2 Sheets—Sheet 1.

W. B. CHISHOLM, J. WALKER & E. MARTIN.

MACHINE FOR STRAIGHTENING RAILROAD RAILS AND OTHER BARS

No. 182,302. Patented Sept. 19, 1876.

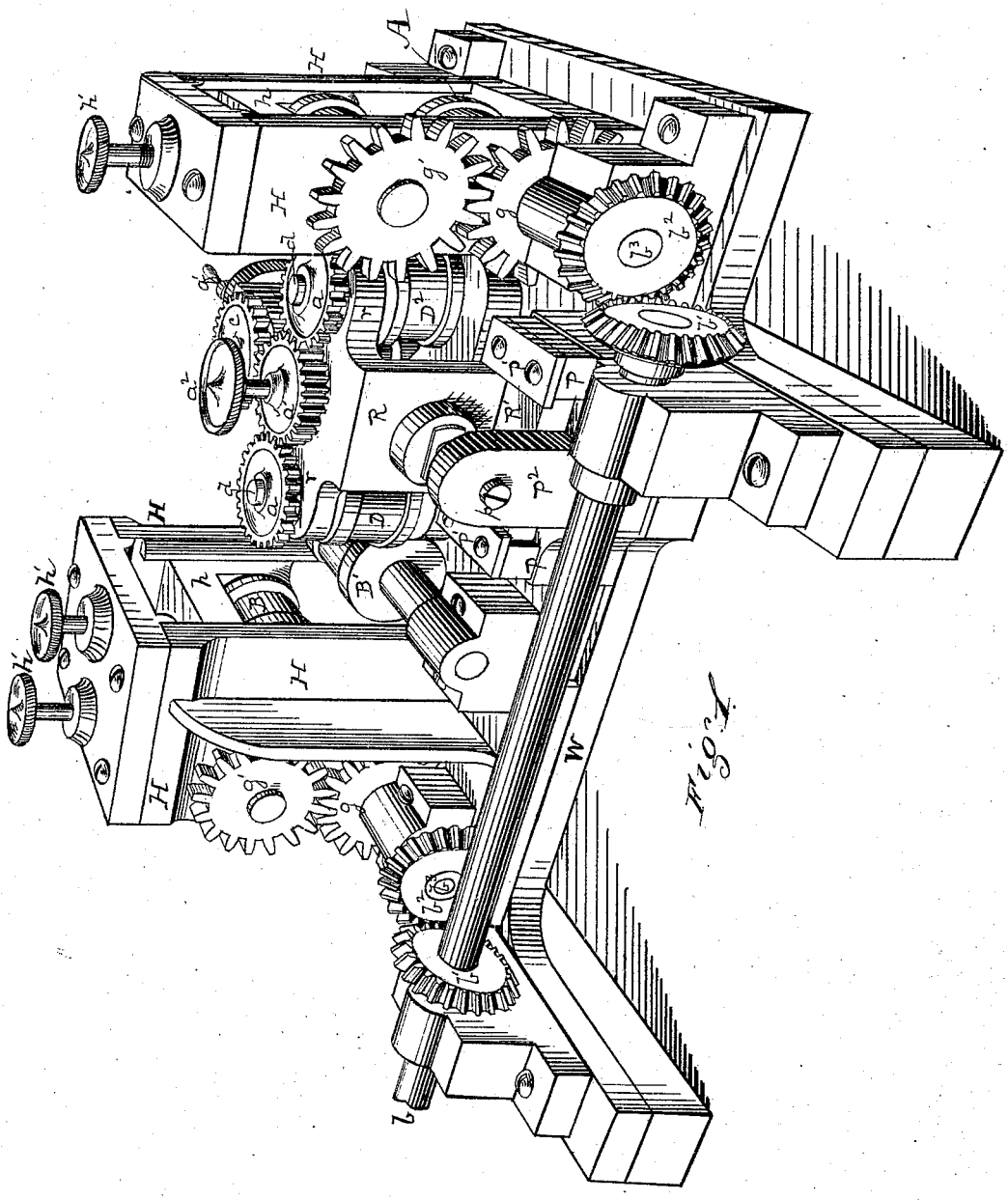

Fig. 1.

