(No Model.) 3 Sheets—Sheet 1.

W. A. McCOOL.

MACHINE FOR STRAIGHTENING AND POLISHING METAL BARS, &c.

No. 445,571. Patented Feb. 3, 1891.

Fig. 1.

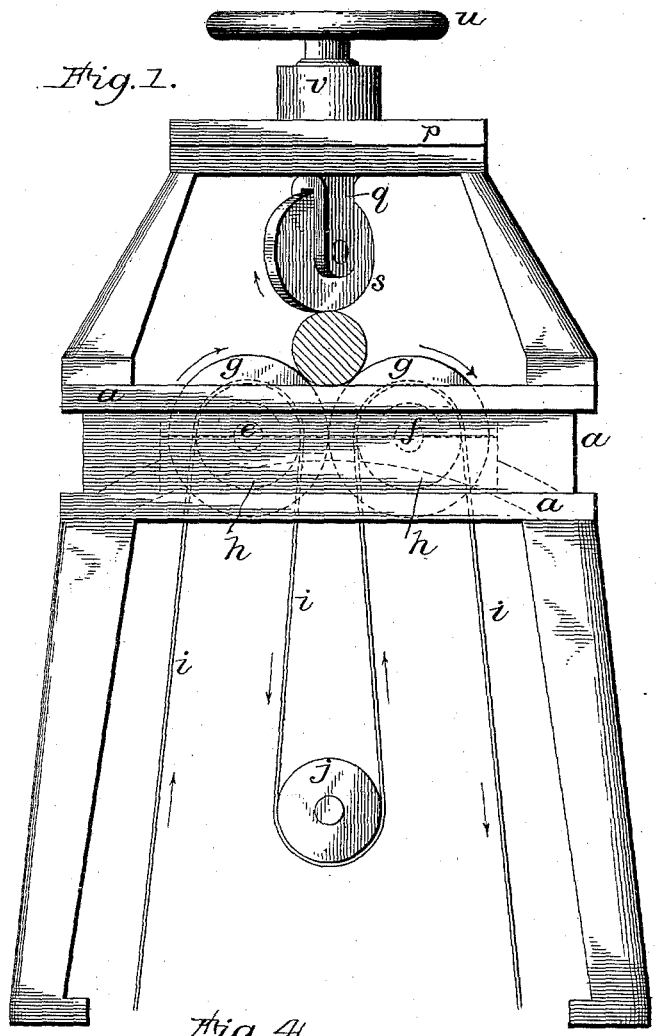


Fig. 4.

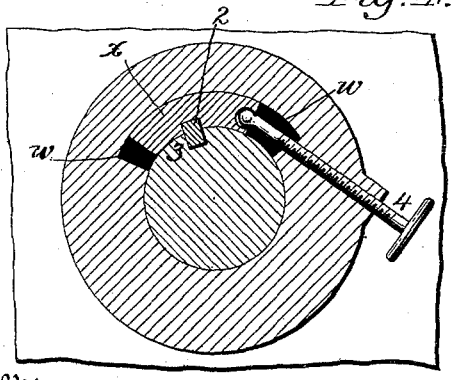
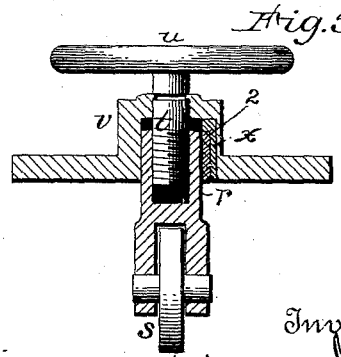


Fig. 5.



Witnesses
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(No Model.) 3 Sheets—Sheet 2.

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No. 445,571. Patented Feb. 3, 1891.

Fig. 2.

