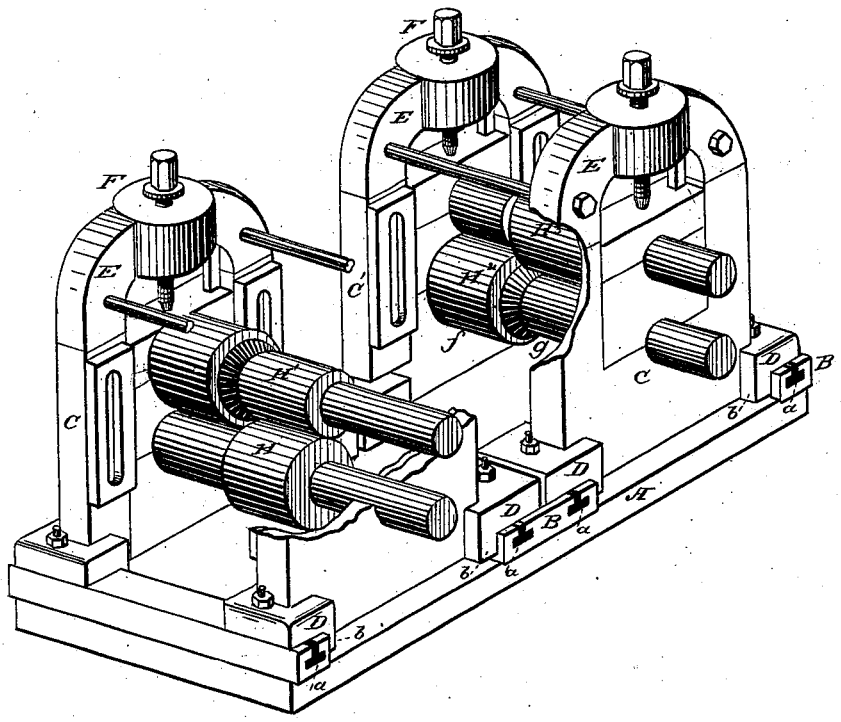
3 Sheets—Sheet 1.

W. R. JENKINS, Jr.
Metal Rolling-Mill.

No. 204,976. Patented June 18, 1878.

Fig. 1.



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W. R. JENKINS, Jr.
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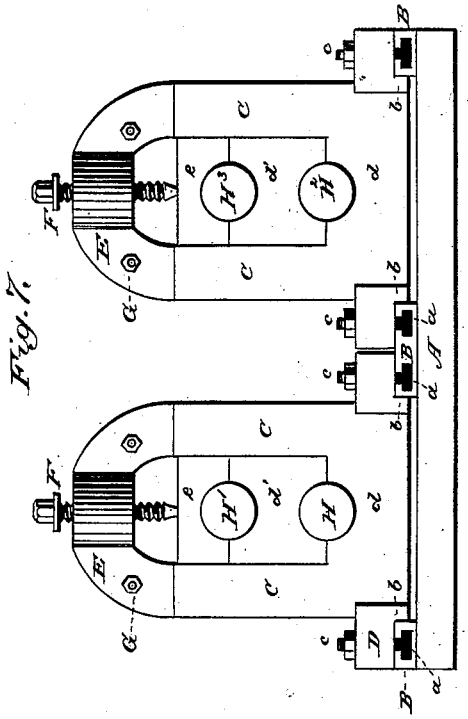


Fig. 8.

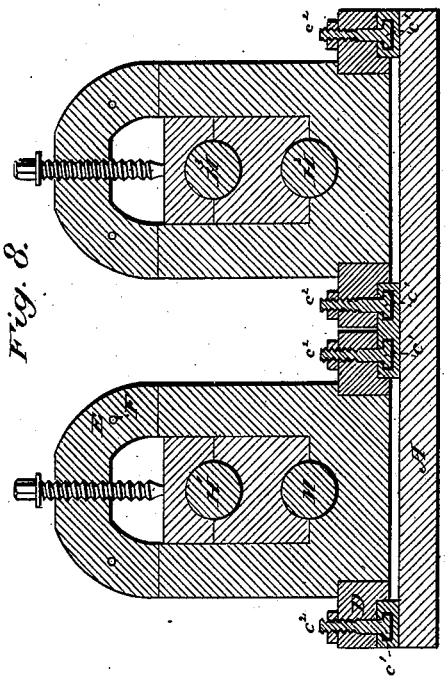


Fig. 2.