Witnesses
Robt Smith
Claudius S. Parker.

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By George H. Christy
their Atty

2 Sheets—Sheet 2.

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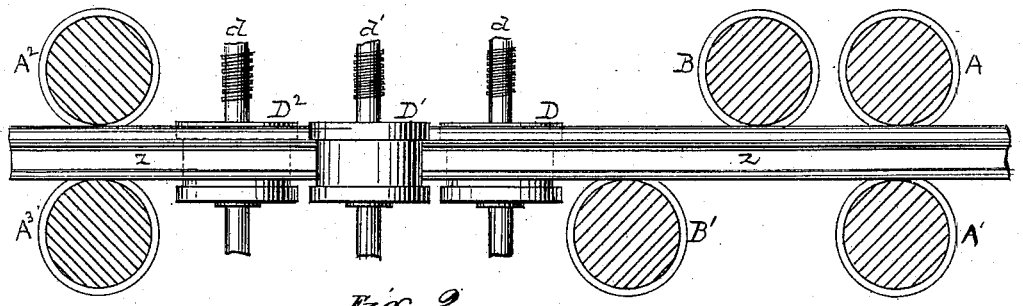

Fig. 2.

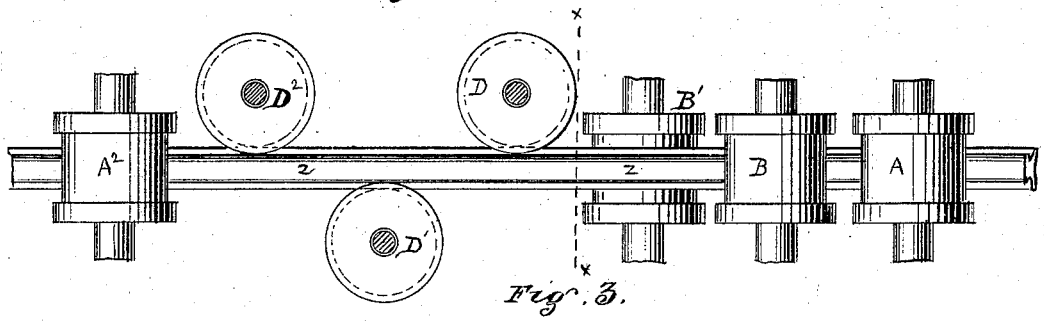

Fig. 3.

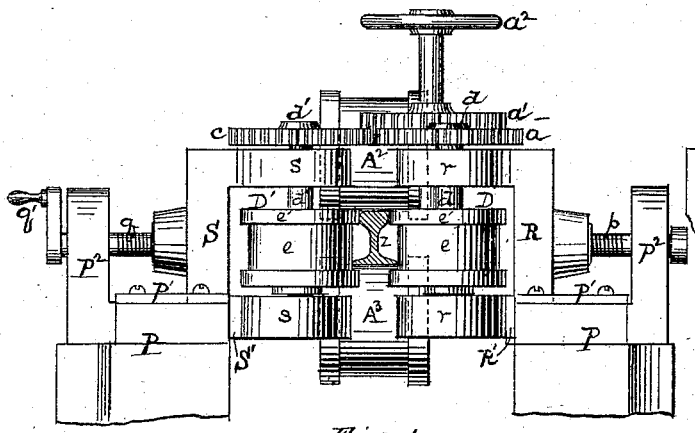

Fig. 4

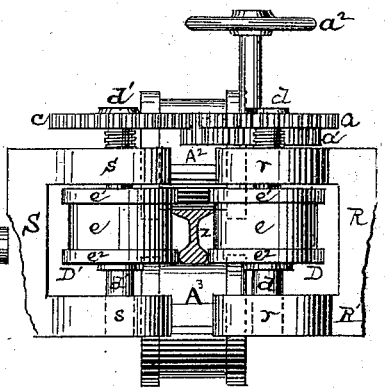

Fig. 5.

