

(No Model.)

M. V. SMITH.
CONTINUOUS ROLLING MILL.

No. 274,524.

Patented Mar. 27, 1883.

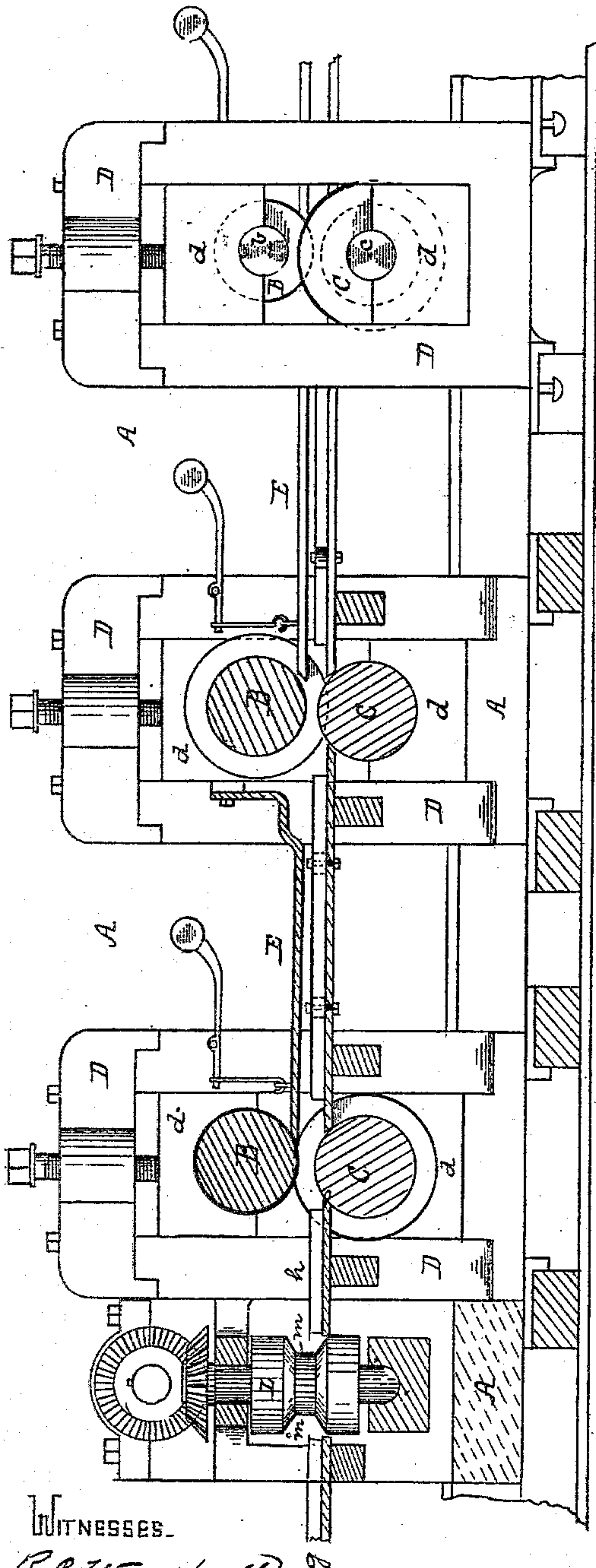


Fig. 1.

