2 Sheets—Sheet 1.

C. H. MORGAN & H. A. YOUNG.

Rolling-Mill.

No. 214,578. Patented April 22, 1879.

FIG. 1.

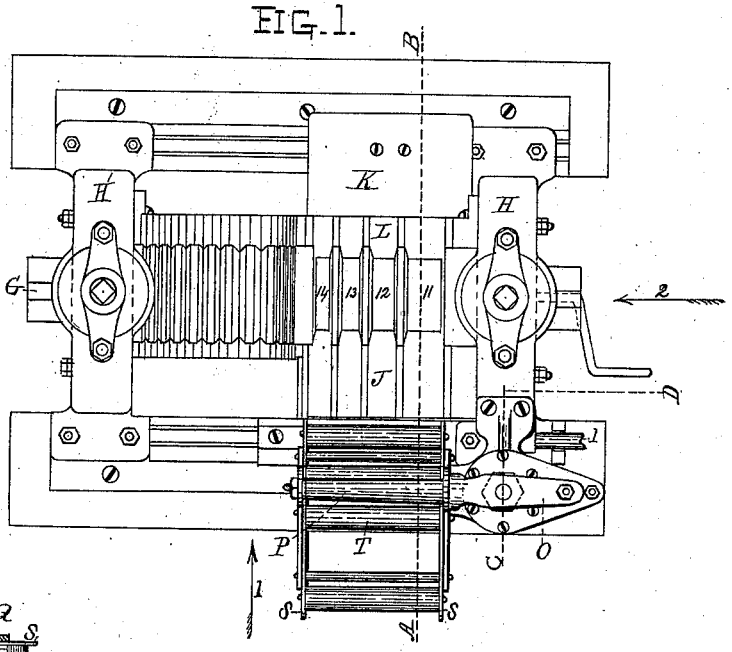


Fig. 6.

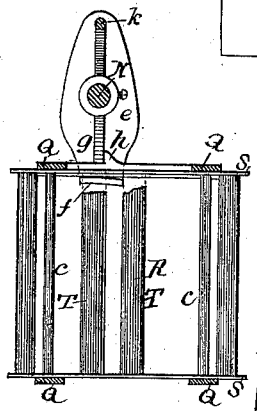
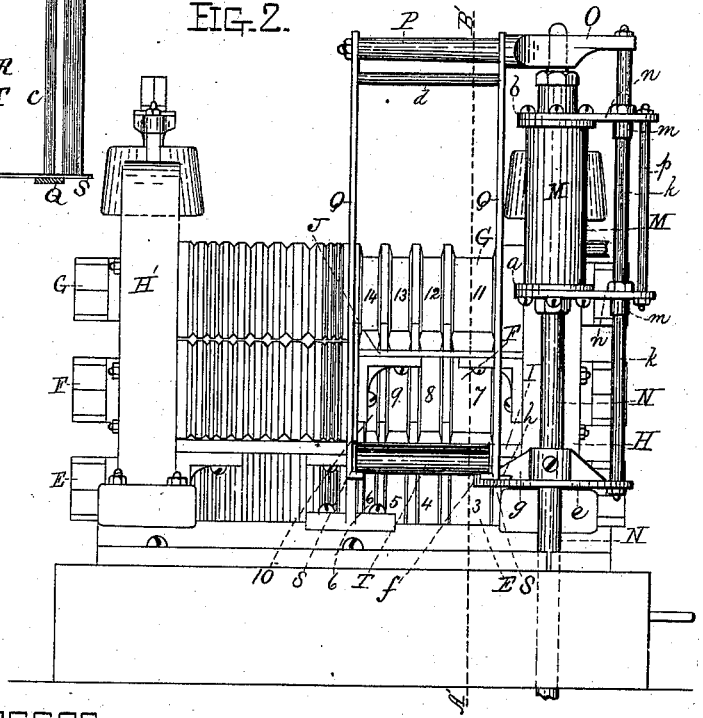


FIG. 2.



Witnesses=

Edwin E. Moore

Frank F. Bullard

Inventor=

Chas. H. Morgan

Horace A. Young

2 Sheets—Sheet 2.

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FIG. 3.

