(No Model.) 3 Sheets—Sheet 1.

R. HEINLE.

CONTINUOUS ROLLING MILL.

No. 344,104. Patented June 22, 1886.

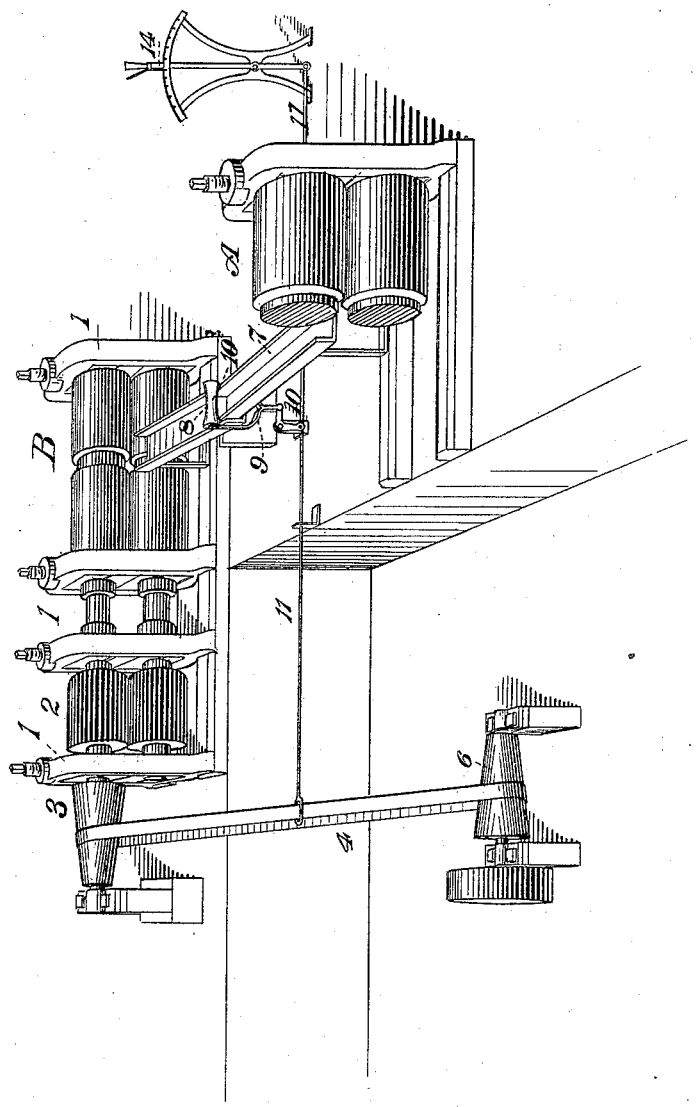

Fig. 1.

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(No Model.) 3 Sheets—Sheet 2.