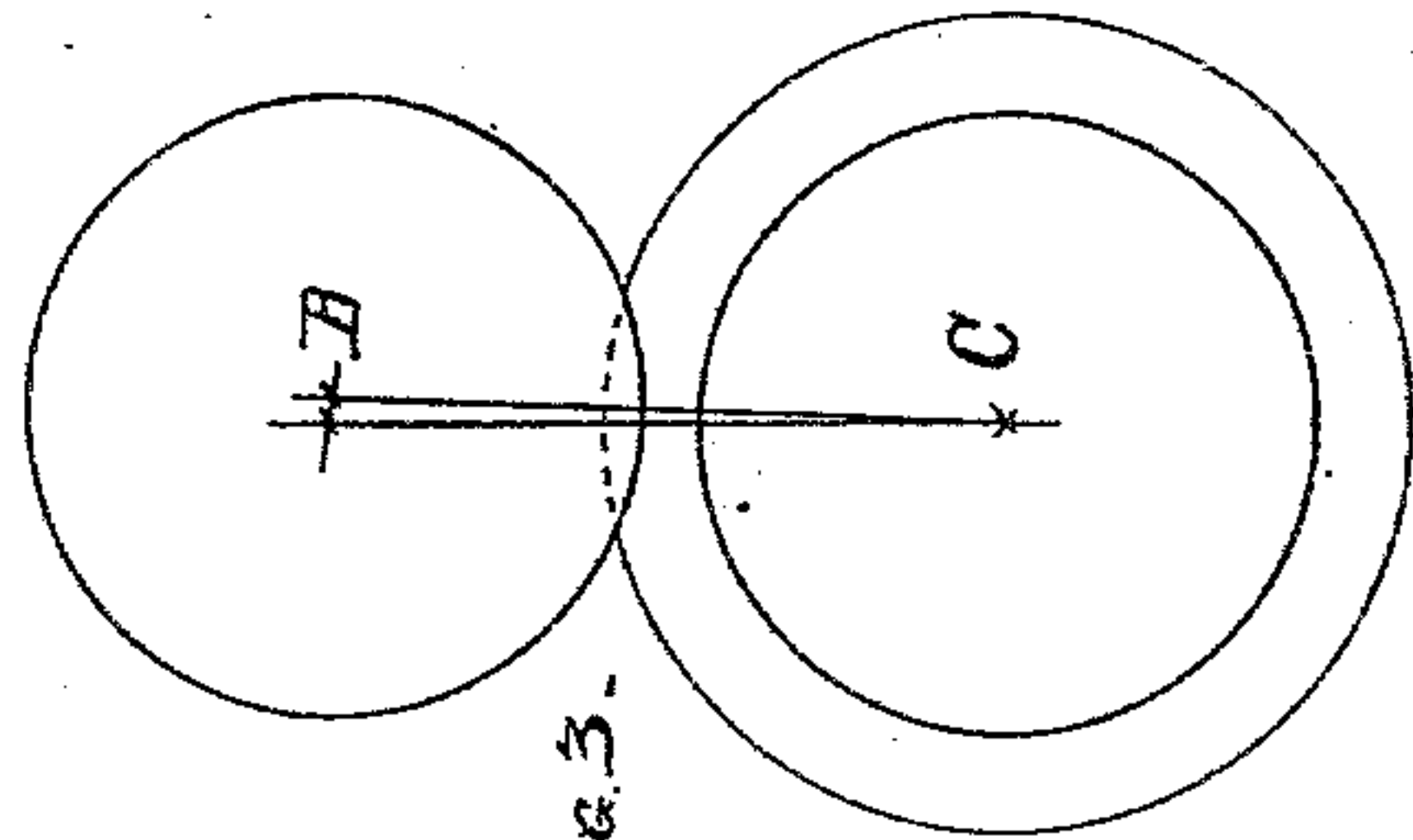


Fig. 3.

