

3 Sheets--Sheet 1.

G. A. CHALFANT & I. HAHN.
Rolling-Mills.

No. 159,078.

Patented Jan. 26, 1875.

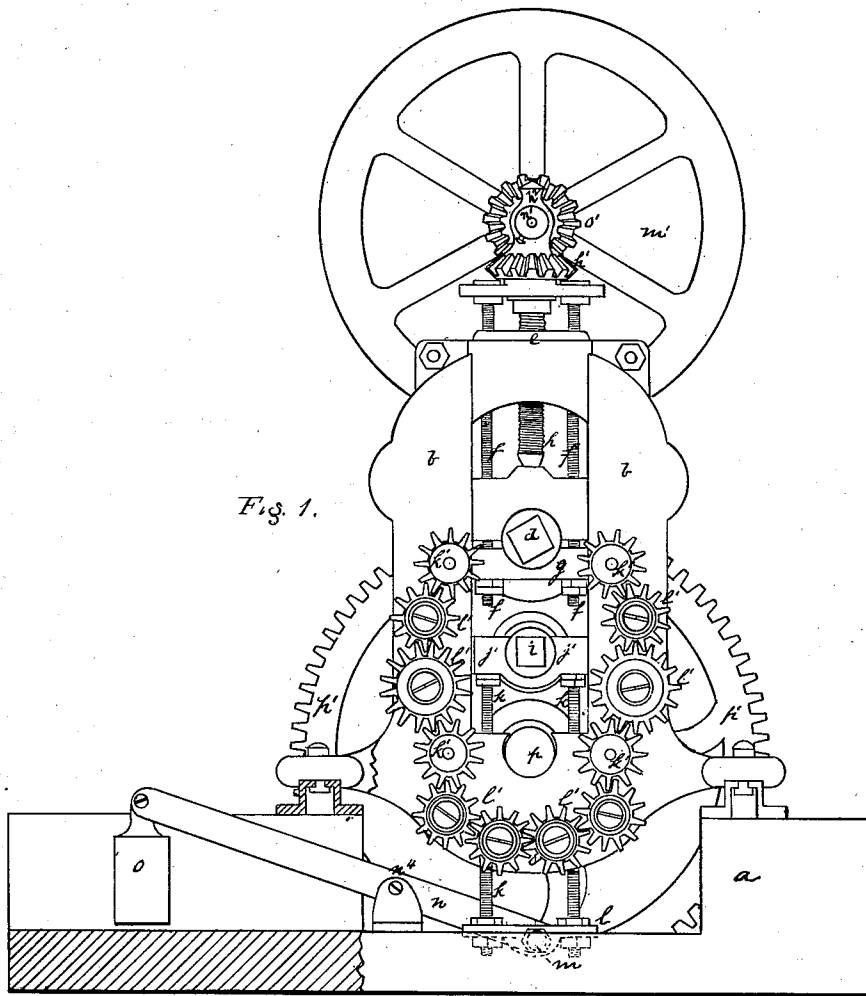


Fig. 1.

