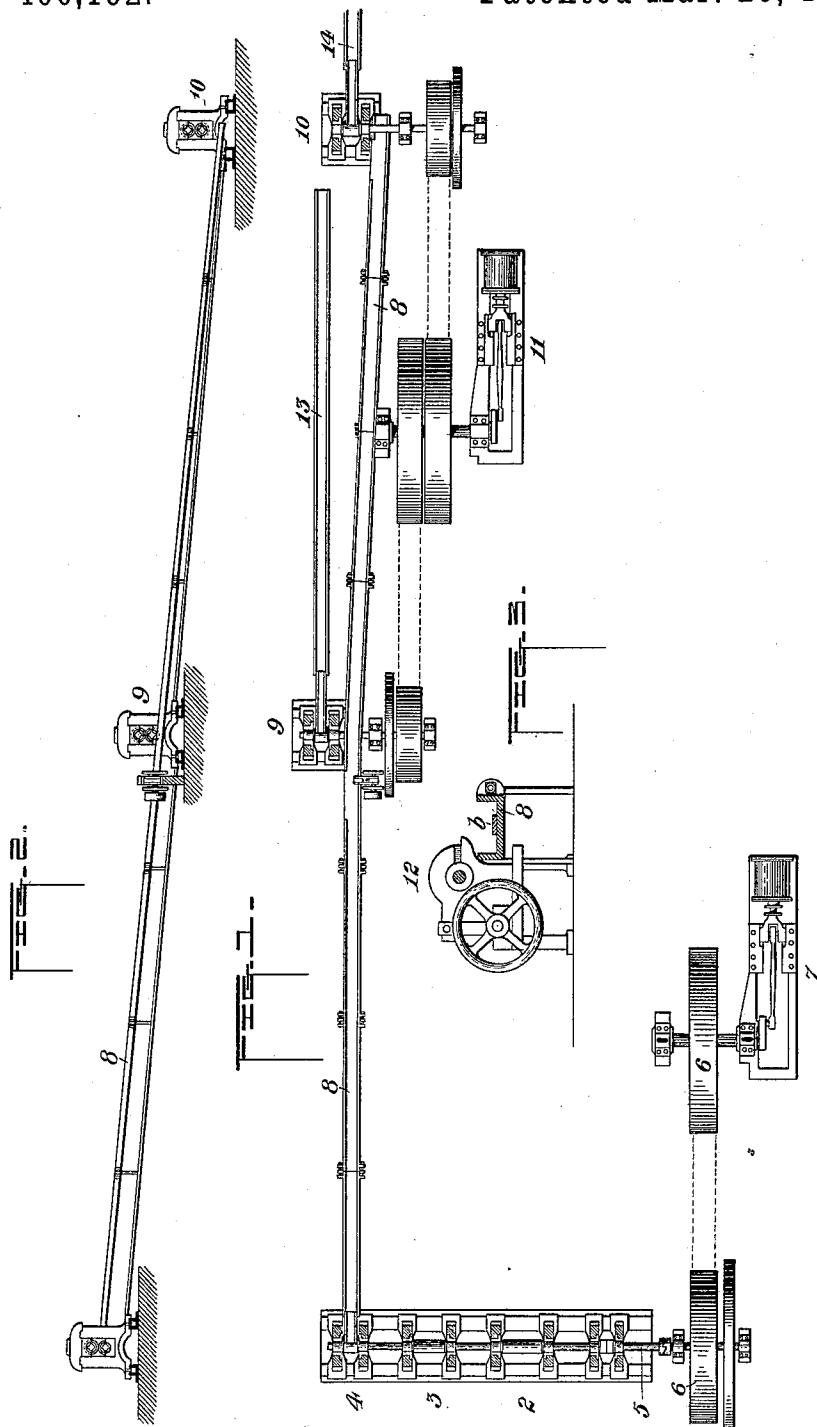


(No Model.)

E. L. CLARK.
ROLLING MILL PLANT.

No. 400,192.

Patented Mar. 26, 1889.



WITNESSES.

H. L. Gill,
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UNITED STATES PATENT OFFICE.

EDWARD L. CLARK, OF PITTSBURG, PENNSYLVANIA.

ROLLING-MILL PLANT.

SPECIFICATION forming part of Letters Patent No. 400,192, dated March 26, 1889.

Application filed February 9, 1889. Serial No. 299,235. (No model.)

To all whom it may concern:

Be it known that I, EDWARD L. CLARK, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new
5 useful Improvement in Rolling-Mill Plants, of which the following is a full, clear, and exact description.

The accompanying drawings represent a rolling-mill plant constructed according to my
10 invention, Figure 1 being a plan view thereof; Fig. 2, a vertical longitudinal section, and Fig. 3 an enlarged vertical cross-section showing the shears which are employed for cutting the metal strip.

