

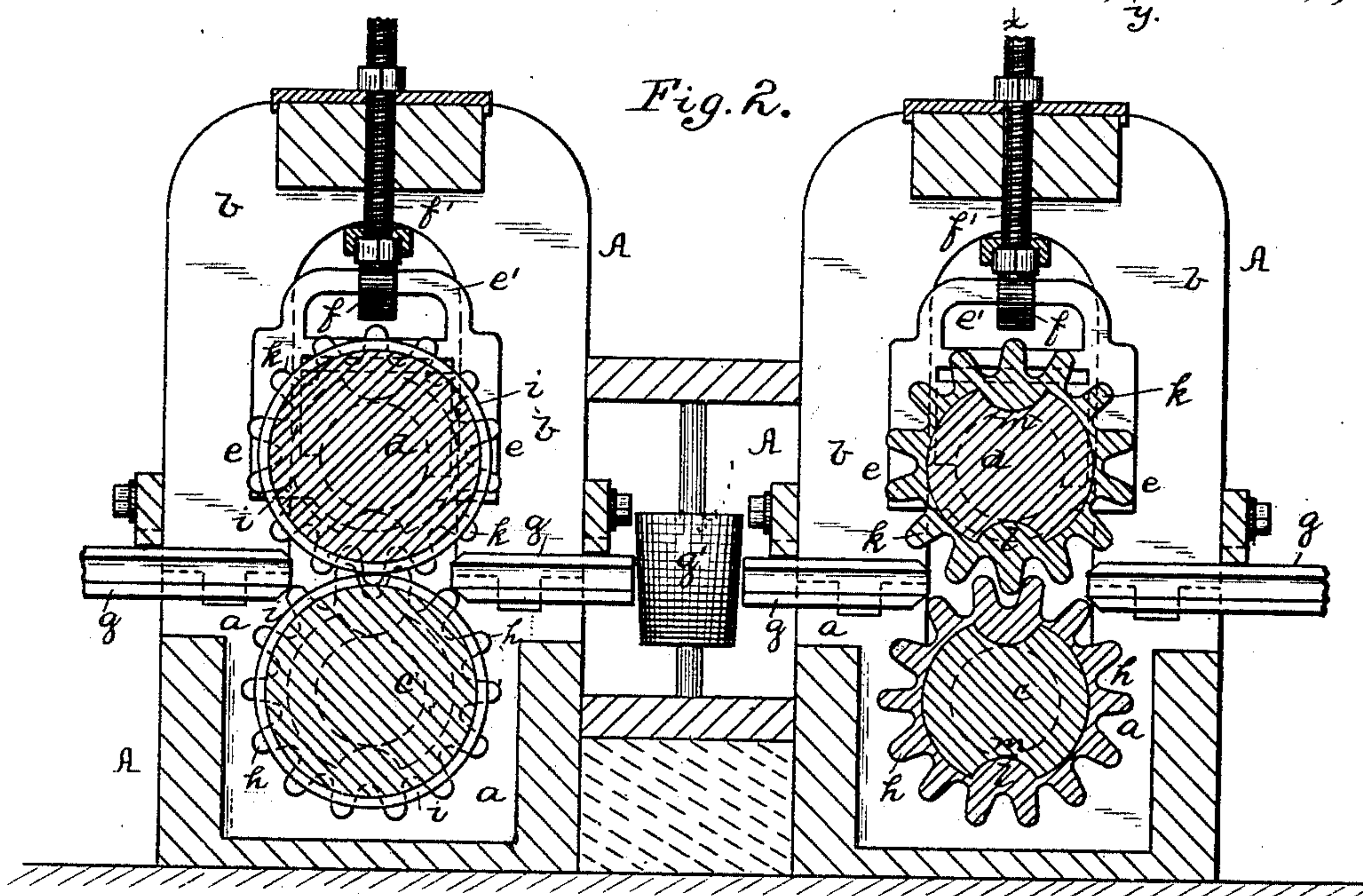