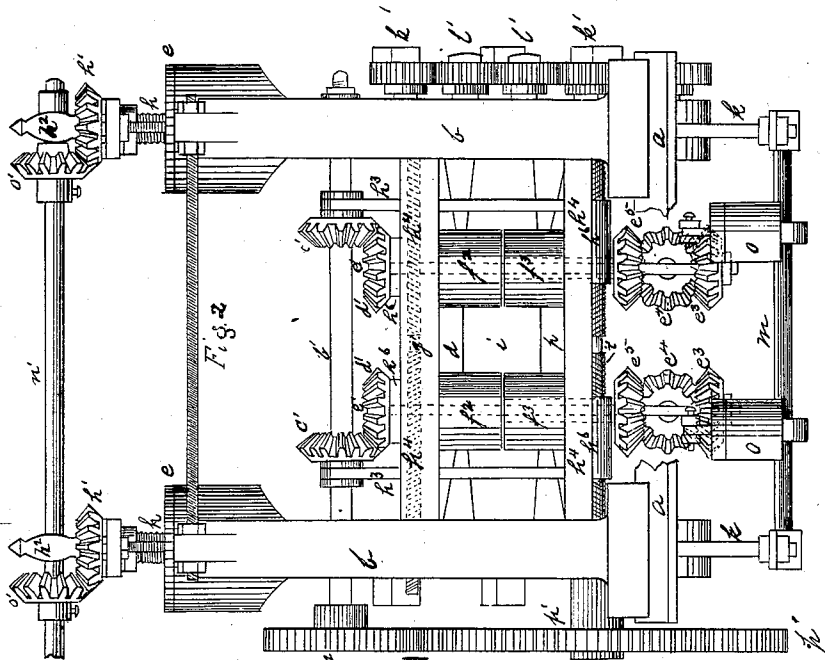
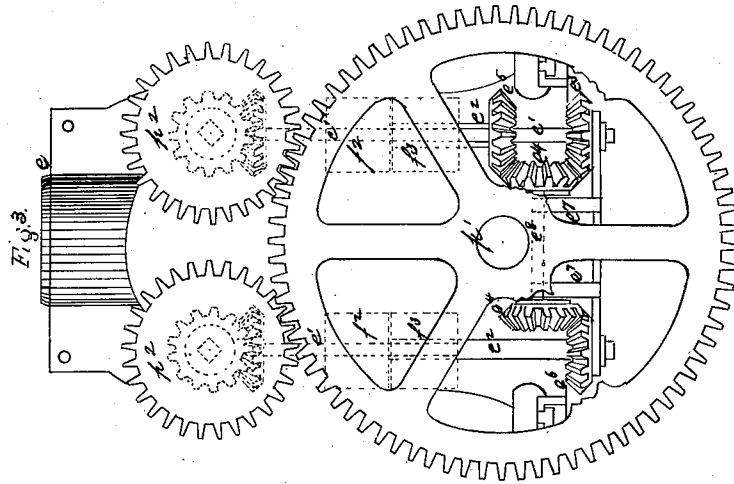
WITNESSES
R. R. Bach
James E. Kay

INVENTORS
George A. Chalfant
Ignatius Hahn
by Bakewell & Kerr
Attys

G. A. CHALFANT & I. HAHN.
Rolling-Mills.

No. 159,078.

Patented Jan. 26, 1875..



