(No Model.) 2 Sheets—Sheet 1.

H. WICK, Jr.

MACHINE FOR STRAIGHTENING BARS, RAILS, &c.

No. 523,497. Patented July 24, 1894.

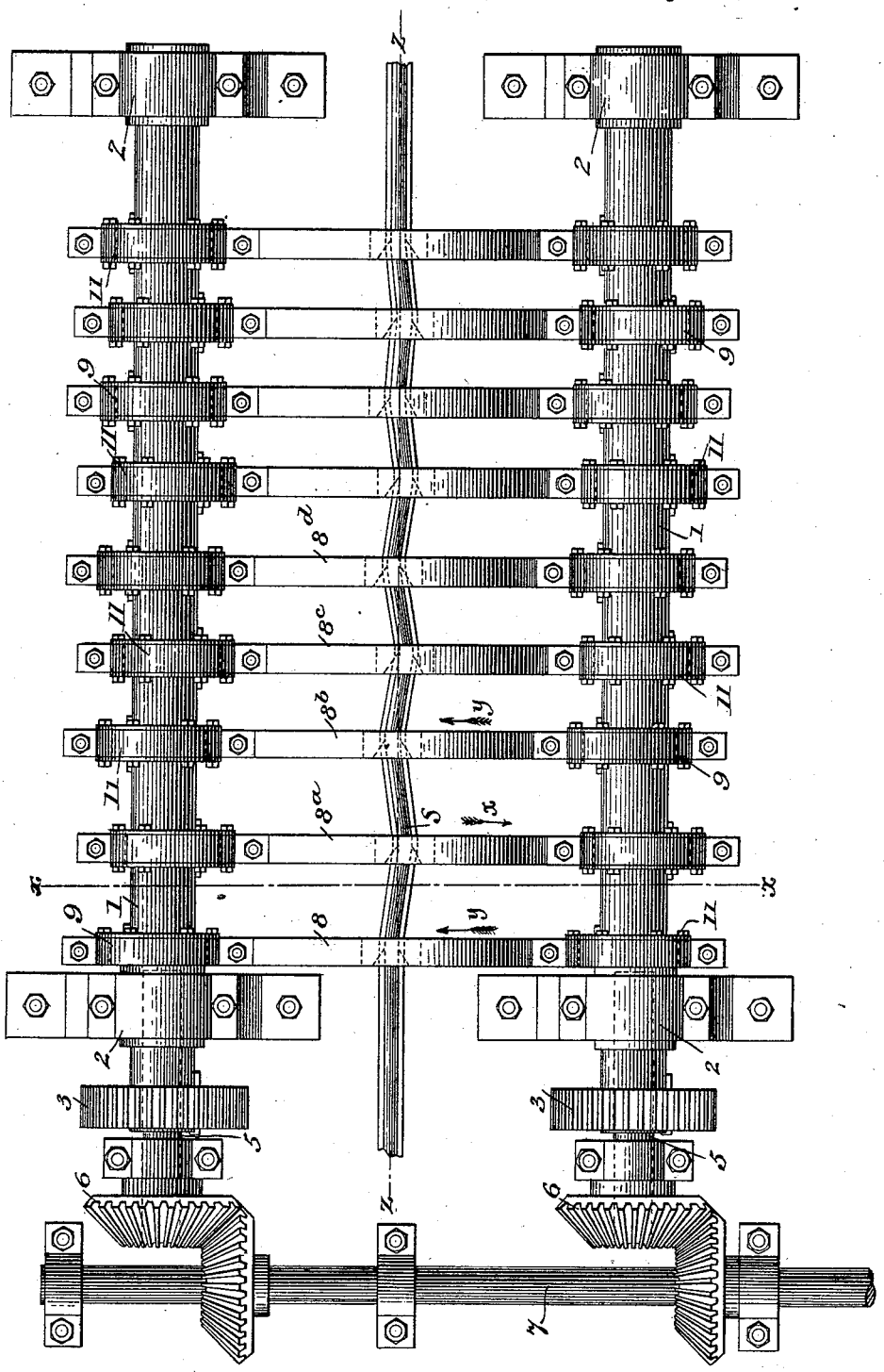

FIG. 1.