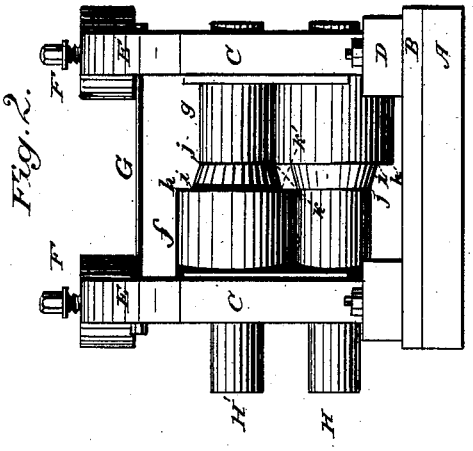
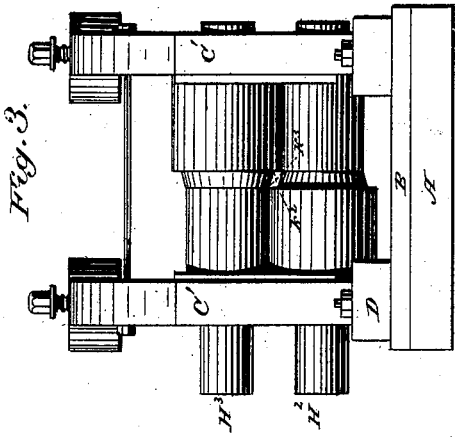


Fig. 3.



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W. R. JENKINS, Jr.
Metal Rolling-Mill.

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Fig. 5.

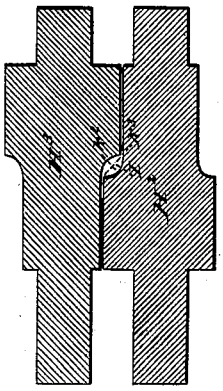


Fig. 6.

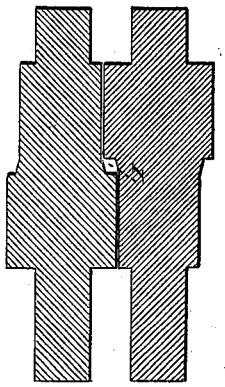


Fig 4

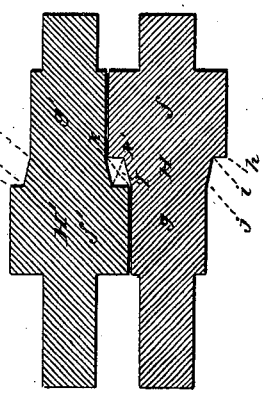
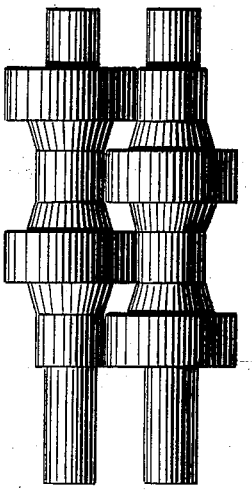


Fig. 9.



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UNITED STATES PATENT OFFICE.

WILLIAM R. JENKINS, JR., OF BELLEFONTE, PENNSYLVANIA.

IMPROVEMENT IN METAL-ROLLING MILLS.

Specification forming part of Letters Patent No. **204,976**, dated June 18, 1878; application filed October 13, 1877.

To all whom it may concern:

Be it known that I, WILLIAM R. JENKINS, Jr., of Bellefonte, in the county of Centre and State of Pennsylvania, have invented a new and useful Improvement in Continuous Rolling-Mills; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The object I have in view is the construction of a continuous rolling-mill, in which all the rolls shall be arranged in a horizontal position without intermediate twisting-guides, and thereby the disadvantages connected with rolls vertically arranged, or twisting-guides, shall be avoided, whereby the power applied may be less complex and expensive, and the whole mill be simpler and cheaper; and my invention therein consists in constructing the train of rolls with grooves or passes, each with a longer and a shorter axis, arranged alternately; and, further, in the arrangement of the pairs of horizontal rolls so that the same will present to the iron passing between them the shorter axes of the grooves or passes alternately at right angles, all as fully hereinafter explained.

In order that those skilled in the art may know how to make and use my rolling-mill, I now proceed to describe the same, having reference to the accompanying drawings, in which—

Figure 1 is a perspective elevation of my rolling-mill; Fig. 2, a front elevation of one pair of rolls; Fig. 3, a similar elevation of the next pair of rolls; Figs. 4, 5, 6, central vertical cross-sections of several pairs of rolls; Fig. 7, a side elevation of the rolling-mill on the gear side; Fig. 8, a vertical section through the housings on the same side, and Fig. 9 a modification of a pair of rolls.

Similar letters denote corresponding parts.

In the drawings, A represents the bed-plate, preferably cast in one piece, long enough to receive all the housings, and of a proper width for the rolls designed to be mounted in the housings. This bed-plate is cast with cross-bearings B, at proper distances to support the housings, in each of which bearings is a locking-groove, *a*, of a T-shaped form, reversed, extending the entire length of the bearing. Upon these bearings the housings C C are mounted, having feet D projecting before and behind, with dependent flanges *b b*. These housings are mounted upon the bearings named by placing the feet so that the flanges *b b* extend below the upper surfaces of the bearings, and are secured in place thereon by bolts *c*, having heads c^1, adapted to fit into and move in the longitudinal portion of the groove *a*, while the body c^2 of the bolt extends up through the foot, and is supplied with a nut or equivalent device, so that the housings may be readily adjusted any desired distance from each other for different sizes of rolls. Between the sides of the housings are the usual carriages *d d'* and riders *e*.