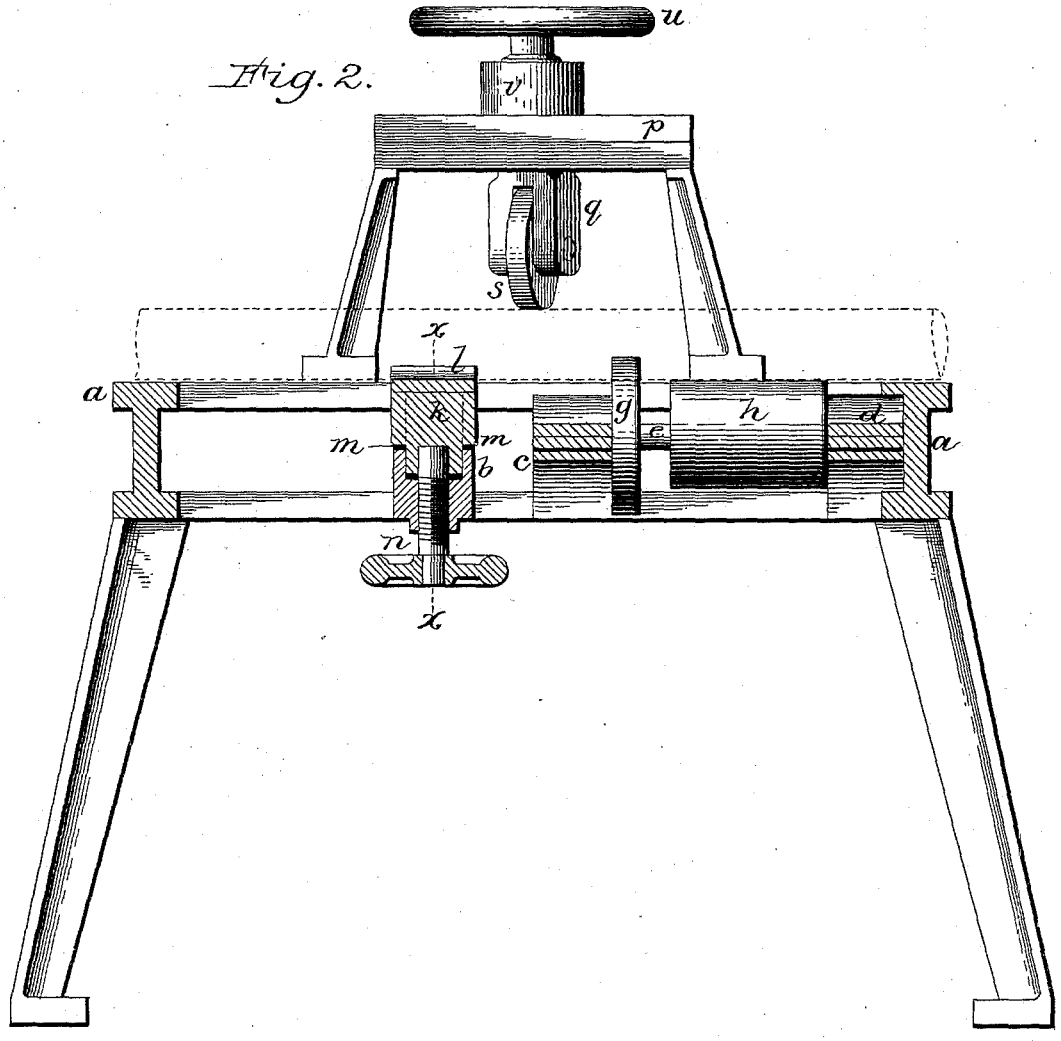

Fig. 3.

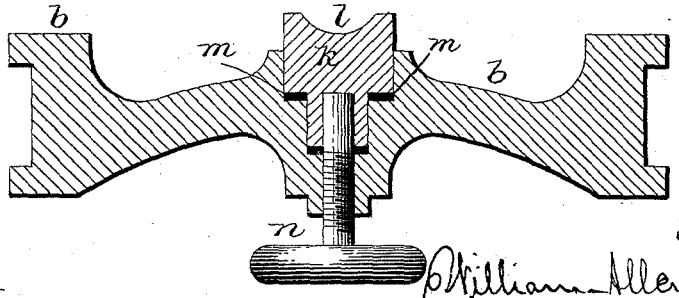

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Fig. 6.

