

I. HAHN.  
Rolling-Mill.

No. 164,679.

Patented June 22, 1875.

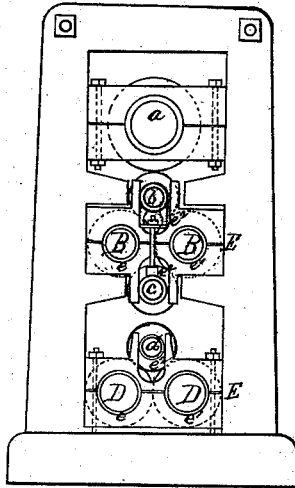


Fig. 1.

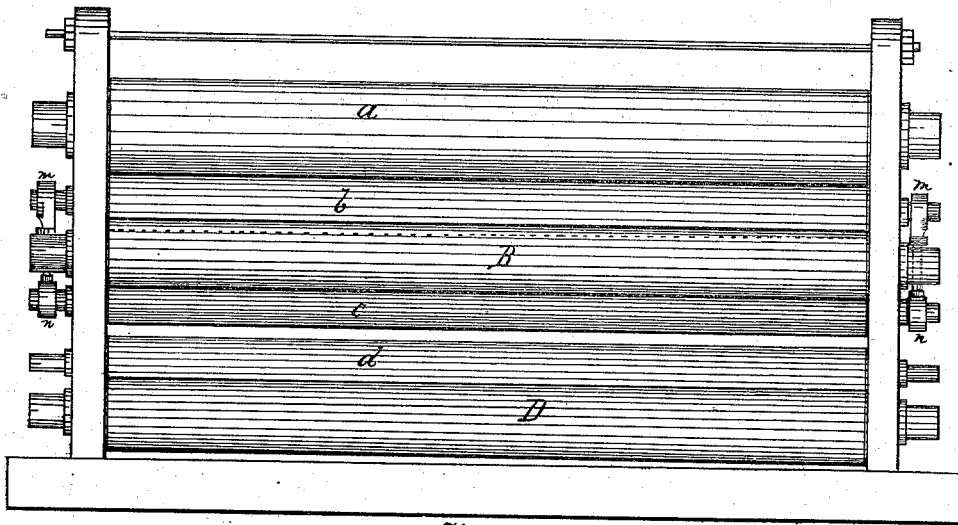


Fig. 2.

WITNESSES.  
James E. Gray  
R. W. Munsell

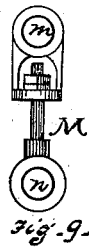


Fig. 9.

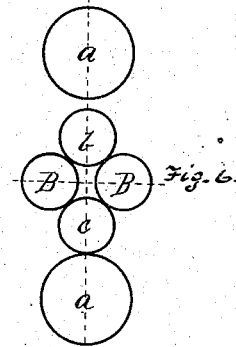
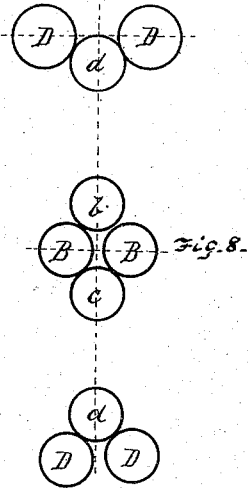
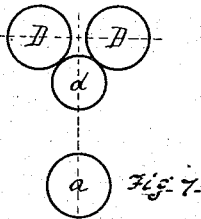
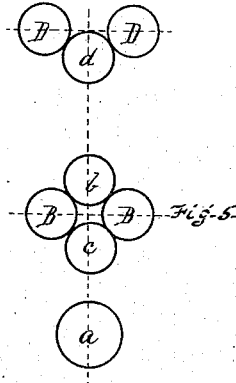
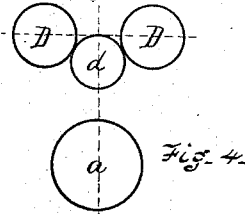
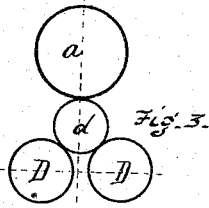
INVENTOR

Ignatius Hahn  
by Bakewell & Kern  
Atty

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WITNESSES.

*James E. Key*  
*Rollins*

INVENTOR.

*Ignatius Hahn*  
*by Bakewell & Kerr*  
*Attys*

# UNITED STATES PATENT OFFICE.

IGNATIUS HAHN, OF PITTSBURG, PENNSYLVANIA.

