3 Sheets—Sheet 1.

J. S. SEAMAN.

Machine for Edging, Sizing and Straightening Non-Cylindrical Metal-Bars.

No. 209,588. **Patented Nov. 5, 1878.**

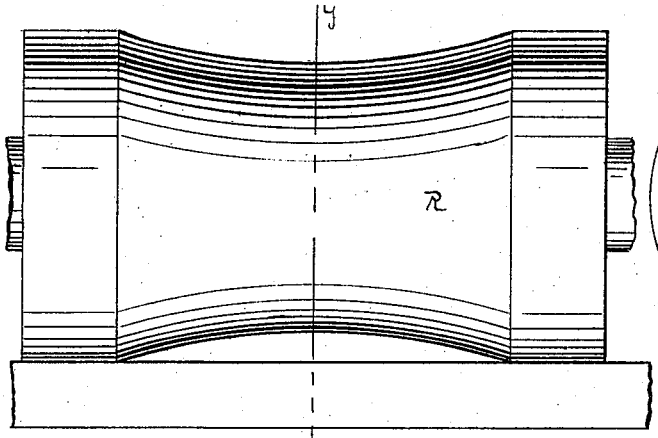

Fig. 1.

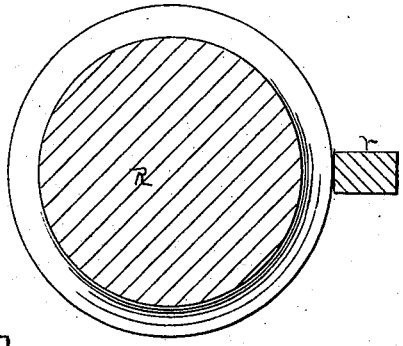

Fig. 2.

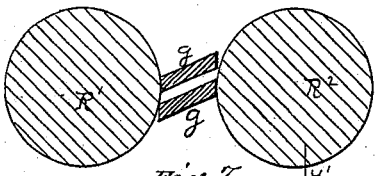

Fig. 7.

Fig. 3.

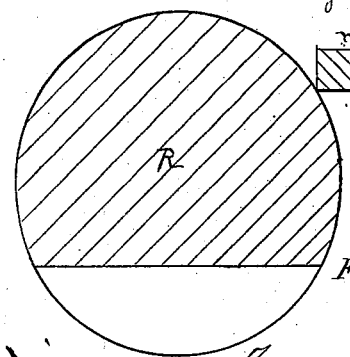

Fig. 4.

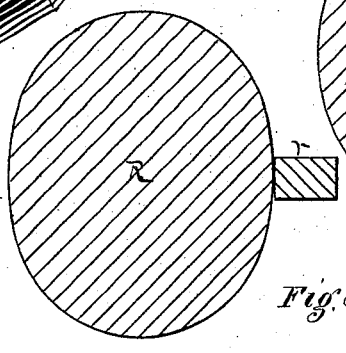

Fig. 5.

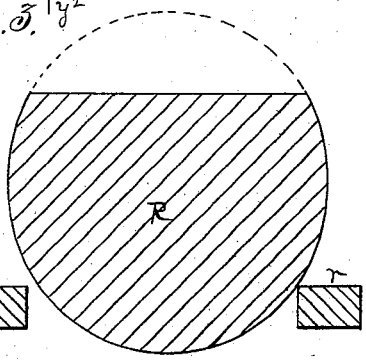

Fig. 6.

Witnesses
Francis L. Clark
C. L. Parker

Inventor Joseph S. Seaman
By Attorney George H. Christy.

3 Sheets—Sheet 2.

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Machine for Edging, Sizing and Straightening Non-Cylindrical Metal-Bars.