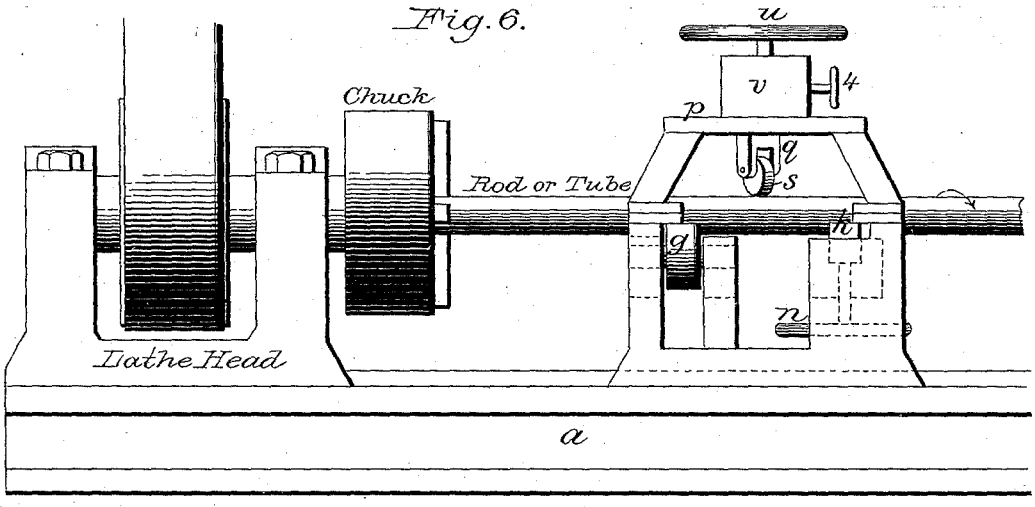
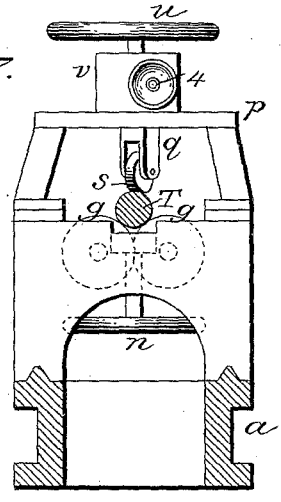


Fig. 7.



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his ATTORNEYS.

UNITED STATES PATENT OFFICE.

WILLIAM ALLEN McCOOL, OF BEAVER FALLS, PENNSYLVANIA.

MACHINE FOR STRAIGHTENING AND POLISHING METAL BARS, &c.

SPECIFICATION forming part of Letters Patent No. 445,571, dated February 3, 1891.

Application filed June 3, 1890. Serial No. 354,187. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM ALLEN McCOOL, a citizen of the United States, residing at Beaver Falls, in the county of Beaver and State of Pennsylvania, have invented new and useful Improvements in Machines for Straightening and Polishing Metal Bars, Tubes, &c., of which the following is a specification.

My invention is directed to improvements in machines for straightening metal bars, shafting, tubes, and other metal articles of cylindrical form to fit them for use for purposes for which they are intended; and my said improvements are more particularly designed to simplify the construction and to increase the efficiency of the machines for which Letters Patent were granted to me under dates of August 28, 1888, and January 1, 1889, as I shall now describe in connection with the accompanying drawings and designate in the concluding claims the matters and things which constitute my said invention.

In this improved machine I provide a vertically-adjustable concave guide-support for the article, which co-operates with the supporting-rolls to give the proper bearing for the article to be straightened, whereby the said guide-support takes the place of a pair of supporting-rolls to lessen the wearing-surfaces of the machine and to afford an easy adjustment of the article vertically in relation to the rotary supports and to compensate for the wear of their surfaces. Provision is also made in my improved machine for adjusting the angle of a pressure-roll in relation to the axis of the article being straightened, so that the periphery of said pressure-roll shall press upon the article at a point above and between the supports for the same at an angle or pitch to the axis of the same, and thereby cause a uniform travel or progression of such article, and by the adjustment of said roll to a greater or less degree of pitch to effect thereby a quicker or slower travel through the machine, as may be desired, and to suit the crooks and bends of the article.

Referring to the said drawings, Figure 1 is an end elevation of a machine embodying my invention. Fig. 2 is a longitudinal section of the same. Fig. 3 is a vertical section of the bearing-brace and the adjustable guide-support for the article, taken on the line *x* of Fig. 2. Fig. 4 is a horizontal section taken through the housing hub of the pressure-roll to illustrate the means of adjusting the pitch of said roll in relation to the line of the feed of the article, and Fig. 5 is a vertical section of the same device. Fig. 6 shows in side elevation my invention as applied to a lathe, and Fig. 7 a sectional end elevation of the same.