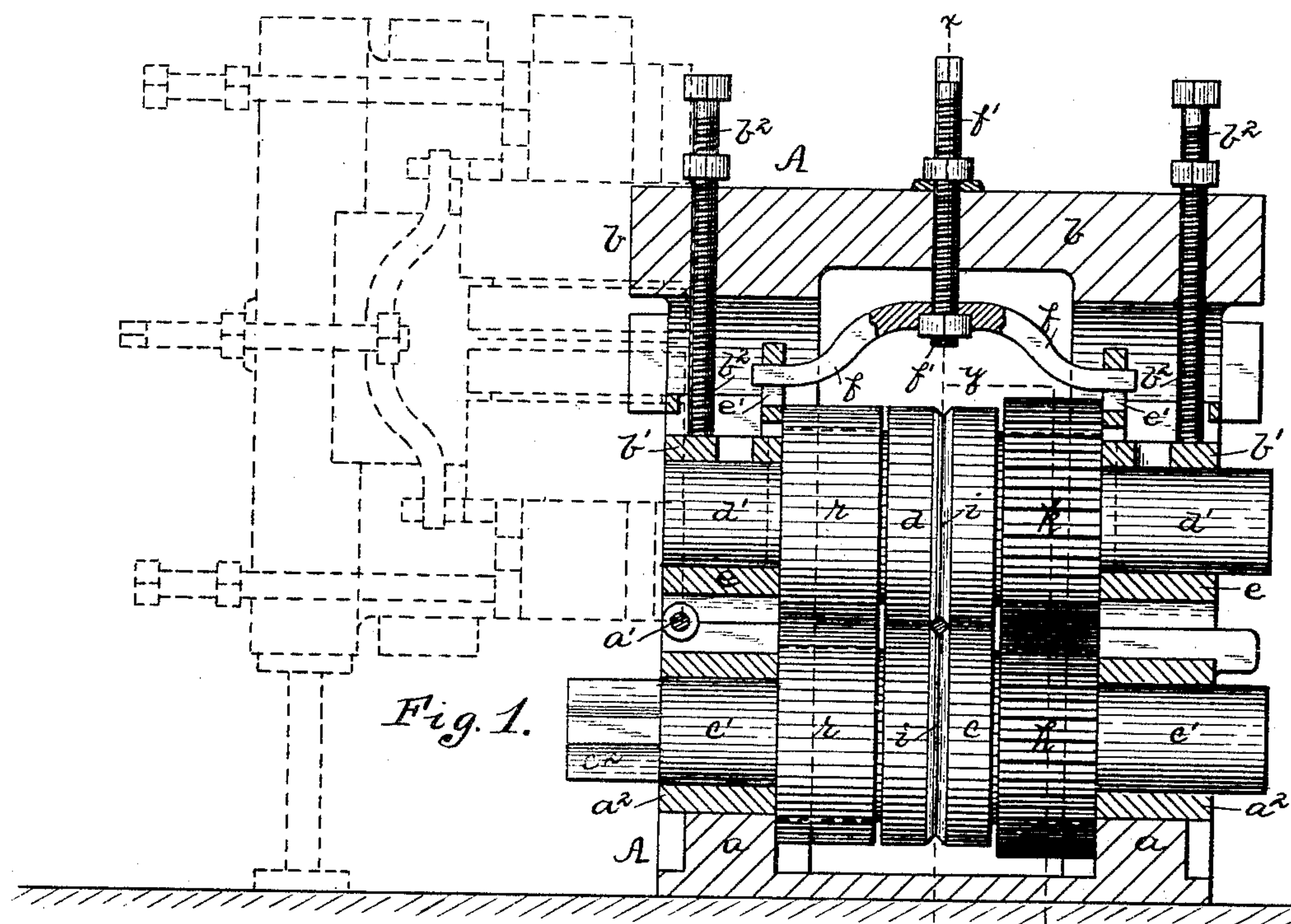
(No Model.)