No. 209,588. **Patented Nov. 5, 1878.**

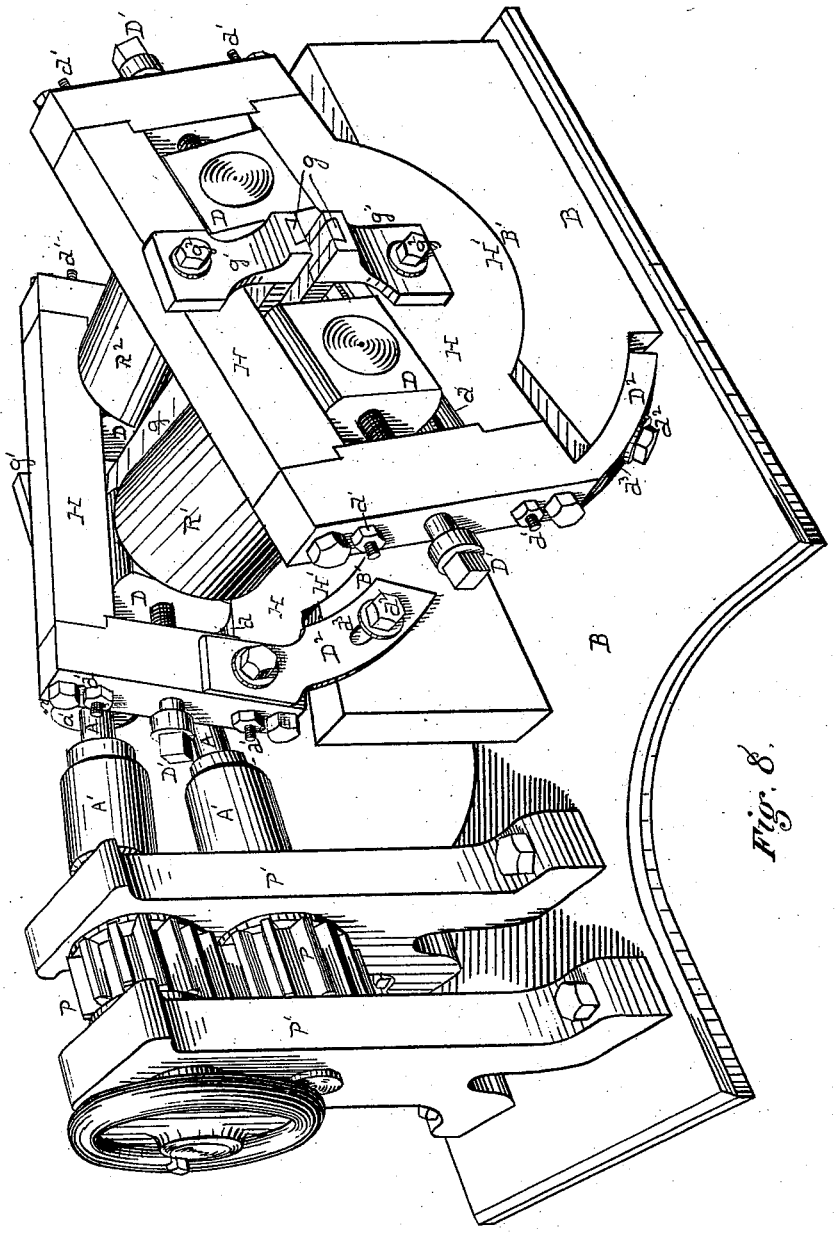

Fig. 8.

Witnesses
Francis L. Clark
E. L. Parker

Inventor Joseph S. Seaman,
By Attorney George H. Christy.

