support the rod or tube at several points along its length, and for this purpose any suitable frame with flexible strips or bands—such as rubber or leather—or springs—such as spiral—with rod loops or rings may be employed. That preferred is shown in Figs. 1, 2, and 4 of the drawings, and consists in a frame which may be composed of sills 25, uprights 26, cross-pieces 27, a longitudinal central timber, 28, and ridge-timber 29, with flexible (rubber or leather) strips 30, extending from timber 28 to timber 29, and provided with rod-holes 31 in the line of feed, and through which passes the rod or tube being operated upon; or, in lieu of the straps shown in Figs. 1 and 4, the spiral or equivalent springs 30*, with rod-loops 31*, may be extended from timber 28 to timber 29, as shown in the modification, Fig. 6.

The devices, being of the general character hereinbefore described, will operate as follows: The rod or tube to be operated on having been inserted in the loops or holes 31 (or 31*) of the flexible guide, its leading end is passed under the first set of rotary pressure-surfaces 24, (or those next to the guide,) over and between the central rotary supports, 16 16, and under the second or distant rotary pressure-surfaces 24, and the bearings of the rotary pressure-surfaces 24 are then lowered by means of the coupled housing-screws 20 20 until they bind on the rod or bar at the two points before and behind the central rotary supports and straightening devices, 16 16. The loop-belts 6 6 are then tightened by means of hand-lever 9, shaft 8, and pulleys 7 7, and said belts impart motion to the rotary supports 16 16, which, being both revolved in the same direction, rotate the rod or tube to be straightened on its own axis, while the rotary pressure surfaces or rollers 24 24 exert their pressure on lines parallel with lines which intersect the fulcrum (rotary supports 16 16) and the axis of the rod operated on, and on both sides of the fulcrum, so that the rotary motion of the rod is transmuted into a progressive forward motion which feeds the rod or tube through the machine without other force. The self-feeding of the bar is due to the position of the rolls and the spring of the bar. The feeding-rolls being somewhat rounding on their faces, as the bar rotates it is fed through by the pressure of the upper rolls, and the feed is both accurate and positive.

The above-described mechanism may be employed to straighten rods, tubes, and like articles which have been previously polished, or to polish or burnish such articles when they require no straightening or have been previously straightened, or it may be used to simultaneously straighten and polish.

Having thus described the nature, operation, and advantages of my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a machine for straightening or polishing rods, tubes, and like articles, the combi-

nation, with centrally-arranged rotary supports whose axes of rotation are parallel with the line of feed, of a series of rotary pressure-surfaces arranged before and behind the rotary supports, said pressure-surfaces having their axes of rotation parallel with each other and with the line of feed, substantially as and for the purposes specified.

2. In a machine for straightening or polishing rods, tubes, and like articles, the combination, with rotary rod-supports, of a series of pressure-rolls having parallel axes and lapping perimeters, substantially as and for the purposes specified.

3. In a machine for straightening or polishing rods, tubes, and like articles, the combination of rotary supports having parallel axes and convex perimeters and rotary pressure-rolls having parallel axes and lapping perimeters, substantially as and for the purposes specified.

4. In a machine for straightening or polishing rods, tubes, and like articles, the combination, with adjustable pressure-rolls, of two parallel centrally-arranged rod-supports provided with pulleys and loop-belts and tightening-pulleys for rotating both of the rotary supports in the same direction, substantially as and for the purposes specified.

5. The combination, with a straightening or polishing machine, of a flexible or yielding rod, bar, or tube guide, substantially as and for the purposes specified.

6. The combination, with a straightening or polishing machine, of a flexible or yielding rod or tube guide arranged to support the bar at several different points along its length, substantially as and for the purposes specified.

7. The combination, with the series of straightening or polishing rolls, of a flexible or yielding strap-guide having a series of rod-holes and arranged in the line of feed of said rolls, substantially as and for the purposes specified.

In testimony whereof I affix my signature, in presence of two witnesses, this 24th day of September, 1888.

WILLIAM A. McCOOL.

Witnesses:
J. F. MERRIMAN,
H. W. NAIR.