WITNESSES:

Dawrin S. Wolcott

Alex Scott

INVENTOR,

Harry Wick Jr

by George H. Christy Att'y.

(No Model.) 2 Sheets—Sheet 2.

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FIG. 2.

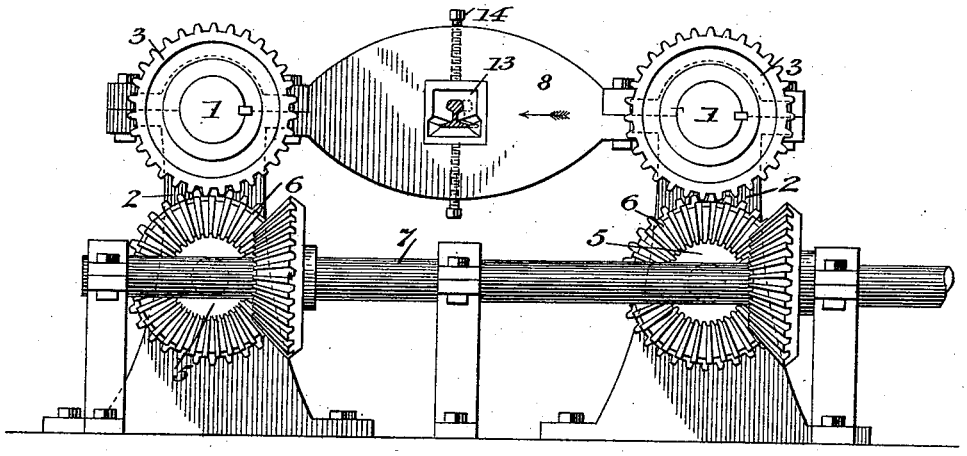


FIG. 3.

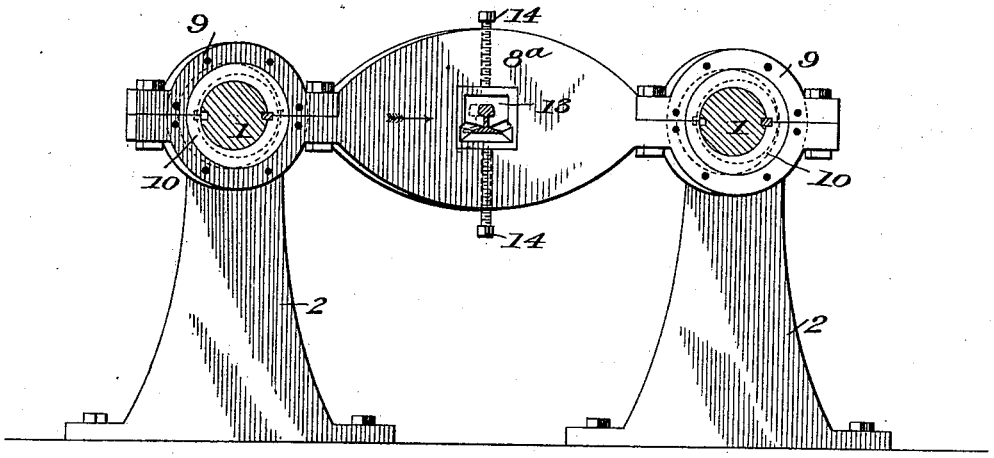


FIG. 4.