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UNITED STATES PATENT OFFICE.

WILSON B. CHISHOLM, JOHN WALKER, AND EDWIN MARTIN, OF CLEVELAND, OHIO.

IMPROVEMENT IN MACHINES FOR STRAIGHTENING RAILROAD-RAILS AND OTHER BARS.

Specification forming part of Letters Patent No. **182,302**, dated September 19, 1876; application filed August 2, 1876.

To all whom it may concern:

Be it known that we, WILSON B. CHISHOLM, JOHN WALKER, and EDWIN MARTIN, of Cleveland, county of Cuyahoga, State of Ohio, have invented or discovered a new and useful Improvement in Straightening-Machine; and we do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—like letters indicating like parts—

Figure 1, Sheet 1, is a side perspective view of our improved machine; Fig. 2, Sheet 2—a vertical sectional view of the horizontal rolls, and a side elevation of the vertical rolls, and of a railroad-rail passing through—illustrates in part their relative arrangement and operation. Fig. 3 is a top or plan view of the devices of Fig. 2; and Figs. 4 and 5 are transverse vertical sections through the machine in the line *x x* of Fig. 3, showing the vertical rolls and their means of adjustment.

While our invention in some of its features is applicable to machines for straightening rods and bars of irregular cross-section generally, we have especially designed and constructed it for use in the straightening of railroad-rails, and other irons of allied shapes, and our description will be chiefly, if not wholly, confined to such construction and use, since it will come within the knowledge of the skilled mechanic to embody its useful and important elements in machines for straightening other irregular sectional shapes.

In our machine, as shown, we employ nine rolls, of which six are horizontal and three vertical. Of the horizontal rolls four, arranged in pairs, A A^1 and A^2 A^3, are, alternately, feed and delivery rolls. One of these rolls, A^1, along with the other two horizontal rolls B B^1, constitute one set of straightening-rolls, and are arranged in accordance with well-known laws for the removal of vertical curves or bends in the rail *z*. The other three rolls, D D^1 D^2, are vertical rolls, and are arranged in like manner for the removal of lateral curves, bends, or deflections. The action of a series of three rolls thus arranged is so well known as not to require a further description. The rolls A A^1 A^2 A^3 B are mounted in bearing blocks or frames *h*, in housings H, of any suitable construction, and the upper ones are vertically adjustable in the usual way, and for the usual purposes, by means of any desired arrangement of adjusting-screws *h'*. The feed and delivery rolls A A^1 A^2 A^3 are geared to run by a common positive motion, imparted to them through a driving-shaft, *b*, and lines of gearing and shafting b^1 b^2 b^3 *g g'*. The shafts b^3 are, for convenience, prolongations of the necks of the rolls A^1 A^3, or, if the roll-bodies are made separate, they are secured on the same shafts. The pinions *g g'* are so shaped as to mesh and operate at all points within the limits of the necessary adjustments of the upper rolls A A^2. The rolls B B' run by frictional contact with the rail passing through.

Between the end rolls thus described, and on the base or foundation W of the machine, we fix on opposite sides of the line of feed a pair of rest-blocks, P, with over-projecting lips P^1 and vertical posts P^2. In one of these we arrange the base-plate R' of an adjustable sliding frame, R, having its inner end boxed out, and having the inner side of the box open, as shown in Figs. 4 and 5. The upper and lower sides of the box are elongated, so as to form bearings *r r* for the shafts *d d*, on which the rolls D D^2 are loosely arranged—that is, are arranged so that the rolls may revolve independently of their shafts. These shafts are made with screw-threads at their upper ends, as shown in Fig. 5, and such threaded parts of the shafts play through tapped nuts fixedly set or secured on or in the upper bearings *r*. Above the bearings the shafts are made long enough for adjusting pinions *a* to be secured thereto. Mounted on the same box is the intermediate pinion a^1, operated by the hand-wheel a^2. The frame R, carrying with it the rolls D D^2, is adjusted to and from the line of feed by an adjusting-screw, *p*. On the other side of the line of feed, and in the other rest-block P, we arrange the like base-plate S^1 of a like adjustable sliding frame, S, boxed out, and with its inner end open in like manner, as already described with reference to the frame R, and as also illustrated in Figs. 4 and 5. The upper and lower parts or sides of this box form bear-