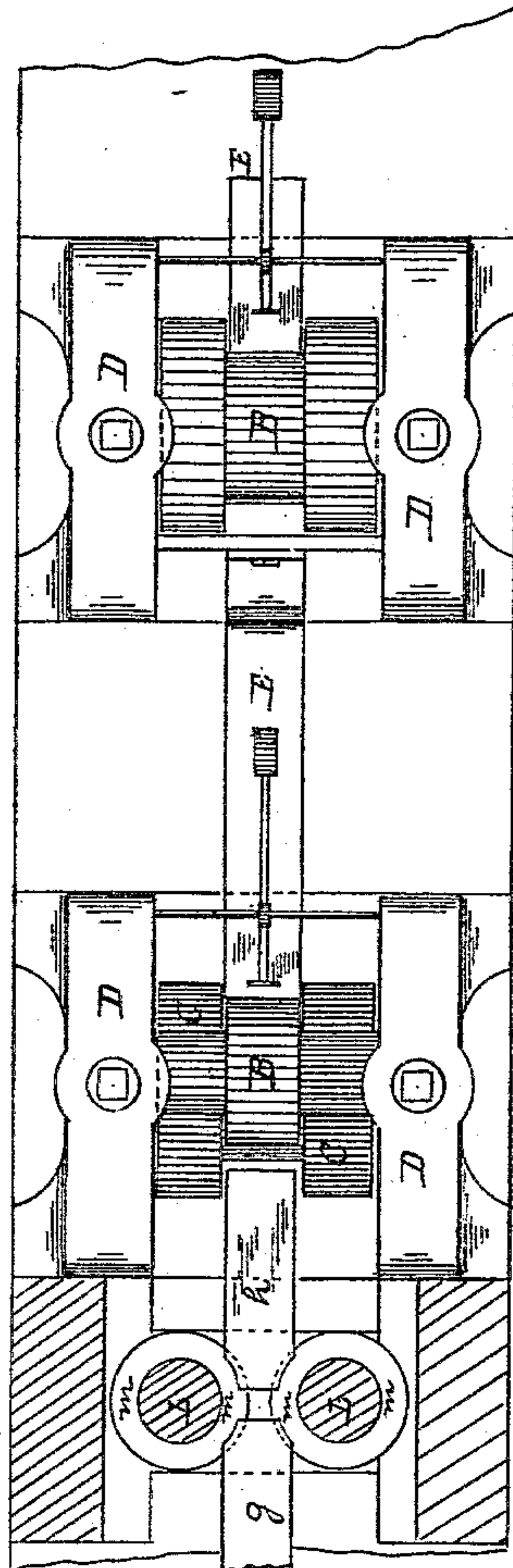


Fig. 2.

WITNESSES.
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MARTIN V. SMITH, OF McKEESPORT, PENNSYLVANIA.

CONTINUOUS ROLLING-MILL.

SPECIFICATION forming part of Letters Patent No. 274,524, dated March 27, 1883.

Application filed December 31, 1881. (No model.)

To all whom it may concern:

Be it known that I, MARTIN V. SMITH, of McKeesport, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Continuous Rolling-Mills; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a vertical longitudinal section of my improved rolling-mill, one set of rolls being shown in side view. Fig. 2 is a plan view of the same, with a horizontal cross-section of the vertical rolls; and Fig. 3 is a diagram view of one set of rolls, illustrating my invention.

My invention relates to certain improvements in continuous rolling-mills, where a series of sets or pairs of horizontal rolls are mounted in common line of feed, and the metal is fed from one set of rolls to the next through or by means of a conductor, the metal being thus gradually reduced by each set of rolls until brought to the desired size or thickness, and the sets of rolls being geared to run at different speeds, so that as the metal is elongated it is fed more rapidly through the mill. In mills of this general construction difficulty has been experienced on account of the tendency of the forward end of the plate, hoop, or bar to turn up after passing through one pair of rolls, so that it is not in proper position to feed automatically into the next pass in the mill, and is liable to catch upon any projection on the roof of the conductor or against the upper roll of the next pass, and for either reason to buckle, or even become jammed in the conductor.

The principal object of my invention is to overcome this difficulty in continuous rolling-mills; and this I accomplish by journaling the upper roll of each pair or set in the continuous mill a little forward of its corresponding lower roll, so that the pass between the rolls has a slight downward incline, instead of being horizontal, and consequently the metal is fed between the rolls in a downward direction upon the conductor, along which it is carried to the next set or pass in the continuous mill.

To enable others skilled in the art to make and use my invention, I will describe its construction and operation.

My invention is illustrated in connection with the manufacture of metal plate for pipe or tubing, commonly known as "pipe-iron."

The mill A is formed of a series of pairs or sets of horizontal rolls mounted in common line of feed, there being any number of sets from two upward, according to the required reduction of the metal, and this being determined by the skilled operator.