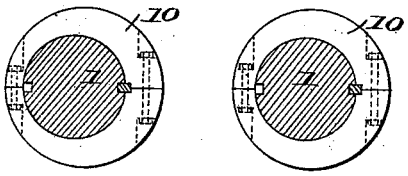
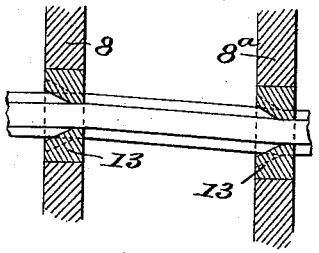


FIG. 5.



WITNESSES:

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by George N. Christy Att'y.

UNITED STATES PATENT OFFICE.

HENRY WICK, JR., OF YOUNGSTOWN, OHIO.

MACHINE FOR STRAIGHTENING BARS, RAILS, &c.

SPECIFICATION forming part of Letters Patent No. 523,497, dated July 24, 1894.

Application filed May 9, 1894. Serial No. 510,614. (No model.)

To all whom it may concern:

Be it known that I, HENRY WICK, Jr., a citizen of the United States, residing at Youngstown, in the county of Mahoning and State of Ohio, have invented or discovered certain new and useful Improvements in Straightening Bars, Rails, &c., of which improvements the following is a specification.

The invention described herein relates to certain improvements in the art of straightening bars, railroad rails, structural shapes, &c., and consists generally stated in subjecting the bar, rail, &c., to lateral flexing or bending of such a degree that when applied to a straight portion of the bar or rail the distortion will be within the elastic limits of the material of which the bar or rail is formed, so that it will return to normal condition, but if applied to a curved or distorted portion of the bar or rail such portion will be forced back toward the longitudinal axis of the bar, and as such flexing will be beyond the elastic limits of the material a permanent set of the curved portion will be effected.

The invention is hereinafter more fully described and claimed.

In the accompanying drawings forming a part of this specification, Figure 1 is a top plan view of my improved machine. Fig. 2 is an end elevation of the same. Fig. 3 is a sectional elevation, the plane of section being indicated by the line *x*—*x*, Fig. 1. Fig. 4 is a detail view illustrating the graduation of the eccentrics employed; and Fig. 5 is a sectional detail view.

In the practice of my invention, two shafts 1 are mounted in suitable pillow-blocks or standards 2, so arranged in pairs that the shafts 1 will be practically parallel with each other. On one end of each shaft is secured a gear-wheel 3, which intermeshes with a pinion on a counter-shaft 5. On the ends of the counter-shafts 5 are keyed bevel pinions 6 arranged to intermesh with corresponding pinions on the driving shaft 7.

One, two or more series of frames 8, 8^a, 8^b, &c., each series consisting of two, three or more frames, are arranged between the shafts 1. Each frame is provided at its ends with straps or boxes 9 for the reception of the eccentrics 10 keyed on the shafts 1. It is preferred to make the eccentrics and their straps or boxes in two parts held together by bolts in order to facilitate their application to and their removal from the shafts. The straps or boxes are held from lateral movement on their eccentrics by disks 11 bolted or otherwise secured to the side of the eccentrics, as shown in Fig. 1. In the frames, preferably midway between the shafts, are formed openings for the reception of the dies 13, which are held in position by set screws 14. In the dies are formed openings corresponding to the cross-sectional contour or shape of the article to be straightened, and of such a size as to permit the easy passage of the article through, without too great lateral movement of the dies independent of the article. As for example, the dies 13 are shown with openings corresponding to the cross-sectional shape of a railroad rail.

As shown in Fig. 1, adjacent eccentrics are set one hundred and eighty degrees apart, that is to say, the eccentrics of frame 8^a are set one hundred and eighty degrees from the eccentrics of frame 8, while the eccentrics of frame 8^b are set one hundred and eighty degrees from the eccentrics of frame 8^a. It results from this arrangement of eccentrics that adjacent frames will move in opposite directions, and that the movement of the frames will be such that the axes of the openings in the dies in the frames 8, 8^b and 8^d will be moved in one direction, in a circle whose center corresponds with the general longitudinal axis of the article being straightened. While the dies in the other frames, as 8^a, 8^c and 8^e, will be correspondingly shifted in the opposite direction. The radii of the circles described by the axes of the dies are of such lengths that a straight portion of the article moved that distance will not be bent beyond the elastic limit of the material, but if any portion of the article is moved a greater distance than the lengths of such radii, the elastic limit of the material will be passed, and permanent set be produced. In short, these radii correspond in length to the greatest limit of flexure within the elastic limits of the material operated on.