WITNESSES

James B. Kay
Frederick Standish

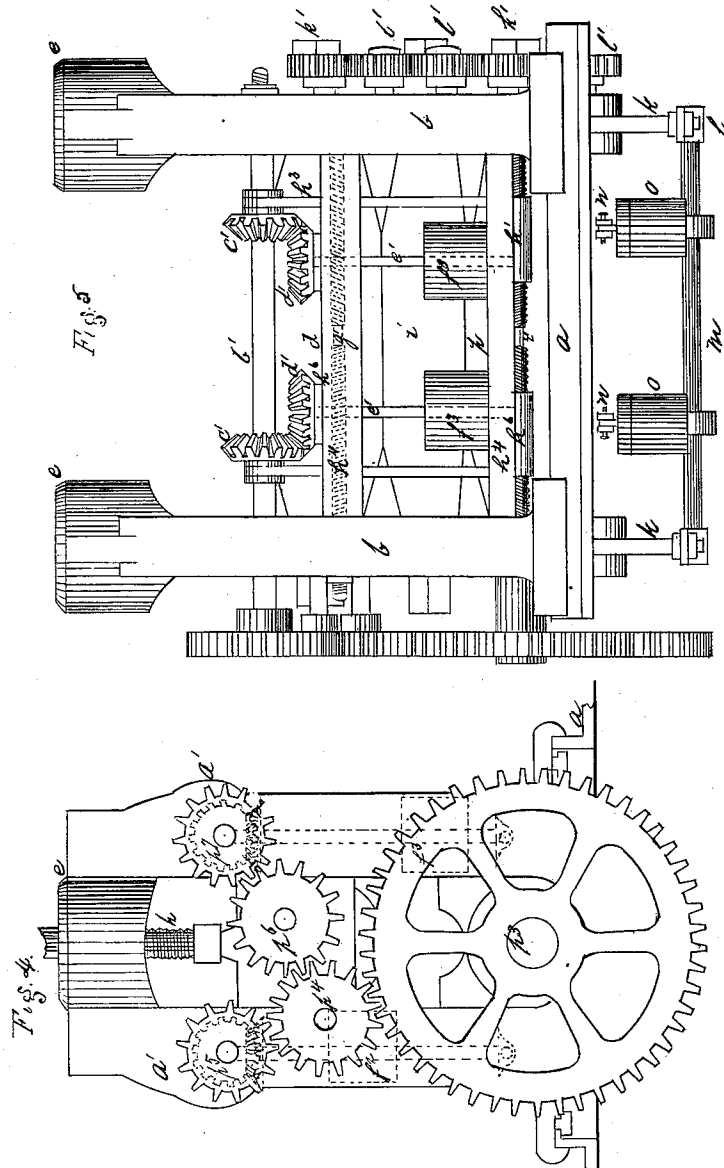
INVENTORS

George A. Chalfant.
Ignatius Hahn
by Bakewell Kerr
Attys

G. A. CHALFANT & I. HAHN.
Rolling-Mills.

No. 159,078.

Patented Jan. 26, 1875.



WITNESSES
James L. Kay
Frederick Standish

INVENTORS
George A. Chalfant
Ignatius Hahn
by Bakewell & Herr
Attys

UNITED STATES PATENT OFFICE.

GEORGE A. CHALFANT, OF ETNA, AND IGNATIUS HAHN, OF PITTSBURG,
PENNSYLVANIA.

IMPROVEMENT IN ROLLING-MILLS.

Specification forming part of Letters Patent No. 159,078, dated January 26, 1875; application filed
October 6, 1874.

To all whom it may concern:

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

Figure 1 is an end elevation of our improved rolling-mill. Fig. 2 is a front view. Fig. 3 is an end view, and Figs. 4 and 5 are views of a modified construction.

Like letters indicate like parts in each.

Our invention consists in the arrangement on the opposite sides of three-high rolls of non-reversible vertical rolls, turning in the direction of the pass in whose plane they stand.

To enable others skilled in the art to make and use our invention, we will describe its construction and mode of operation.

Upon the bed-plate *a*, which is designed to be bolted to the foundation in the usual manner, are housings *b*. In the housings *b* are mounted three horizontal rolls, *d*, *i*, and *p*, or, in other words, three-high rolls. The top roll hangs in the collars *c*, by means of the rods *f*, holders *g*, and housing-screws *h*. The housing-screws *h* are threaded, and pass through the threaded boxes *e*. The rods *f* are attached to the holder *g*, and pass through the housing *b* by means of suitable openings. Mounted on the upper end of the screws *h* are the pinions *h*¹, and extending from the hand-wheel *m* through the bearing *h*² is a shaft, *n*¹, carrying bevel-pinions *o*¹, which mesh into the pinions *h*¹. By turning the hand-wheel *m* the roll *d* will be raised or lowered in the stationary boxes *e* by the screws *h*. The middle roll *i* is mounted on the hands *j*, which are sustained by bolts or rods *k*, extending up from the cross-heads *l*, the latter being mounted on a shaft, *m*, which is situated below the housings. Loosely attached to the shaft *m* are levers *n*, which have their fulcrums at *n*⁴, and are provided with counter-weights *o* at their outer ends. These weights counterbalance

the roll *i* just sufficiently to cause it to follow the top roll, *d*, in its upward adjustments. This counter-balance is sufficiently nice to cause the roll *i* to be thrown down by a slight pressure, so that when the bar or plate is fed between it and the upper roll it will immediately be forced down on the lower one.

For the purpose of gaging the distance between the rolls of each vertical pair of rolls with respect to the width of the bars or plates, we have arranged a shaft with right and left hand thread *g*¹, which extends through the nuts of the vertical roll-bearings *h*³, and then by means of the pinion *k*¹, mounted on its end, communicating by idlers *l*¹ with the pinions *k*¹ mounted on the ends of similar right and left hand screws *i*¹, passing through the lower bearings of the same pair of rolls, and the upper and lower bearings of the opposite pair of vertical rolls, the power from the shaft *g*¹ is thus communicated to the other three shafts *i*¹. The adjustment is made by means of a lever placed on a squared end of the shaft *g*¹. By turning the lever in the desired direction the vertical rolls are caused to approach or recede from each other.

Each vertical roll is divided into two rolls, an upper and a lower one, which move in opposite directions, so that while the lower ones are feeding between the middle and lower horizontal rolls the upper ones will be drawing out the pass from between the middle and the upper rolls.