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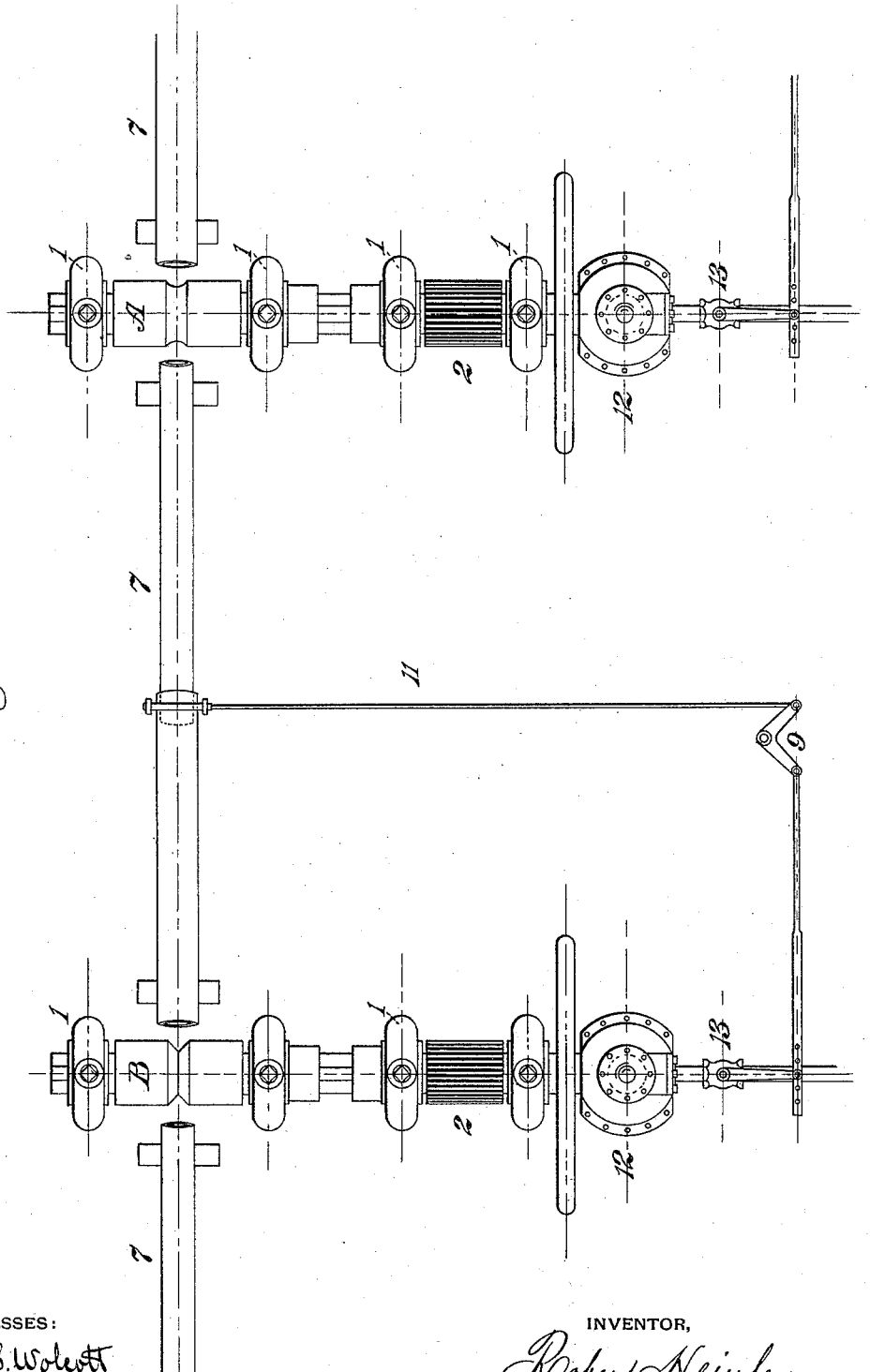

Fig. 2.

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(No Model.) 3 Sheets—Sheet 3.

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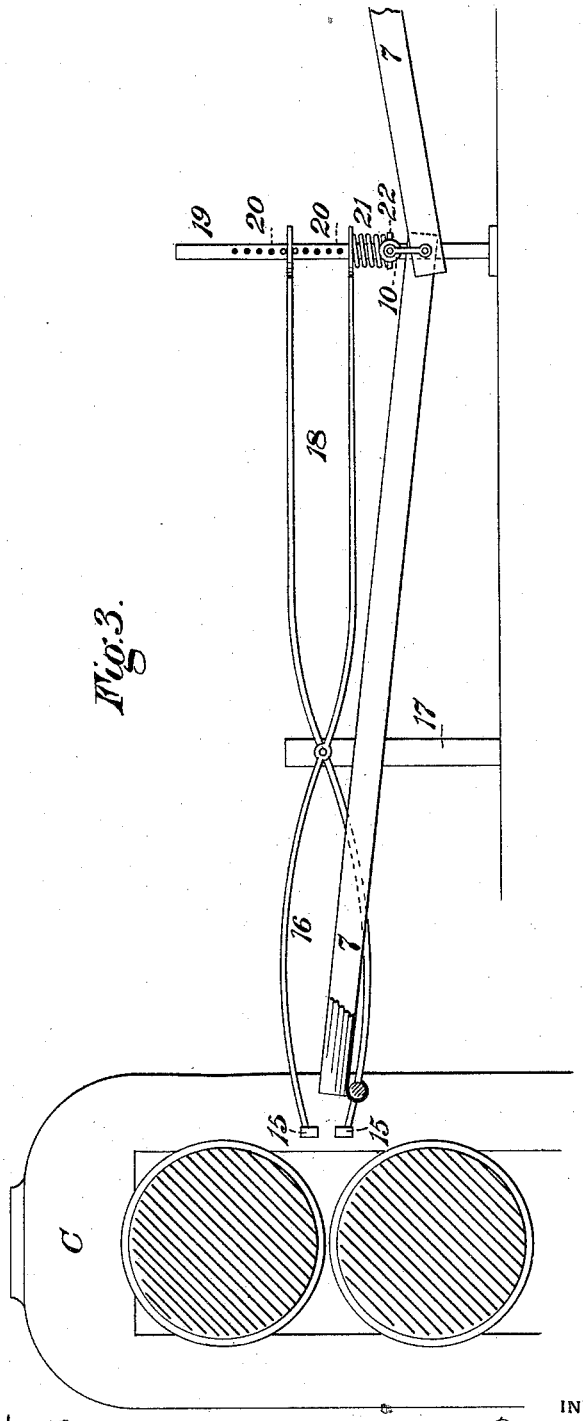