3 Sheets—Sheet 3.

J. S. SEAMAN.

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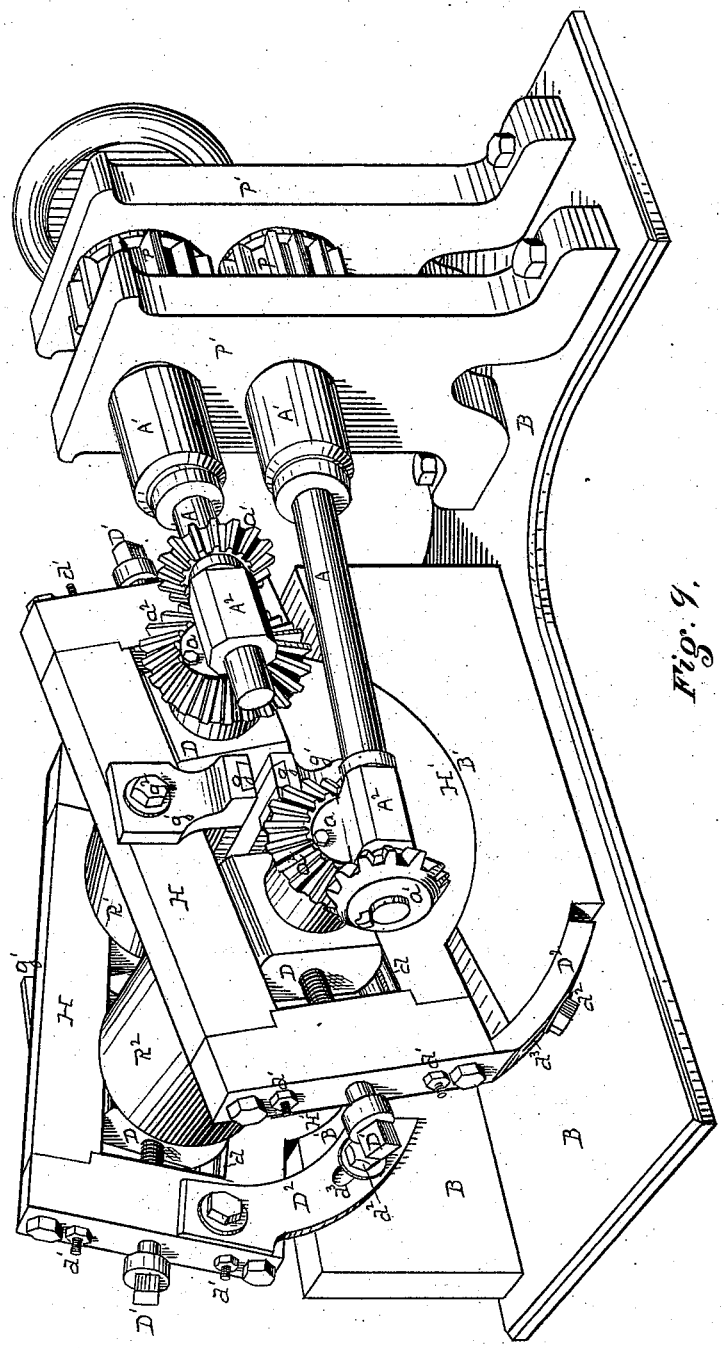

Fig. 9.

Witnesses.
Francis L. Clark
C. L. Parker

Inventor Joseph S. Seaman,
By Attorney George H. Christy

UNITED STATES PATENT OFFICE.

JOSEPH S. SEAMAN, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN MACHINES FOR EDGING, SIZING, AND STRAIGHTENING NON-CYLINDRICAL METAL BARS.

Specification forming part of Letters Patent No. **209,588**, dated November 5, 1878; application filed April 18, 1878.

To all whom it may concern:

Be it known that I, JOSEPH S. SEAMAN, of Pittsburg, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Metal Edging, Straightening, and Sizing Machines; and I 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 indicate like parts.

The present improvement relates to the edging, straightening, and sizing of iron and steel bars, beams, girders, rails, &c., of irregular or other than cylindrical shape in cross-section, or bars, beams, girders, rails, &c., which in such operation are not rotated on their axes.

The characteristic features of the machine I employ are, first, a pair of revolving rolls of any known suitable form, such as cylindrical, concave-faced, disk-rolls, or screw-collared rolls, or rolls having two or more of these features in combination; second, a guide or guides which shall first prevent the rotation of the bar (using this term, as I propose to do through this specification, in a generic sense) while being operated on, and, second, shall give a line of feed other than right angular to a plane passing through the axis of either roll, that being the only line of feed ever yet used to my knowledge in passing such non-cylindrical material through a rolling operation.

As the substantive features of my improvement may be embodied in many ways, I will explain somewhat in detail those which I deem the more important, taking up first the subject of edging.

Figure 1 shows a concaved-face roll, R, of any desired curvature. It is a well-understood fact that such a roll can be cut by a plane passing through it at such an angle with the axis that the line of cut on the surface of the roll will be a straight line. Assume that the dotted line $x\,x$, Fig. 3, represents such a line. Let Fig. 2 represent a cross-section of the roll R in the line $y\,y$, Fig. 1, with a rectangular bar, r, presented edgewise thereto and in a line parallel to the axis of the roll. The roll would then bear on the bar only at the ends of the roll and on the bar only at the center of its edge.

If, now, the bar r be thrown out line with the roll until it presents the same angle to the roll-axis as is represented by the line $x\,x$, then the roll will take a bite on the bar from end to end, but in a diagonal line, as represented by the dotted line $x\,x$ in Fig. 3.

One end of the roll will bear on the corner of the edge of the bar, as in Fig. 4, (that being a cross-section in the line $y^1\,y^1$,) the other end will bear on the diagonally-opposite corner of the same edge, as in Fig. 6, section on $y^2\,y^2$, and at the middle of the bar the bearing will be directly across the middle of the edge, as approximately shown in Fig. 5, section on $y^3\,y^3$. Now, by varying this angle of bar and roll, or varying the angle of feed with reference to the roll, I vary the edging effect of the rolls.