I prefer to so construct the bed or frame *a* that it may be fitted to the "ways" or "shears" of a lathe, and for this purpose it is cast open in the form shown, although it may be any suitable construction and mounted upon legs. Within the bed there is cast or otherwise made fast three transverse bearing-braces *b c d*, the middle one *c* of which is about in the middle of the bed and with the brace *d* next to the inner side of the bed are fitted to receive and confine the journals of two parallel shafts *e* and *f*, upon each of which is keyed a roll *g* in coincident positions, preferably next to the middle bearing-brace. These rolls are of equal diameter, and are so placed that their peripheries nearly meet and form a support between them for the article to be operated on, as seen in Fig. 1. Upon these roll-shafts, between the rolls and the brace *d*, are keyed the pulleys *h h*, which are of equal diameter and placed in coincident positions to receive a belt *i*, which passes in the direction of its travel over one pulley, then over an idle-pulley *j*, and back over the second pulley to a hand-wheel below, as in my said patent of January 1, 1889, so that the rotation of both the supporting-rolls shall be in the same direction, and thus cause the article to be revolved thereon.

The third bearing-brace *b* is placed a short distance from the middle brace and has fitted within it a block *k*, which has a concave groove *l* in its upper surface, which receives, supports, and serves to guide the article, and for this purpose the said groove has its axis coincident with the axis of the article to be straightened, and the arc described by said groove should be coincident with the circumference of the said article. This concave block is of rectangular form and fits into a rectangular seat *m* in the brace, so that it cannot turn within its seat, and rests therein

upon the upper end of a hand-wheel screw *n*, which is threaded in an opening in the brace, and by which the block may be adjusted vertically, so that the article may be supported in a horizontal line. I prefer to socket the lower end of the concave block and to fit the non-threaded portion of the screw therein the better to hold the block firmly in its seat.

A suitable housing *p* is mounted upon the frame-bed, within which a depending yoke-head *q* is secured by a guid -stem *r*, fitted in a bore formed in said housing and carrying at its lower end a pressure-roll *s*, acting in a direction toward and upon the article, so as to bend it down toward a point between its points of support. The guide-stem *r* is cylindrical and is bored out from its upper end and threaded in said bore for the reception of a powerful screw *t*, having an operating hand-wheel *u* and secured to a hub *v* in such manner as to allow said screw to be rotated for setting the yoke-stem to give the desired pressure upon the article at the point stated. In this adjustment the yoke-stem is raised and lowered within the bore of the housing. The bore of the housing has a recess *w* at one side (see Fig. 4) of segmental form, within which is fitted a segmental plate *x*, but not of a size to fill the recess, so that the plate can be moved around horizontally within the latter. This plate has a groove 2 on its side, which joins the stem, and the latter has a feather 3, which fits said groove and permits the stem to be adjusted vertically, as stated. To one edge of the segmental plate I connect a hand-wheel screw 4, which is threaded in a bore of the hub at a right angle with the axis of the stem and at one side of the latter, so that the action of the screw will move the segmental plate horizontally in its recess, and by means of its connection with the stem cause the latter to partially rotate within the hub, and thereby change the relative pitch or angle of the pressure-roll in relation to the axis of the article, and in this way to cause a forward feed of the article through the machine without other force. The connection of the stem of screw 4 with the segmental plate *x*, as shown, is made by a ball-and-socket joint in which the socket is larger than the ball on the end of the screw to give a free movement of the latter in a straight line, while the path of the segmental plate is circular; but any suitable loose connection of the screw and segmental plate may be used that will permit the adjustment of the segmental plate within its segmental recess, as stated. This provision for automatically moving the article forward also gives the advantage of regulating the speed of its feed or travel by increasing or diminishing the pitch or angle of the pressure-roll. This automatic feeding action of the pressure-roll by reason of its oblique angle in relation to the article gives also a polishing action in connection with the action of the rotating and fixed supports to the surface of the article, and it will be understood that the supporting-rolls, revolving in the same direction, causes the article to be revolved in the same direction and the pressure-roll to be revolved in an opposite direction, and by reason of the oblique relation of said roll to the article and the pressure of said roll upon the article at the point stated cause it to move forward under a straightening and polishing pressure and action.