We will now explain how this is accomplished. We mount a large spur-wheel, *p*¹, on the extended end of the shaft of the lower roll, *p*; and on the ends of each of the shafts *b*¹ we mount a spur-wheel, *p*², meshing into the spur-wheel *p*¹. We divide the vertical rolls in two, *f*² and *f*³. The upper ones, *f*², are rigidly attached to the solid shafts *e*¹, and are turned by bevel-gear wheels *o*¹, mounted on the shafts *b*¹, which mesh into and turn bevel-wheels *d*¹ on the upper ends of the shafts *e*¹. The shafts *e*¹ and *e*² of each roll pass through a sliding frame, *h*³, which are caused to travel back and forth in the ways *h*⁴ by the operation of the screws *g*¹ and *i*¹, which effect the lateral ad-

justment of the vertical rolls. The spur-wheels c' are moved on their shafts b' by the yokes h^3 , which extend up from the frames h^6 . The solid shafts e^1 on one side of the three-high rolls extend down through the bearing, and are provided with bevel-gear wheels e^3 at the lower ends. Surrounding the lower ends of the solid shafts e^1 are hollow shafts e^2 , which carry the lower roll, f^3 . The hollow shafts are provided at their lower ends with bevel-gear wheels e^6 . This construction is followed in the vertical rolls on one side of the machine. At the other side of the machine the solid shaft e^1 is stepped in the hollow shaft, and the hollow shaft e^2 is continued down through the bearing, and is provided with a bevel-gear wheel, e^6 . Mounted on the standards e^7 is a shaft, e^8 , on the ends of which are placed bevel-gear wheels e^4 . The front wheel e^4 meshes into the wheels e^3 and e^6 , so as to turn their shafts e^1 and e^2 in opposite directions. The rear wheel e^4 meshes into the wheel e^6 , and turns the rear shaft, e^2 , and roll f^3 . This arrangement causes the lower rolls, f^3 , to turn always in one direction, and the upper rolls, f^2 , in the opposite direction. We have, therefore, reverse-moving vertical rolls, the direction of their movement being the direction required by the pass between the horizontal rolls.

When the nature of the work to be done permits it we construct our mill in a more simple manner by omitting the vertical rolls at the discharge side of the upper and lower pass and retaining them at the feed side. This modification is shown in Figs. 3 and 4. Here the vertical rolls are driven by spur-wheels p^3 , keyed to the extended shaft of the bottom roll, p . This wheel meshes into the idle-wheel, p^4 , which turns directly the wheel p^5 , mounted on the end of the horizontal shaft b' of one pair of vertical rolls, and indirectly, by means of the wheel p^6 , the wheel p^7 , which is mounted upon the end of the horizontal shaft b' of the other pair of vertical rolls. This arrangement, it will be evident, causes the vertical rolls f^2 and f^3 to turn in

the direction of the feed on their respective sides of the horizontal rolls. This modification is adapted for rough work, there being vertical rolls at the feed side only of the upper and lower pass.

The operation of this machine is evident, its purpose being to save the necessity of idle passes. The plate or bar being passed through the lower rolls is carried up and placed in between the top and middle rolls for return. The top roll turns in opposite direction to the bottom roll by the friction of the middle one or by gearing.

It is evident to the skilled mechanic that the mechanical devices and arrangements are for transmitting power to the vertical rolls for the purpose of causing them to move in reverse directions, and may be altered by the use of friction-gearing, belting, &c.

The middle or the upper horizontal roll may be the fixed roll, if desired. In the first case the two outer rolls would have to be mounted in adjustable boxes, and in the latter case the lower roll only would require to be so mounted. The changes and manner of working them are well known to the skilled constructor of rolling-mills.

What we claim as our invention, and desire to secure by Letters Patent, is—

The combination of the following parts: first, the non-reversing power-driven horizontal rolls d , i , and p , forming a direct and a return pass; second, the non-reversing vertical rolls arranged in pairs on both sides of the horizontal rolls, in the plane of each pass, and turning in the direction of the pass in whose plane they stand; and, third, devices for turning the vertical rolls by power from the power-shaft, for the purposes described.

In testimony whereof, we, the said GEORGE A. CHALFANT and IGNATIUS HAHN, have hereunto set our hands.

GEORGE A. CHALFANT.
IGNATIUS HAHN.

Witnesses:

FRANCIS TORRANCE,
JAS. R. DARRAGH.