The eccentrics are so constructed as regards their throw, that the flexure or bend produced by their operation on straight portions of a rail or bar will not exceed the elastic limit

thereof, and will not therefore produce a permanent bend. But when operating on a portion already bent, the opposite movements of adjacent dies will produce a flexure beyond the elastic limit of the material and produce a permanent set in the article. As the direction of such flexure is toward the general longitudinal axis of the article, the deformed portion acted on will when the set has been produced, be in the general longitudinal axis.

As for example, the rail is shown in Fig. 1 as having a curve at *s*, the greatest curvature being in line with the frame 8^a, when this frame is moved in the direction of the arrow *x* and the frames 8 and 8^b in the direction of the arrows *y*, a slight flexure in the same direction as the curve would be produced, but when the motions of these frames are reversed, the curved portion will be bent in a direction opposite to its curvature, and the point *s* will be pushed into the general longitudinal axis of the rail as indicated by the line *z*. On account of its original curvature, the movement of the point *s* will be greater than the radii of the circles described by the axes of the dies and consequently beyond the elastic limit of the material, so that the rail will be set with the portion which had the curve with its axis in line with the axis indicated by the line *z*.

It will be understood that suitable mechanism is employed with the straightening machine for forcing the article forward through the dies, and that the onward movement of the rail is continuous, so that while the foregoing operation is described as being effected while the rail is stationary, and the die in frame 8^a operative only on the apex of the curve, it will in fact operate on all points.

If the curves or crooks in a bar or rail were of the same length, only a single series of frames, with a uniform throw of eccentrics, would be necessary; but as the curves vary in length and degree, two, three or more series are employed. The frames of each succeeding series are arranged closer together so as to operate on shorter curves; and as the shorter curves are of less depth than the longer ones, the throw of the eccentrics of the succeeding frames is decreased proportionately. By thus employing several series of frames, the frames of each succeeding series being arranged closer together and having shorter ranges of movement, provision is made for reducing all degrees of curvature so that the bar or rail will issue from the machine with all portions in practically perfect alignment.

It will be understood that in lieu of employing removable dies in the frames, openings corresponding to the cross-sectional contour of the article may be formed in the frames if desired.

In lieu of arranging the frames in series as regards their proximity to each other, and the throw of their eccentrics, the frames may be arranged that the distances between adjacent frames decrease gradually and the throw of the eccentrics of each successive frame decreases correspondingly.

As shown in Fig. 5, the dies are provided in their front sides with bell-mouths so as to insure the entry of the bars or rails into the dies regardless of the position of the latter.

I claim as my invention—

1. In a machine for straightening bars, rails, &c., the combination of a series of three or more frames having openings conforming to or approximately to the cross-sectional contour of the article to be straightened, means for imparting a combined lateral and vertical positive movement to alternate frames in one direction, and a similar movement to intermediate frames in the opposite direction, substantially as set forth.

2. In a machine for straightening bars, rails, &c., the combination of two parallel or approximately parallel shafts, three or more pairs of eccentrics arranged on said shafts, alternate pairs being set one hundred and eighty degrees or approximately so to the intermediate pairs, three or more frames provided at their ends with straps or boxes for the reception of the eccentrics, and having openings therethrough corresponding to the cross-sectional contour of the article to be straightened, substantially as set forth.

In testimony whereof I have hereunto set my hand.

HENRY WICK, JR.

Witnesses:
DARWIN S. WOLCOTT,
F. E. GAITHER.