Fig. 3.

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UNITED STATES PATENT OFFICE.

ROBERT HEINLE, OF ALTOONA, PENNSYLVANIA.

CONTINUOUS ROLLING-MILL.

SPECIFICATION forming part of Letters Patent No. 344,104, dated June 22, 1886.

Application filed March 11, 1886. Serial No. 194,767. (No model.)

To all whom it may concern:

Be it known that I, ROBERT HEINLE, residing at Altoona, in the county of Blair and State of Pennsylvania, a citizen of the United States, have invented or discovered certain new and useful Improvements in Continuous Mills, of which improvements the following is a specification.

In the accompanying drawings, which make part of this specification, Figure 1 is a perspective view of a portion of a continuous mill embodying my invention. Fig. 2 is a plan view of a continuous mill, showing a modification of my invention. Fig. 3 is a detail view of the scraping mechanism.

The invention herein relates to certain improvements in that class of rolling-mills known as "continuous trains," in which the various sets of rolls composing the train are arranged one in front of the other. The rod or bar passing through these sets of rolls is reduced more or less in cross-section by each set of rolls, and in order to take up the "slack," as it might be termed, produced by the elongation effected by sectional reduction, each succeeding pair of rolls is driven at an increased rate of speed proportional to the elongation effected; but as this sectional reduction and consequent elongation varies with each size of bar rolled, and with the wear of the grooves of the various rolls, it follows that means are necessary to adjust the speeds of the various sets of rolls in accordance with the varying conditions of work.

The object of the invention herein is to so construct and arrange such a mill and its driving mechanism that the speeds of the several sets of rolls shall be automatically adjusted to the desired speed by or from the movement of the bar or rod as it passes between the several sets of rolls; and to this end the invention consists in the construction and combination of parts, substantially as hereinafter described and claimed.

In the drawings are shown two sets or pairs of rolls, A and B, forming a part of a continuous mill. These rolls are mounted in the usual manner in the housings 1, and are provided with the usual intermeshing driving-gears, 2, as shown in connection with the pair or set of rolls B. To the shaft of one of the gears 2 is secured the cone-pulley 3, around which passes a belt, 4, leading from an oppositely-arranged cone-pulley, being driven in any suitable manner.

Between the sets or stands of rolls A and B is arranged a guide-trough or leader, 7, formed in two parts, as shown, the adjacent ends of said parts fitting one within the other. The outer ends of the two parts of the trough 7 are arranged on a line with the grooves in the two sets of rolls; but the adjacent ends are arranged below the plane passing through the grooves of the two sets of rolls, so that a rod passing from the set of rolls A will pass down one part of the trough and up the other part to the rolls. Over the trough, at its lowest point, is located the grooved friction-roll 8, mounted in the arms of the yoke 9, surrounding the trough, said yoke being connected to one arm of the bell-crank lever 10, the opposite arm of said lever being connected to a rod, 11, provided at its outer end with an eye, through which passes the driving-belt 4.

The set of rolls A, and all other sets of rolls composing the train, are driven in the manner described and shown in connection with the rolls B, except the first set of rolls of the train, which are driven in the ordinary manner.

In operating my improved mill the driving mechanism is so arranged that each set of rolls is normally driven at a higher rate of speed than is required by the elongation produced in cross-sectional reduction; hence when, for instance, a rod going from the rolls A will pass along the trough 7, following the line of said trough, and entering the grooves in the rolls B, and as these rolls are driven, as above stated, at a higher rate of speed than that of the rod, the latter will be drawn taut, causing it to rise out of the trough and lift the roll 8 and yoke 9. This movement of the yoke will effect, through the bell-crank 10 and rod 11, such a shifting of the belt as to reduce the speed of the rolls B until their circumferential velocity will equal that of the rod being fed thereto. If there should be any slackening of the rod between the rolls, the yoke and roll will immediately drop, and thus shift the belt 4 so as to increase the speed of the rolls B, and thus keep the rod under a constant tension.