The cap E is made in usual form, so as to be removed in order to take out the rolls, and has the ordinary top screw F, for adjusting the vertical position of the rolls, and the usual stay-rods G are employed.

Each of these housings, which may be as numerous as needed, usually from eight to sixteen in number, carries a pair of rolls, H H^1—the first the lower, the second the upper roll. Each roll has in that portion of it which is between the housings a large portion, *f*, and a smaller portion, *g*. The larger portion terminates toward the center of the roll in a shoulder, *h*, sloping outwardly and downwardly, but slightly to a point, *i*, and from that point sloping outwardly and downwardly at an obtuse angle to a point, *j*, at which point the small portion *g* of the roll is reached. The roll H^1 is constructed precisely like the roll H, but is arranged with its large portion *f'* directly above the small portion *g* of the roll H, and its small portion *g'* directly above the large portion *f* of the same roll, and the contiguous parts nearly touching. It follows, then, that between the shoulders of the two rolls, placed as above described, there is the groove or pass I, which in Figs. 2 and 3 is of a lozenge or diamond form, with a long axis, *k*, and a short axis, k^1. The rolls in the next housing, C' C', are arranged in a reverse order to the rolls in the first housing, C C, which are intended to be placed at the head or front of the mill—as, for instance, if in the first housing, C C, the larger portion of the lower roll is to the

right, and the larger portion of the upper roll to the left; in the next housing, C′ C′, the larger portion of the lower roll is to the left, and the larger portion of the upper roll to the right.

It follows that, the rolls being precisely alike in construction, the groove or pass I′ between the rolls H^2 H^3 in the second housings is precisely like the groove or pass I in form, only a little smaller, except that in the groove or pass I′ the shorter axis k^2 is at right angles to the shorter axis k^1, and the longer axis k^3 is at right angles to the longer axis k. It follows, then, that a bar of iron inserted in the groove or pass I is compressed most violently upon the line of the shorter axis; but when the same bar enters the groove or pass I′ it is compressed upon what has become the line of the longer axis, and so on alternately through the succession of the pairs of rolls. The iron is first compressed in one direction, and then in the opposite direction, and yet without turning or twisting the bar.

It may be observed here that suitable guides may be employed between the pairs of rolls and between the housings.

It will be observed in Fig. 5 that the grooves or passes are of an oval or flattened annular form; and it is apparent that a great variety of forms of the grooves or passes come within the spirit of my invention, if such forms have a longer and a shorter axis.

In the arrangement of my rolls I prefer that an oval form, as in Fig. 5, should be succeeded by a lozenge or diamond form, as in Fig. 6. At the last or finishing pair of rolls the groove or pass may have a square or circular form, or, indeed, any form which it is intended that the finished article shall assume.

In operating my rolling-mill the usual trains of gear may be employed; but as all the rolls are arranged horizontally it is evident that the gear may be simple, cheap, and cheaply operated, as compared with gear used to drive continuous mills, where the rolls are placed alternately in a horizontal and in a vertical position, and where, consequently, a change of direction of power is required at each pair of rolls.

It is apparent that additional grooves may be employed in these rolls, by increasing the number of larger and smaller parts in each roll, without departing from the spirit of my invention.

The principal advantage of the peculiar bed-plate is, that it gives a stronger support longitudinally, and greater strength to the bearings which support the housings; of the peculiar bearings, that they afford by their grooves a more secure and convenient adjustable means of securing the housings; of the peculiar form of the rolls, that they give greater strength of resistance in the direction of greater pressure; of the grooves or passes, that they give a form or shape to the iron which reduces it in size without forming a "fin" upon it; in the alternate disposition of long and short axes, that the iron is compressed without destruction of its fiber; in the arrangement of all the rolls horizontally, that the mill is thereby rendered more simple and cheap in construction, and more simply and cheaply operated; in the whole mill, being a continuous mill, that iron can be rolled of a greater length, more rapidly, and with less expense of labor than where it is necessary to roll back and forth. There are other advantages of a less prominent character, which will be apparent upon inspection to those skilled in the art.

Having thus described my rolling-mill and enumerated some of its advantages, what I claim as new therein, and of my own invention, is—

1. In a continuous rolling-mill, the train of rolls H H^1 H^2 H^3, constructed as described, provided with grooves or passes I, each with a longer and a shorter axis, arranged alternately, substantially as described.

2. In a continuous rolling-mill, the arrangement of the pairs of rolls, in a train of rolls placed horizontally, so that the same shall present to the iron passing between them the shorter axes of the grooves or passes alternately at right angles, substantially as described.

This specification signed and witnessed this 3d day of October, 1877.

WILLIAM R. JENKINS, JR.

Witnesses:

L. W. SEELY,

P. D. DYER.