The rolls B C are mounted in suitable housings, D, which are bolted to a bed-plate or otherwise secured in line. Between the several housings in the line of feed are secured the guides or conductors E, through or by means of which the metal is carried from one set of rolls to the next.

The horizontal rolls B C are preferably tongue-and-groove rolls, and to prevent the formation of large fins on either side of the plate the tongues and grooves of the alternate pairs are reversed, so that the fins formed along the top edges in one pass are rolled off in the next. The rolls are connected in the usual manner with the driving-gear, the speed of the different sets being regulated according to the reduction and lengthening of the plate.

The lower horizontal rolls, C, are mounted in the housings D in the usual manner, resting in the journal-boxes *d*. The upper horizontal roll, B, of each set is mounted in the housings a short distance forward of the lower roll, thus imparting to the pass between them a slightly downward incline or course, so that the metal, when passing through, will be directed down onto the bottom of the guide or conductor. This may be accomplished by changing the relative position of the roll-necks *b* or *c* in the journal-boxes, the bearings of the lower roll-necks, *c*, being arranged the required distance back of the central line of the housings, or the bearings of the upper roll-necks being arranged the required distance forward of said line. It may also be accomplished by changing the seats of the journal-boxes in the housings.

The guides or conductors E, between the several sets of rolls, may be of any desired construction and shape, and where the rolls are so geared as to prevent buckling of the metal as it passes through it is not necessary to have the conductor covered, its only function being to receive the metal and deliver it in proper

position to the next set of rolls. The conductor generally employed by me is the one shown in the drawings, which is described and claimed in a separate application for patent of even date herewith.

I generally form the first pass in my improved mill of vertical grooved rolls *L L*, the grooves *m m* of the rolls being only deep enough to surround the ends or edges of the pile as it is fed in. The bases of the grooves are flat and the sides are formed gradually tapering to the outer circumference of the rolls, so that these rolls serve to give the pile the proper width for feeding to the groove or pass of the first set of horizontal tongue-and-groove rolls, and the sides of the grooves, besides holding the pile in proper line to feed to the horizontal rolls, also serve to draw together and weld the edges of the pile while it is at its highest heat. The vertical rolls are made adjustable to suit different widths of pass in the continuous mill. A guide-plate, *g*, to the vertical rolls and a guide-plate, *h*, between the vertical and horizontal rolls, are generally found desirable. The operation of my improved rolling-mill is as follows: The billet or pile is brought to the proper heat and is fed over the guide-plate *g* to the vertical rolls *L L*, which have been previously adjusted to the proper width of pass. These rolls then impart to it the proper width to fit the groove through the first set of horizontal rolls, weld the edges of the pile or billet, and feed it over the guide-plate *h* to the first set of horizontal rolls, the metal being delivered by the vertical rolls in proper line to feed into the pass of the rolls. As the metal passes through the horizontal rolls, on account of the

slight downward incline of the pass, it is discharged in a downward direction onto the guide or conductor, the direction of the pass entirely overcoming the tendency of the forward end of the billet, pile, plate, or bar to turn up, so that it travels along the conductor without rising against the conductor-roof, and feeds automatically to the next set of rolls, through which it passes in the same manner, and so on through the entire mill until reduced to the thickness or size required. As the metal is discharged from each pair or set of rolls in a slightly downward direction, its tendency is to hold to the bottom of the conductor, and it is therefore in proper position to feed rapidly and automatically into the next pair, so that the difficulty of the plate buckling or jamming, which occurs, as above set forth, where the rolls are journaled in the same vertical line, is entirely overcome.

What I claim as my invention, and desire to secure by Letters Patent, is—

A continuous mill for rolling metals formed of a series of two or more pairs of horizontal rolls arranged in common line of feed, and guides or conductors between the pairs of rolls, the upper roll of each pair being journaled forward of its corresponding lower roll, so as to impart a slightly-downward incline to the pass between them, substantially as set forth.

In testimony whereof I, the said MARTIN V. SMITH, have hereunto set my hand.

MARTIN V. SMITH.

Witnesses:

DANIEL N. HERWIG.

JAMES I. KAY.