The feed of the article may be reversed by a reversal of the angle of the pressure-roll in its relation to article being operated on.

When it is desired to apply my invention to a lathe, I fit the bed to the ways or slides of the lathe so that it forms a carriage in the lathe, and in such case the article is rotated independently of its roll-supports and acts as a feed-screw under the pressure of the top roll, and the straightening device is fed forward and backward upon the article until the desired results are obtained, as shown in Figs. 6 and 7.

In the organization of such a machine the wear of the supporting-rolls is compensated for by a quick vertical adjustment of the concave supporting-block. Moreover, this supporting-block acts as a fixed polisher for the article, which is both rotated and slid upon it under the action of the supporting and of the pressure rolls, so that the article is made straight between fixed and rotating surfaces, and polished by their combined rolling and rubbing action.

It is evident that articles which need no straightening may be polished in this machine, and in such case the pressure-roll is set to give the fastest feed to the article. I prefer to make the acting surfaces of the supporting and pressure rolls straight, and to make the non-moving concave bearing-surface considerably longer than the width of the supporting-rolls, so as to obtain the best polishing effect and to aid in the straightening action of the pressure-roll and the true guiding of the article through the machine.

I claim as my improvement—

1. In a machine for straightening and polishing metal articles of cylindrical form, the combination of the supporting-rolls, a vertically-adjustable support having a concave groove coincident with the circumference of the article, and a pressure-roll arranged to act upon the article at a point between its rotating and fixed supports, substantially as described.

2. In a machine for straightening and polishing metal articles of cylindrical form, the combination of the supporting-rolls, an angular supporting-block having a concave groove coincident with the circumference of the article, an angular socket-seat for said block, an adjusting device for raising and lowering said concave supporting-block, and the pressure-roll acting between the rigid grooved support and the supporting-rolls, for the purpose stated.

3. In a machine for straightening and polishing metal articles of cylindrical form, the

combination of the supporting-rolls, the vertically-adjustable concave supporting-block having a concave bearing-surface of greater length than the width of the supporting-rolls, and the vertically-adjustable pressure-roll, arranged and operating as described.

4. In a machine for straightening and polishing metal articles of cylindrical form, the combination of the supporting-rolls, the vertically-adjustable concave supporting-block having a concave bearing-surface coincident with the circumference of the article, the pressure-roll, and a device for adjusting its angle or pitch in relation to the axis of the article, substantially as described.

5. In a machine for straightening and polishing metal articles of cylindrical form, the combination of the supporting-rolls, the vertically-adjustable concave supporting-block having a concave bearing-surface coincident with the circumference of the article, the vertically-adjustable pressure-roll, its supporting-yoke head having a cylindrical stem provided with a vertical feather, a housing having a bore for said yoke-head and provided with a segmental recess, a segmental plate within said recess having a face-groove to receive said feather, and a screw connected with said segmental plate, whereby to adjust the pitch or angle of the pressure-roll in relation to the axis of the article, for the purpose stated.

6. In a machine for straightening and polishing metal articles of cylindrical form, the combination of the supporting-rolls, the angular concave block *k*, its angular guide-seat *m*, and the adjustable screw *n*, the pressure-roll, its yoke-head having a threaded bore and a vertical feather, the hand-screw for vertically adjusting said pressure-roll, a suitable housing for said screw, and means for adjusting the pressure-roll laterally, consisting of the segmental plate 2, having a groove connection with said feather, and the screw 4, connected with said segmental plate and the said housing, substantially as described.

7. In a machine for straightening and polishing metal articles of cylindrical form, wherein the article is supported upon rotating rolls and a concave bearing-surface, a pressure-roll above and between said moving and non-moving supports, having its axis at an angle with the axis of the article and rolling upon the latter at a pitch or angle, for the purpose stated.

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

WILLIAM ALLEN McCOOL.

Witnesses:
J. F. MERRIMAN,
GEORGE WARRINGTON.