ings *s s* for the shaft d^1, on which the third vertical roll D^1 is loosely arranged, as before described. And the upper end of this shaft is in like manner threaded, Fig. 5, and the threaded part plays in a tapped nut securely set in or on the upper bearing *s*. On the upper end of this shaft is secured the pinion *c*. This frame S, with its roller D^1, is also adjustable to and from the line of feed by an adjusting-screw, *q*, and, as the chief lateral adjustment is intended to be secured by varying the position of this single roll, we add a crank, q^1, for ease and facility in effecting the desired lateral adjustment.

The pinions *a*, *a*, and *c*, all mesh into the intermediate pinion a^1, and the teeth of these pinions, particularly of a^1 and *c*, are preferably so shaped that they will mesh at all times within the necessary limits of the lateral adjustments of the vertical rolls to and from each other. Also the intermediate pinion a^1 is made with teeth of such length as to be adapted to engage the teeth of the pinions *a a c* at all points of the necessary vertical adjustments of the rolls D D^1 D^2.

The horizontal rolls are, preferably, grooved, as shown, and the vertical rolls necessarily so, or, at least, made of different diameters in different parts, the depth of the groove, or the difference in diameter, being equal in each roll to one-half the difference between the breadth of the base and tread of the rail. Such differences of diameter will vary with the irregular shape of the bar to be straightened; and to this end the faces of the rolls may have any of the forms known in iron-rolling or included under the term "moldings."

Our invention is more particularly designed to enable rails to be inverted for passing through the machine, as well as to be run through with the tread up, so that going through tread up or base up it may be engaged on all sides, and all crowning-places be brought down straight.

In Figs. 2 and 4 we have represented the rail *z* as going through in its usual position.

The horizontal rolls are adjusted in the usual way, so as to be operative in removing vertical crowning curvatures or crooks. During this pass the vertical rolls are to be adjusted, as in Fig. 4, so that the grooves *e* shall engage the edges of the base of the rail, and the flanges e^1 the tread.

If, now, as frequently occurs, the rail has curvatures the reverse of those which the arrangement of rolls set forth is adapted to remove at the first pass, it then becomes necessary to invert the rail and run it through again. By having both sets of end feed and delivery rolls geared to run with a common motion we are enabled to reverse the power, (in any of the ordinary ways,) and run the machine back as easily and effectually as forward, and so, after inverting the rail, pass it back, as illustrated in Fig. 5; but before doing so the vertical rolls are to be readjusted, so that the flanges e^2 will engage the sides of the tread of the rail, while the groove *e* engages the edges of the base, as before, the horizontal rolls performing their function in either case in the same way. This operation is continued till the rail becomes perfectly straight, or as nearly so as practical use requires.

So far as relates to the vertical adjustment of the vertical rolls, it is obvious that other means of adjustment may be employed, and such rolls may be made separately adjustable, instead of adjustable simultaneously, by a single motion. It is also evident that the vertical rolls described might be made to work horizontally, and the horizontal rolls vertically, and such, as well as other changes, which do not change substantially the mode of operation, we include within our invention.

What we claim is—

1. In a machine for straightening metallic rods, rails, and bars, of irregular shape in cross-section, a series of grooved, collared, or molded rolls, at least three in number, on different sides of the line of feed, adjustable in the direction of their length with reference to the inversion of the rod, rail, or bar, substantially as and for the purposes set forth.

2. The grooved rolls D D^1 D^2, in combination with mechanism, substantially as described, for effecting the simultaneous endwise adjustment of the rolls.

3. The combination of end feed and delivery rolls, horizontal straightening-rolls, and endwise adjustable vertical straightening-rolls, substantially as and for the purposes set forth.

In testimony whereof we have hereunto set our hands.

WILSON B. CHISHOLM.
JOHN WALKER.
EDWIN MARTIN.

Witnesses:
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R. C. HAYES.