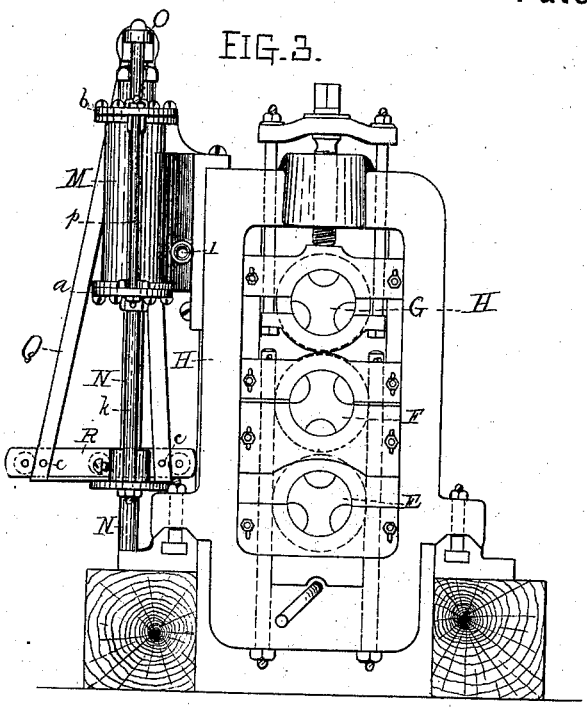


FIG. 4.

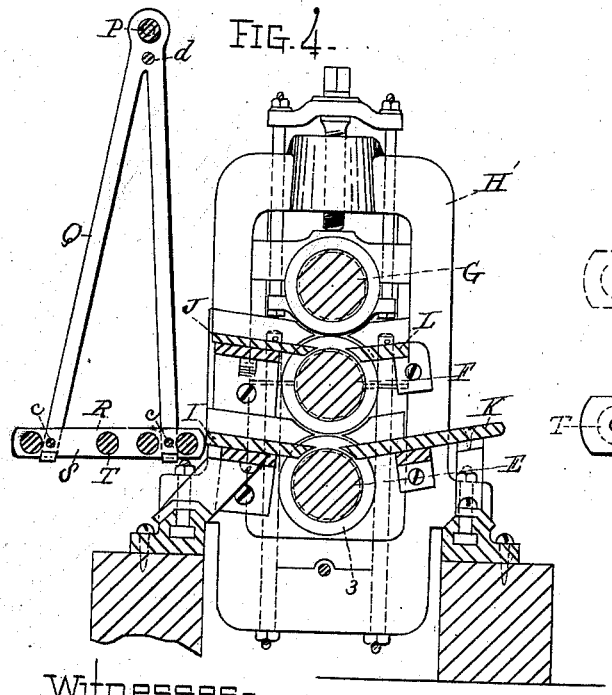
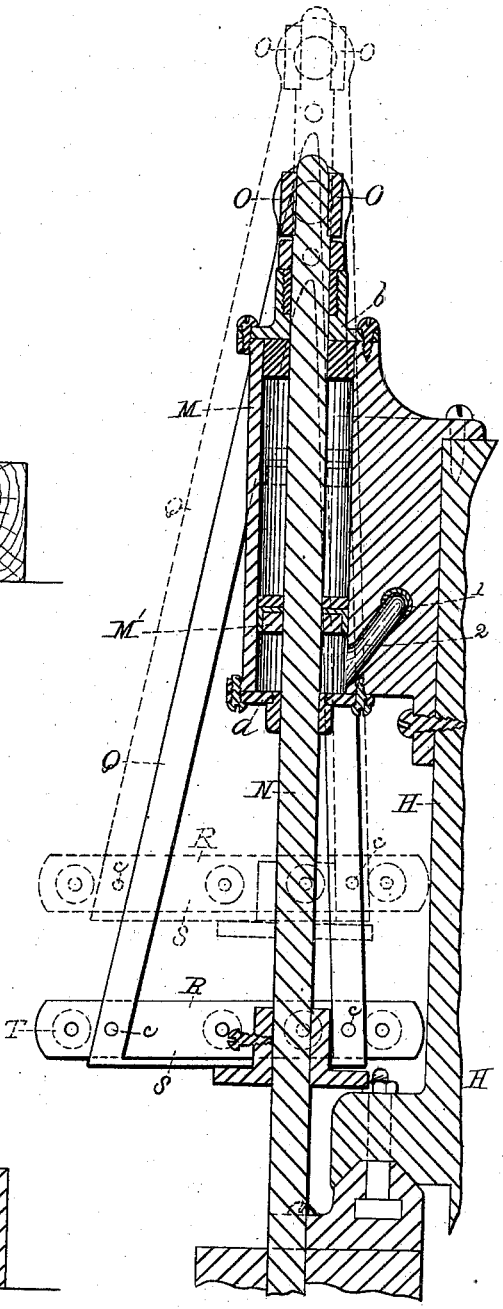