## IMPROVEMENT IN ROLLING-MILLS.

Specification forming part of Letters Patent No. 164,679, dated June 22, 1875; application filed April 6, 1875.

*To all whom it may concern:*

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

Figure 1 is an end view of a cluster of rolls embodying my invention. Fig. 2 is a side view of the same; Figs. 3 to 8, modifications in the arrangement of the cluster-rolls; and Fig. 9 is a view of a device which may be used for securing the rolls in clusters of four or more.

Like letters refer to like parts wherever they occur.

My invention relates to the construction of plate and sheet mills, and may also be used in what is known as universal mills; and consists, first, in securing the working-roll to two or more surrounding rolls by means of adjustable attachments, so that the former will always bear tight on the circumference of the brace-rolls; second, in clusters of four rolls, connecting the upper and lower rolls by means of adjustable devices, whereby the upper and lower rolls may be pressed close to the circumference of the bearing or brace rolls, and the work-rolls will assume their proper position without special attention being given to the alignment of their axes.

I will now proceed to describe my invention, so that others skilled in the art may apply the same, first premising that the improvements are applicable to all metal-rolling mills, whether two, three, four, five, or more high mills, though, for illustration, I have selected a three-high mill.

In the drawing, *a*, *b*, *c*, and *d* represent work-rolls, of which *a* is a roll of such diameter as is commonly used. *b*, *c*, and *d* are small work-rolls, and, if employed alone, would be inadequate; but to retain the advantage of the small roll and avoid the objections, I insert between the upper and lower small roll one or more brace-rolls, B B, to each side of the central line of both working-rolls, which then bear toward and on the circumference of the brace-rolls, so that the bracing of those working-rolls is such that all tendency of the rolls to

spring during the passage of the pile of metal to be rolled is avoided, the brace-rolls B B and D D grasping the circumference of *b*, *c*, and *d*, transmitting power to and sustaining the rolls *b c d* both vertically and laterally.

In addition to the power transmitted direct to the circumference of the work-rolls by the friction between the latter and the brace-rolls, I may drive also the small rolls direct by gearing or belting, in the manner described in my application for rolling-mill filed February 24, 1875, always taking care to have equal circumferential speed for all rolls.

E represent boxes for journaling the shafts of the surrounding or outer rolls B B and D D, and, as in the present instance, where two brace-rolls are employed, there will be two bearings, *e e'*, one on each side of the medial line, the central portion of the rider E being provided with guides or slots *e''*, one or more in number, which receive the neck of the small work-rolls. Where the small roll is placed above the outer rolls it will be, as a consequence, sustained, and its own weight will be sufficient to retain it in position; but in clusters where one of the work-rolls is the lowest roll, as in the case chosen for illustration, such roll will have to be journaled in a separate box or else suspended by suitable means. I have selected the latter method as the one by which the axial adjustment of the rolls is best preserved, and for this purpose I employ an additional link or coupling device, M, one loop, *m*, of which passes over the end of the upper roll *b*, and the other loop, *n*, incloses the end of lower roll *c*. By this means the rolls *b c* may be forced against the circumference of the surrounding rolls; and as the necks of the small rolls turn loosely in the guides on the riders of the outer rolls it follows that the work-rolls will adjust themselves without special attention being paid to a vertical alignment of their axes. Where the cluster D d D is used as the upper set the work-roll *d* will then be the lowest of the series, and must be suspended by a strap or similar device, which will permit of its adjustment against the rolls D D.

In two, three, or more high mills the several clusters may have stationary or movable bearings, according to circumstances; for in-

stance, the lower cluster may have stationary boxes, while the other clusters have movable boxes, the central cluster may be movable and the upper and lower clusters fixed, or the central cluster fixed and the upper and lower clusters movable, according as it is desired to operate the rolls.

Figs. 3 to 8, being simply arrangements of cluster-rolls, will require no further description.

I need not give special attention to the adjustment of the work-rolls, as the position of the brace-rolls is such that the work-rolls must assume their proper relative proportions.

Having thus described my invention, I claim—

1. The combination, with the two brace-

rolls, of a work-roll suspended by adjusting-links, whereby the work-roll will at all times align itself properly, and be held in contact with the brace-rolls, substantially as specified.

2. The combination of the upper working-roll of one set of rolls and the lower working-roll of another set of rolls with a pair of brace-rolls common to both sets by means of the adjusting-links M, substantially as described.

In testimony whereof I, the said IGNATIUS HAHN, have hereunto set my hand.

IGNATIUS HAHN.

Witnesses:

T. B. KERR,  
JAMES I. KAY.