It will be observed from the above that the speed of each succeeding set of rolls will always be proportional to the speed at which the rod is fed by the preceding rolls, and hence

any liability of a looping out of the wire between two sets of rolls is obviated.

In lieu of the cone-pulleys and belts, a small engine, 12, may be employed to drive each set of rolls, as shown in Fig. 2, in which case the rod 11 is connected to the throttle-valve 13 of the engine, for the purpose of regulating its speed in accordance with the feed of the rod being rolled, and in lieu of the open trough I may use a tube formed in two parts, their adjacent ends fitting one within the other, the yoke 9 being connected to such tube, so as to rise and fall therewith.

In some instances it may be desirable or necessary to effect the regulation of the speed of the rolls by hand, in which case the rod 11 is connected to a hand-lever, 14, so located that the operator may watch the movements of the rod being rolled, and regulate the speed of the rolls in accordance with such movements.

In order to produce a proper finish on rods or hoops, it is customary to scrape such rods or hoops just before their passage through the last or finishing set of rolls, such scrapers being generally operated by hand.

In order to make the operation of my improved mill as nearly automatic as possible, I attach the scraping-blades 15 to the jaws of the tongs 16, which are pivoted to a post, 17, in the rear of the rolls C and at one side of the trough 7. The blades 15 extend laterally from the jaws of the tongs into the path of the rods being rolled. The reins 18 of the tongs extend to a post, 19, in line with point of union between the two parts of the trough, and are provided with forked ends embracing said post. The rein connected to the lower scraping-blade is held stationary by the pins 20, passing through holes in the post, a series of such holes being provided for the adjustment of said lower blade, as will be readily understood. The rein connected to the upper scraping-blade rests upon a spring, 21, surrounding the post 19, said spring being in turn supported by a fork, 22, extending from the roller 10 or from the trough 7, said fork also embracing the post 19.

By the above-described mechanism, the scrapers, as well as the speed-regulating mechanism, will be operated by or from the rod being rolled. By interposing the spring 21 between the movable rein and the fork 22 the upper blade will be caused to follow any inequalities in the surface of the rod or hoop being rolled.

The main characteristic of my invention is the regulation of the speed of each succeeding set of rolls in accordance with the speed of the rod passing between two sets of rolls; and hence I do not wish to limit myself to any particular form or arrangement of driving mechanism, or of mechanism for communicating motion from the rod being rolled to such driving mechanism for the purpose of regulating the same.

I claim as my invention—

1. In a continuous mill, the combination of two or more sets of rolls, mechanism for driving such rolls, and mechanism for independently adjusting the speed of such rolls in accordance with the feed of the article being rolled, substantially as set forth.

2. In a continuous mill, the combination of two or more sets of rolls, mechanism for driving such rolls, and mechanism for automatically adjusting the speed of such rolls in accordance with the feed of the article being rolled, substantially as set forth.

3. In a continuous mill, the combination of two or more sets of rolls, mechanism for driving such rolls, and automatic mechanism located between adjacent sets of rolls for adjusting the speed of the rolls in accordance with the feed of the article being rolled, substantially as set forth.

4. In a continuous mill, the combination of two or more sets of rolls, mechanism for driving such rolls, and mechanism for adjusting the speed of the rolls in accordance with the feed of the article being rolled, such speed-adjusting mechanism being operated by such article on its passage between two sets of rolls, substantially as set forth.

5. In a continuous mill, the combination of two or more sets of rolls, mechanism for driving such rolls, a jointed trough connecting two adjacent sets of rolls, and mechanism connecting the trough and the roll-driving mechanism, whereby a movement of the trough will vary the speed of rolls, substantially as set forth.

6. In a continuous mill, the combination of two or more sets of rolls, scraping-blades arranged in front of one of said sets, and mechanism for operating said blades by the article being rolled, substantially as set forth.

7. In a rolling-mill, the combination of a pair of rolls, scraping-blades arranged in front of said rolls, and mechanism for operating said blades by the article being rolled, substantially as set forth.

In testimony whereof I have hereunto set my hand.

ROBERT HEINLE.

Witnesses:
DARWIN S. WOLCOTT,
R. H. WHITTLESEY.