FIG. 5.



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Horace A. Young

UNITED STATES PATENT OFFICE.

CHARLES H. MORGAN AND HORACE A. YOUNG, OF WORCESTER, MASSACHUSETTS; SAID YOUNG ASSIGNOR TO WASHBURN & MOEN MANUFACTURING COMPANY, OF SAME PLACE.

IMPROVEMENT IN ROLLING-MILLS.

Specification forming part of Letters Patent No. **214,578**, dated April 22, 1879; application filed September 28, 1878.

To all whom it may concern:

Be it known that we, CHARLES H. MORGAN and HORACE A. YOUNG, both of the city and county of Worcester, and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Rolling-Mills, more particularly adapted for rolling blooms into bars; and we do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 represents a top or plan view of so much of a rolling-mill as is necessary to illustrate our present invention. Fig. 2 represents a side view of the parts shown in Fig. 1, looking in the direction of arrow 1, same figure. Fig. 3 represents an end view, looking in the direction of arrow 2, Fig. 1. Fig. 4 represents a vertical section on line A B, Fig. 1, and on line A′ B′, Fig. 2, looking in the direction of arrow 2, Fig. 1. Fig. 5 represents, upon an enlarged scale, a section of a portion of the mill on line C D, Fig. 1. Fig. 6 is a detail of the swinging table, and means for guiding and arresting the same.

To enable those skilled in the art to which our invention belongs to make and use the same, we will proceed to describe it more in detail.

The operation of rolling blooms into bars is one which tests very severely both the strength and skill of the workman, owing, in a great measure, to the size and weight of the blooms, the metal composing the same being about six inches square and about three feet long, and ordinarily weighing from two hundred and fifty to three hundred pounds each. The heating-furnace being filled with blooms when the operation of rolling commences, it is very important that the blooms should be removed from the heating-furnace with regularity, in order that they may not be overheated, since if any considerable delay occurs after the bloom has been properly heated there is liability of the metal being injured by overheating.

The object of our invention is to prevent and greatly lessen the causes of delay in the operation of this class of mills as heretofore constructed, while at the same time rendering the labor less severe, and enabling the attendants to produce a greater production, and that, too, of a better and more uniform quality, of metal bars from blooms than can be produced by the mechanism in use prior to our said invention.

In the drawings, the parts marked E, F, and G are three grooved rolls, their journals being fitted to turn in proper housings or bearings in the ends H H′ of the mill, in the ordinary manner, and therefore need not be further described. Upon each side of the rolls are feeding-tables. Tables I and J, on one side, only extend part way of the length of the rolls, while tables K and L are arranged to match them on the opposite side.

To the end piece, H, is fastened a cylinder, M, fitted with proper heads, *a* and *b*, through which passes the piston-rod N, suitable packings being employed to make the joints watertight. The lower end of piston-rod N works in a hole in the base of the machine, while to the upper end thereof is secured a head-piece, O, which extends out in front, but above the tables I and J. From the arm P of the head O are suspended frame-pieces Q Q, between the lower ends of which is arranged a swinging table, R, consisting of side pieces, S, and a series of rolls, T, the latter being fitted with journals to turn in the side pieces, S.

