G. F. McCleane,

Metal Rolls.

No. 104,177. Patented June 14. 1870.

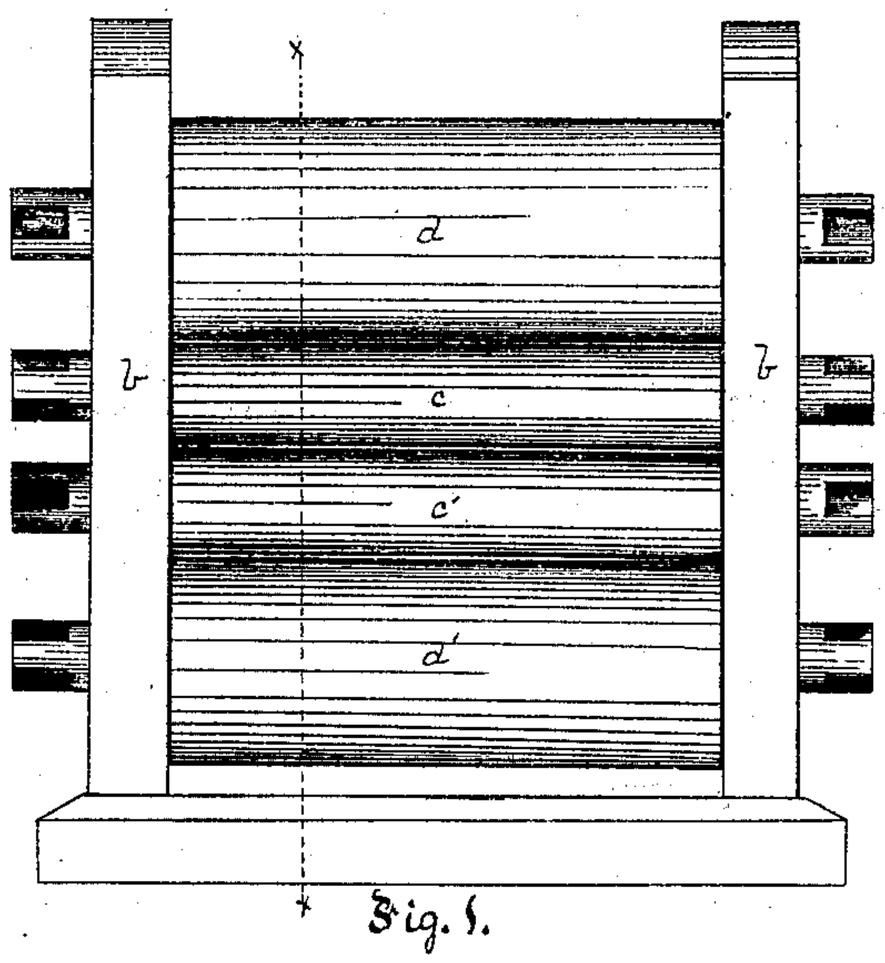


Fig. 1.

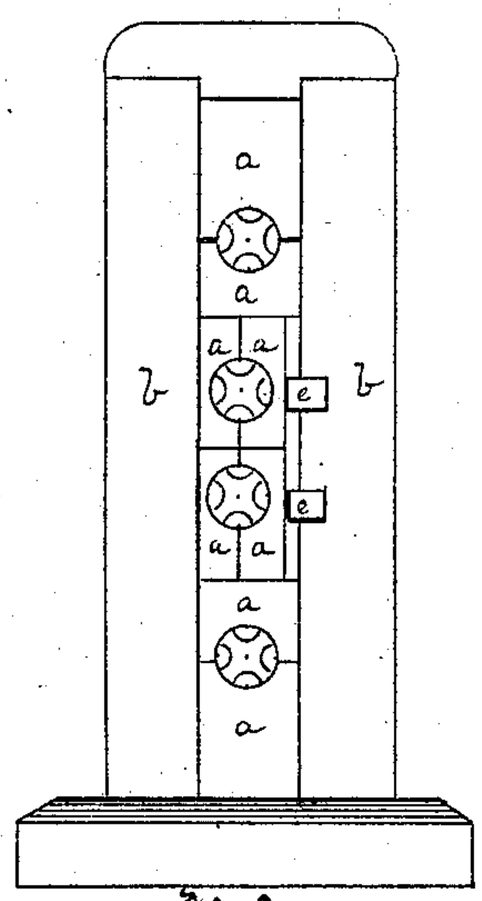


Fig. 2.

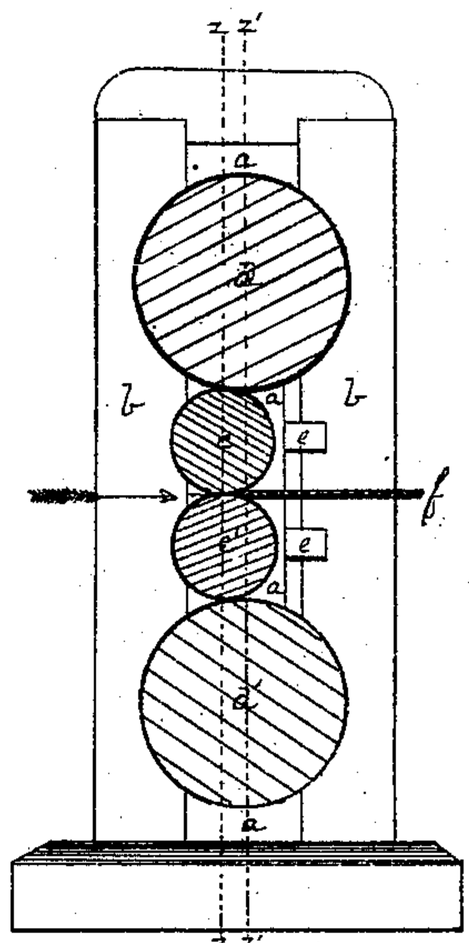


Fig. 3.