15 Like symbols of reference indicate like parts.

In the drawings, 2, 3, and 4 represent trains of rolls, set with their axes in line with each other and driven by a common driving-shaft, 5, which is connected by belts and pulleys 6,
20 or by other suitable gearing, with a driving-engine, 7. In rolling hoop iron or steel the billet from which the strip is to be made is passed back and forth a suitable number of times between the rolls 2 and 3 until it is sufficiently
25 elongated and reduced in thickness and is in condition to be passed through the last pair of the series of rolls, 4. As the strip emerges from the rolls 4 it is received in and guided by a guide trough or channel, 8, which is preferably
30 downwardly inclined and extends throughout a distance about equal to the intended length of the strip. During the completion of the manufacture of the strip it is necessary to pass it through finishing-rolls, in
35 order to impart to it the finish and gloss desirable in hoop iron or steel; but as the strip comes from the rolls 4 covered with scale it must be allowed to cool sufficiently to cause the scale to loosen and to enable it to be scraped
40 off before it is capable of taking such fine finish. The greatly-increased length of the strip as it comes from the rolls 4, as compared with the original length of the billet, has in the method of rolling heretofore practiced formed
45 a practical limit to the size of the original billet which may be employed, and consequently to the output of the mill. The temperature of the ends of the strip in passing through the finishing-rolls must be substantially equal, or
50 otherwise the strip will be unequally reduced by the finishing-rolls, and will be of irregular size and gauge. This evenness of temperature

cannot practically be maintained in passing a long strip continuously through the finishing-rolls, since it necessarily requires considerable
55 time to pass through the same, and if the forward end be of proper temperature in entering the bite of the rolls the rear parts of the strip, passing through the rolls some time subsequently thereto, are apt to have chilled so
60 much as to cause that irregularity in size which I have noted. For this reason it has been the practice to form the strip from small billets, and as the labor and time necessarily employed
65 in rolling them is almost as great as that employed in rolling billets of large size the improved quality of the product has been attended with diminished output and a consequent loss.

In the use of my improvement this is not
70 the case, and from billets of twice the size of those heretofore commonly used I am enabled to make finished strips of as uniform size as from the small billets in practically the same
75 length of time and with but little increase in cost of labor. The output of the mill may thus be doubled without sacrificing anything in quality of the product and without proportionately increasing the expense. To this end
80 I prefer to employ two sets of finishing-rolls, 9 and 10, one of them preferably situated at or near the middle of the guide 8 and the other situated at the end thereof. These rolls are driven by suitable power-connections from
85 an engine, 11, and are arranged at the side of the trough 8. At a place near the rolls 9 is a shearing-machine, 12, the preferable position of which relatively to the trough 8 and the strip
90 *b*, which passes through the trough, is shown in Fig. 3. Suitable guide-troughs, 13 and 14, lead from the delivery sides of the rolls 9 and 10.

The operation of the plant is as follows: The metal strip as it comes from the rolls 4 travels through the guide-trough 8, and when
95 it has passed through the trough to its full extent it is lifted by the workmen and is cut at the middle of its length into two parts by the shears 12. These parts are held for a time until they have severally reached the proper
100 temperature to cause the scale to loosen. The scale is removed and the parts are passed separately through the rolls 9 and 10 at as nearly the same time as the slight difference

in their temperature will permit. The removal of the scale may conveniently be effected by scraping the surfaces of the strips during their passage into and through the finishing-rolls by means of scrapers held against the moving strips on the ingoing side of the rolls. Each part of the divided strip passes through the rolls forward end first, the forward half of the strip passing through the rolls 10 and the rear half through the rolls 9, and as they pass nearly simultaneously through these rolls the finishing of the parts of the entire strip may be done in about the same time as that required in finishing a single strip made from a billet of half the size of the billet which I employ. Besides this practical advantage, there is another advantage, which results from the fact that the divided sections of the long strip, being separately handled and rolled and being individually no longer than the strips made from small billets, do not consume sufficient time in passing through the finishing-rolls to cause them to chill and to be unequally reduced; but each

section is short enough to maintain its proper temperature in passing through these rolls, and therefore when finished will be of substantially uniform size throughout.

I claim—

1. As an improvement in rolling-mill plants, the combination of the rolls 4 and 10, the intermediate rolls, 9, and the shears adjacent to the rolls 9, substantially as and for the purposes described.

2. As an improvement in rolling-mill plants, the combination of the sets of rolls 4 and 10, the guide-trough 8, leading from the one set to the other, the set of rolls 9, arranged at the side of the trough, and the adjacent shears 12, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 7th day of February, A. D. 1889.

EDWARD L. CLARK.

Witnesses:

W. B. CORWIN,
THOMAS W. BAKEWELL.