Table R is rendered rigid and strong by having stay or brace rods *c* running from the lower ends of one of the frame-pieces Q to the other, while the upper ends of frame-pieces Q are also braced and stayed by a rod, *d*, all as fully indicated in the drawings. Table R can swing back on the arm P, from which it is suspended by means of the frame-pieces Q. The rolls T of table R are so arranged that when the table is in the position shown in full lines, Figs. 3, 4, and 5, rolls T will be a little below a horizontal plane on a line with the outer upper edge of table I, and when said table R is elevated to the position shown in dotted lines, Fig. 5, the rolls will be a little above the outer upper edge of table J.

To the piston-rod N, below the cylinder M,

is secured a flanged brace-piece, *e*, the inner flange, *f*, of which prevents the frame of table R from springing in toward the center of the mill, and the end of the flange *g* prevents it from springing out to the right, while the projection *h* on the right-hand side of table R prevents the latter frame from swinging in too near to the feed-table I by coming in contact with the side of the vertical flange *g*, all as fully indicated in the drawings.

The outer end of flanged brace-piece *e* is secured to the lower end of a guide-rod, *k*, the upper end of which is fastened to the outer end of head-piece O. Guide-rod *k* passes through tubular supports *m m*, secured in the projecting pieces *n n*, which are rigidly secured to cylinder M; and in order to give greater strength, brace-rod *p* is connected to the outer ends of pieces *n n*, as fully indicated in Fig. 2 of the drawings.

When piston-rod N rises and falls, rod *k* slides up and down in the tubular bearings *m m*.

A pipe, 1, communicates with a port, 2, which enters cylinder M below the piston-head M′, and this pipe 1 is to be provided with a three-way cock or with two cocks, as may be preferred, whereby water can be let in, and then shut off, so as to prevent the water returning through port 2, and also so that the water in cylinder M can be allowed to run out through port 2, when the piston and table R are to be lowered or dropped down from the position shown in dotted lines, Fig. 5, to the positions shown in full lines, same figure, for purposes hereinafter to be explained.

The first groove, 3, in roll E is wider and deeper than the second groove, 4, in the same roll, while the groove 5 is not so deep or wide as groove 4, and groove 6 is still smaller than groove 5. The grooves 7, 8, 9, and 10 in roll F run in connection with grooves 3, 4, 5, and 6 in roll E, and grooves 11, 12, 13, and 14 in roll G, and the latter grooves vary in size the same as those in roll E, only they are smaller than those in roll E.

The operation is as follows: An attendant withdraws a bloom from the furnace, places it upon the table K, and feeds or runs it between rolls E and F in the grooves 3 and 7, and as the partially-reduced bloom passes through upon table I it is guided by an attendant upon the opposite side of the mill upon swinging table R, after which the attendant in charge of the hydraulic lifting apparatus lets on water, and table R, by the action of the water upon the under side of piston-head M′, with the bloom, is elevated so that it can be entered from table J between rolls F and G, being run through grooves 7 and 11. The attendant upon the opposite side immediately draws the heated mass of metal out over table L, and allows it to drop upon table K, and runs it back between rolls E and F again, but through the grooves 4 and 8. In the meantime the attendant in charge of the hydraulic apparatus has turned the proper cock and allowed the water to run out of the cylinder M, whereby the parts have dropped by the force of gravitation to their original positions, and table R is ready to receive the iron as it comes through the grooves 4 and 8, when the operation before described is repeated until the heated metal has been run through between all the grooves in rolls E and G, in front of which the adjustable and swinging table R is arranged, and by this time the mass of heated metal has become very much reduced in size, and also elongated, and after which the metal is run back and forth through the grooves upon the opposite ends of the rolls, the size of the bar now being such that the attendant can lift up the end and enter it in the upper set of grooves without the aid of a power lifting apparatus.

Having described our improvements in rolling-mills, what we claim therein as new and of our invention, and desire to secure by Letters Patent, is—

1. The combination, with one end of a rolling-mill, of cylinder M and piston-rod N, brace-piece *e*, projecting pieces *n n*, head O, arm P, swinging table R, supported by frame O, and rods *p k*, substantially as and for the purposes set forth.

2. The combination, with one end of a rolling-mill, of table R, brace-piece *e*, projection *h*, and flanges *f* and *g*, substantially as and for the purposes set forth.

CHAS. H. MORGAN.
HORACE A. YOUNG.

Witnesses:
FRANK F. BULLARD,
EDWIN E. MOORE.