Witnesses:
R. C. Mershall
Thos. B. Kerr

Inventor:
George F. McCleane,
by Bakewell & Johnson
his Attys.

# United States Patent Office.

GEORGE F. McCLEANE, OF PITTSBURG, PENNSYLVANIA.

*Letters Patent No.* 104,177, *dated June* 14, 1870.

## IMPROVEMENT IN "FOUR-HIGH ROLLS" FOR ROLLING METAL.

**The Schedule referred to in these Letters Patent and making part of the same**

*To all whom it may concern:*

Be it known that I, GEORGE F. McCLEANE, of the city of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Four-High Roll; and I do hereby declare the following to be a full, clear, and exact description thereof.

My improvement is designed for rolling thin sheets of iron, in order to give them a fine, smooth surface, and draw them out to the degree of tenuity required.

In order to secure the desired results to the greatest advantage, it is requisite to apply great pressure to the rolls by means of screws bearing on the pressure-blocks, in the housing or frame-work which carries the journals of the rolls. To this end, the rolls are screwed down until their bite is less than the thickness of the pack of three or four sheets to be passed between them, and, as in rolling sheets of considerable width, the rolls have to be correspondingly long, they must, where only a pair of rolls is used, be of sufficient diameter to afford the requisite strength to resist the strain equally at all points in their length, as otherwise, if the rolls should yield to the tendency to spring in the middle, the pack of sheets would be rolled thicker in the middle than at the edges, and thus be be spoiled. But rolls of considerable thickness have practically too broad or bearing-surface on the sheets passed through between them, to produce a good result, and it is almost impossible to roll very thin sheets of iron by means of such apparatus.

To obviate this difficulty, the device of "three-high rolls," as they are called, has been used, consisting of a set of three rolls with their axes in the same vertical plane, and the middle roll being of less diameter than the outside or upper and lower rolls, thereby securing the bearing and resisting support of the heavy large diameter-rolls with the narrow bite of the small diameter-roll.

This device, however, does not effect the desired result so satisfactorily as does my device, which I will proceed to explain, with reference to the accompanying drawing making a part hereof, in which—

Figure 1 is a front elevation of four-high rolls, mounted in a housing;

Figure 2 is an end view thereof, more perfectly illustrating the relative position of the rolls; and

Figure 3 is a vertical cross-section through the line *x x*, fig. 1.

Like letters of reference indicate like parts in each.

In the housings *b* and in boxes or bearing-blocks *a a'* are mounted the four-high rolls *c c' d d'*, two of which, *d d'*, the top and bottom rolls of the set, are of sufficiently large diameter to resist the strain or pressure of the working rolls *c c'* placed between them, and prevent the springing or yielding of the working-rolls *c c'*, which are of smaller diameter than the rolls *d d'*.

The bearing-blocks *a'*, which carry the rolls *c c'*, are so set that the line of bite of the rolls *c c'* shall be a little forward of the vertical plane in which lies the axes of the upper and lower rolls *d d'*, and, by the use of wedges *e*, set-screws, or other known means effecting such adjustment, this line of bite of the rolls *c c'* may be set forward a greater or less distance, as may be desired.

It is not designed to pass the pack of sheets *f* back and forth between the rolls *c* and *c'*, nor between either of the large diameter-rolls *d* or *d'* and its adjoining small diameter-roll *c* or *c'*, but only in one direction, as indicated by the arrow in the drawing, the reason for this being that, even with the vertical support of the large diameter-rolls *d* and *d'*, if the four rolls had their axes in the same right line, there would be a tendency of the smaller rolls *c c'* to bend and slip forward in the middle, and thus injure the bite of the rolls and spoil the sheets being rolled.

To overcome this tendency, as already mentioned, I set the two small diameter working-rolls, with their axes, in a line, *z z*, parallel with the line *z' z'*, in which the axes of the large diameter-rolls are set but slightly forward of that line, so that the large diameter-rolls may usually have a nearly vertical bearing on the smaller or working-rolls, but also a sufficiently horizontal or lateral bearing to resist any tendency of the smaller rolls to slip forward, or, in other words, the rolls *c c'* being subject to not only a vertical, but also a lateral strain in consequence of their reducing action on the pack *f*, this lateral strain being in a direction opposite to the feeding-side of the rolls, or in the direction indicated by the arrow, the rolls *c c'* are supported against the tendency to spring or bend in both directions, by upper and lower rolls *d d'*. Such support is the result of the arrangement described. This arrangement has also the effect to increase slightly the pressure of the rolls on the pack of sheets as it is passed through between them in the direction indicated by the arrow in the drawing.

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

The arrangement hereinbefore described of the pair of working-rolls *c c'* and the pair of supporting-rolls *d d'*, the former being of less diameter than the latter, and located in a vertical plane somewhat in advance of the supporting-rolls, substantially as and for the purpose set forth.

In testimony whereof, I, the said GEORGE F. McCLEANE, have hereunto set my hand.

GEO. F. McCLEANE.

Witnesses:

JOHN GLENN,

THOS. B. KERR.