On the one hand, by making the line of feed a little nearer the line of the roll than is represented by the supposed line $x\,x$, I cause the chief working power of the roll to be effective on the edges of the bar, and by reducing such edges or working them down I make the edge of the bar r rounding; and, on the other hand, by making the angle of feed greater than that represented by the supposed line $x\,x$, the chief working power of the roll will at its middle part be made effective on and directly across the edge of the bar, so as to give a flat edge with square corners.

By arranging a like roll, so as, under like conditions, to be operative in like manner on the other edge of the bar, such opposite edge can be rounded or squared at the same time; but preferably in such case the two rolls are arranged in different planes, with the line of feed bisecting the angle which the axial lines of the rolls make with each other.

In order to make the above illustration clear, I have shown a much greater concavity in the roll R than I would prefer to employ.

A machine embodying the principles above explained in what I now believe to be their best form is represented in the other figures of the drawings, in which Figs. 8 and 9, Sheets 2 and 3, show perspective views of the machine from opposite sides.

The rolls $R^1\,R^2$ are arranged, as just stated, in different planes, their axial lines crossing each other at or near a point midway between

their ends, and in such position relative to the interposed feed-guides *g g* as that the line of feed shall, by preference, bisect such angle, or nearly so, at or near the crossing-point. The rolls represented are intended to be slightly hollowing or concave from the ends to or toward the middle points of their length; but in the rolls as I prefer to use them the concavity is so slight that it is difficult to represent it in perspective view. But the amount of concavity is not material, and in fact the invention may be used with rolls both of which are of the ordinary cylindrical form. These rolls are mounted in rocking or oscillating housings H H, each made with a portion or the whole of the lower edge of a circular form, as at H′, and which circular edge rests on a correspondingly-curved seat, B′, of the stationary or main frame B. Each housing may then be rocked one one way and the other the other, so as to cause the rolls to assume any desired angle with reference to each other. To permit of this adjusting motion, the roll-necks have their bearings in bearing-blocks D D, the upper and lower bearing-edges of which are made rounding, as shown, and such rounded edges rest in concave seats in the adjacent edges of the housing-frame, the form of such seats being as illustrated at *d*. As the housings are rocked in the plane of their length, the bearings D will rock in a plane transverse thereto, so that the rolls will be automatically adjustable relative to each other and to the line of feed. The bearings D are adjusted toward each other by means of set-screws D^1, and in a reverse direction by screw-bolts and nuts d^1, the opposite or unseen ends of which are made of T or L form, and hook onto the inner or adjacent ends of the bearings D in the manner common in such art. One or more lugs or straps, D^2, extend from each housing H, an lap onto some fixed part of the stationary frame B, so that the rocking housings H can be fixed or secured at any desired position of adjustment by means of fastening-bolts d^2, passing through slots d^3, or by other equivalent means.

The feed-guides *g g* are made of such form of face as may be necessary to hold the bar to be operated on in the proper line of feed, so as to present the proper edges to the action of the rolls, and also so as to prevent the rotation of the bar on its own axis while being operated on.

The guides shown are intended for use in the edging and straightening of rectangular bars; but as I propose to employ the invention with railroad-rails, H-iron, and iron and steel bars, rails, girders, beams, &c., of other irregular forms, the adjacent faces of the guides must, in such use, be correspondingly changed. These guides are in any case open on their sides toward the rolls at all working points, but should be so shaped and attached as that, while leaving room for the bar to pass through readily under the feeding motion imparted to it by the rolls, (such effect being well known in the use of such rolls,) they will still prevent any material bending or buckling of the bar, or any part thereof, in a vertical direction during the time that the rolls are working the bar by transverse or horizontal pressure. Such guides may be secured to the housings by brackets g^1 and bolts g^2. For purposes of adjustment relative to the working-planes of the rolls, they may be turned on the bolts g^2 as centers, and adjustment to and from each other may be provided for, if necessary, by the usual slotted connections; but this will probably be unnecessary, as separate guides will ordinarily be required for different sizes and shapes of product or article to be worked.

I have shown one convenient construction of driving-gear, in which the pinions P P are mounted in housings P′. The shafts A have swiveled or universal-joint connections in the coupling-boxes A^1 at one end, and at their other ends they are journaled in boxes A^2, which are secured to the pinion-blocks *a*, and the latter have a swiveled or universal-joint connection with the adjacent roll-necks in any of the ways known to the art. Motion is then communicated from the shafts to the rolls through the miter-wheels a^1 a^2.

In accordance with principles of operation already explained, the edges or two opposite faces of a bar, beam, girder, or rail are presented to the action of the rolls, so as to round and straighten or square and straighten the edges or face operated on, and also at the same time bring the articles worked to a uniform size. Among other uses of this improvement, I employ it for edging and sizing file-blanks, making the edges rounding or flat, with square corners, as may be desired; also for sizing iron or steel bars where great accuracy of size is required; also, in connection with suitable guides, for bringing railroad-rails to a uniform height. It is a well-known fact that as the grooves in which such rails are rolled become worn by use they will produce a rail a little too high, and with many railroad men a variation of the one-thirty second part of an inch in this respect will cause the condemnation of the rail. By passing such rails through my machine I can bring them all to a uniform height, and thus enable the roller to continue the use of the same rolls for a much longer time, as well as bring the rails much more perfectly to the standard measurement; and the same may be done with T-iron, H-iron, &c., guides conformed to the worked faces of the bar being substituted for those shown, and the rolls being properly adjusted in accordance with the principles above stated.

So far as relates to sizing and making flat edges or faces, cylindrical rolls arranged with their axes parallel may be employed; but in such case they should be geared so as to revolve in opposite directions, and not in the same direction, as illustrated in the drawing, with reference to concave-faced rolls; also, in

such case, the feed-guides should be at an acute angle to the axial line of the rolls; but such angle may be varied at pleasure.

It will also be within the present invention to incline the guides *g* somewhat, as illustrated in Fig. 7, Sheet 1, so that a skelp may be fed through and its edges be beveled by the action of the rolls thereon preparatory to making a lap-weld pipe or tube. The rolls in this case may be either cylindrical or concave-faced.

From these illustrations the skilled mechanic will have little or no difficulty in adapting this improvement to other uses in the art of edging, straightening, or sizing different metallic articles or products.

The use of the rocking or adjustable housings I do not deem essential, as other modes of adjustment may be employed; and, in fact, the rolls may be set at the proper angle in fixed housings at one or both ends, so as to do one or more kinds or sizes of work without other means of adjustment in such fixed housing than such as are in ordinary use; and all such and other modifications which include my improvement, in whole or in part, are expressly included within the scope of the claims hereinafter made.

Without confining myself to any exact theory of operation, it is probable that the rolls have partly a grinding or cutting and partly a reducing or compressing effect on the bar, the percentage or relative proportion of each effect depending somewhat, perhaps, on the temperature of the bar and the amount of pressure employed. Preferably the bar is heated before being operated on, but not necessarily so, as the operation described may be performed even after the bar has become cold, or practically so; and, in so far as relates to straightening, such effect results in part from the fact that by feeding in the bar at an angle varying from a right angle the length of bite of the two rolls on the bar is correspondingly prolonged, and all kink, crooks, or other inequalities not longer than the length of bite will be removed.

I should add that under the term "rolls" I include any known form of revolving rolling-surface—such as disk-rolls, the disks being of uniform diameter or concaved more or less at the middle, and also rolls having a worm face, like a screw-thread, rectangular in cross-section, and either straight or curved, as before; and the feeding effect of such screw-thread may be made use of in the operation described.

I claim herein as my invention—

1. The mode of working the opposite edges or top and bottom faces of bars, skelps, rails, beams, and other like non-cylindrical articles by causing them to pass between a pair of rolls at other than a right angle to one or both the rolls, while prevented from rotating by top and bottom guides, substantially in the manner and for the purposes above set forth.

2. The combination of revolving rolls, rocking frames or housings, and self-adjusting roll-bearings in the housings, substantially as described.

3. A rocking frame or housing having guide-supports attached thereto, in combination with inclined rolls and parallel guides, substantially as set forth.

4. A pair of parallel guides, *g g*, Fig. 7, tilted on their longitudinal axial lines to an oblique position, arranged between a pair of revolving rolls and parallel therewith or at an acute angle thereto, substantially as set forth.

In testimony whereof I have hereunto set my hand.

JOSEPH S. SEAMAN.

Witnesses:

JAMES A. MCKEAN,

GEORGE H. CHRISTY.