2 Sheets—Sheet 1.

J. HUNTER.
ROLLING MILL.

No. 437,893.

Patented Oct. 7, 1890.



Witnesses:
J. S. Cooley.
J. S. Gray

Inventor:
James Hunter
By James S. Ray
Attorney

(No Model.)

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Fig. 3.

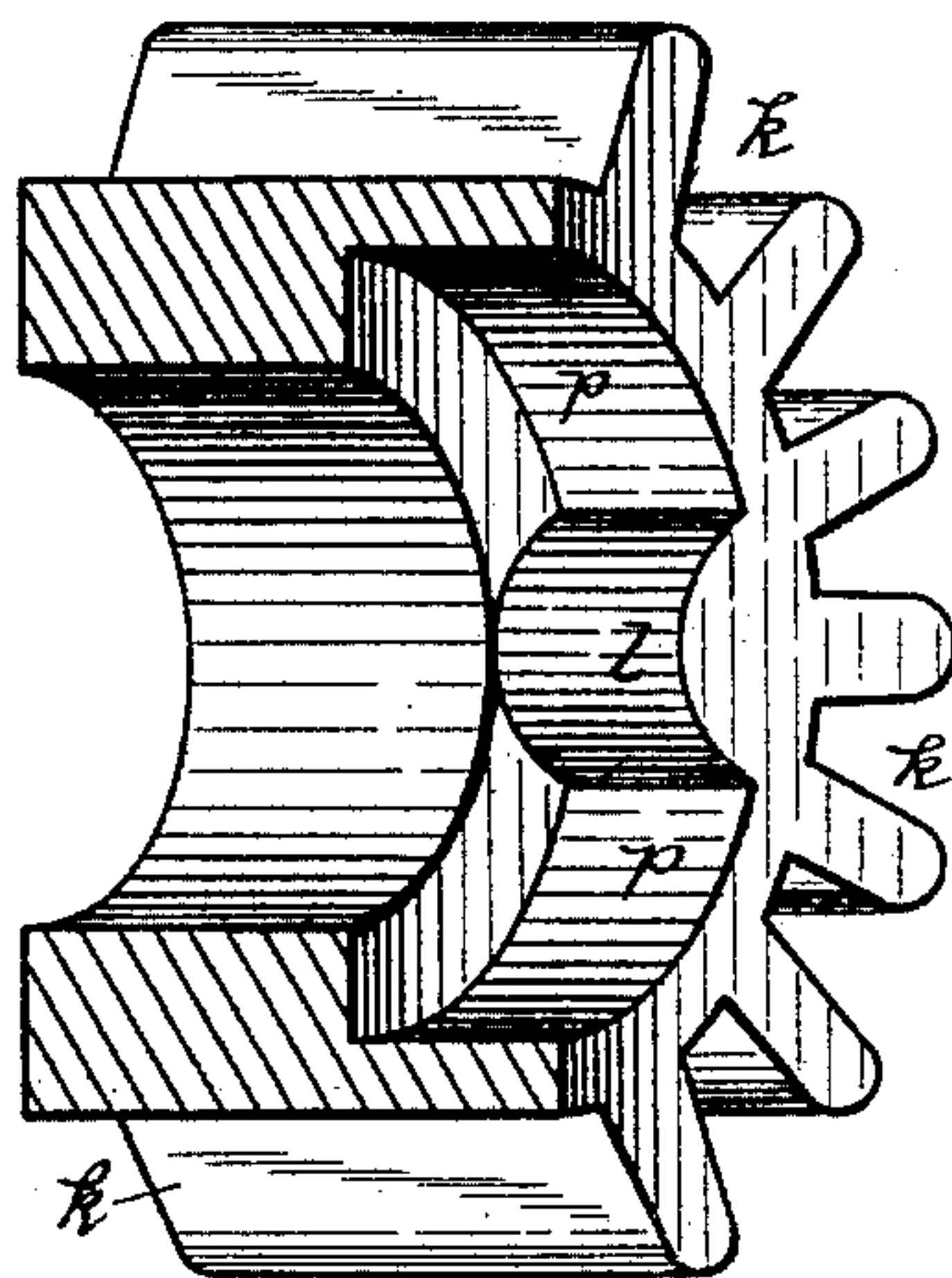
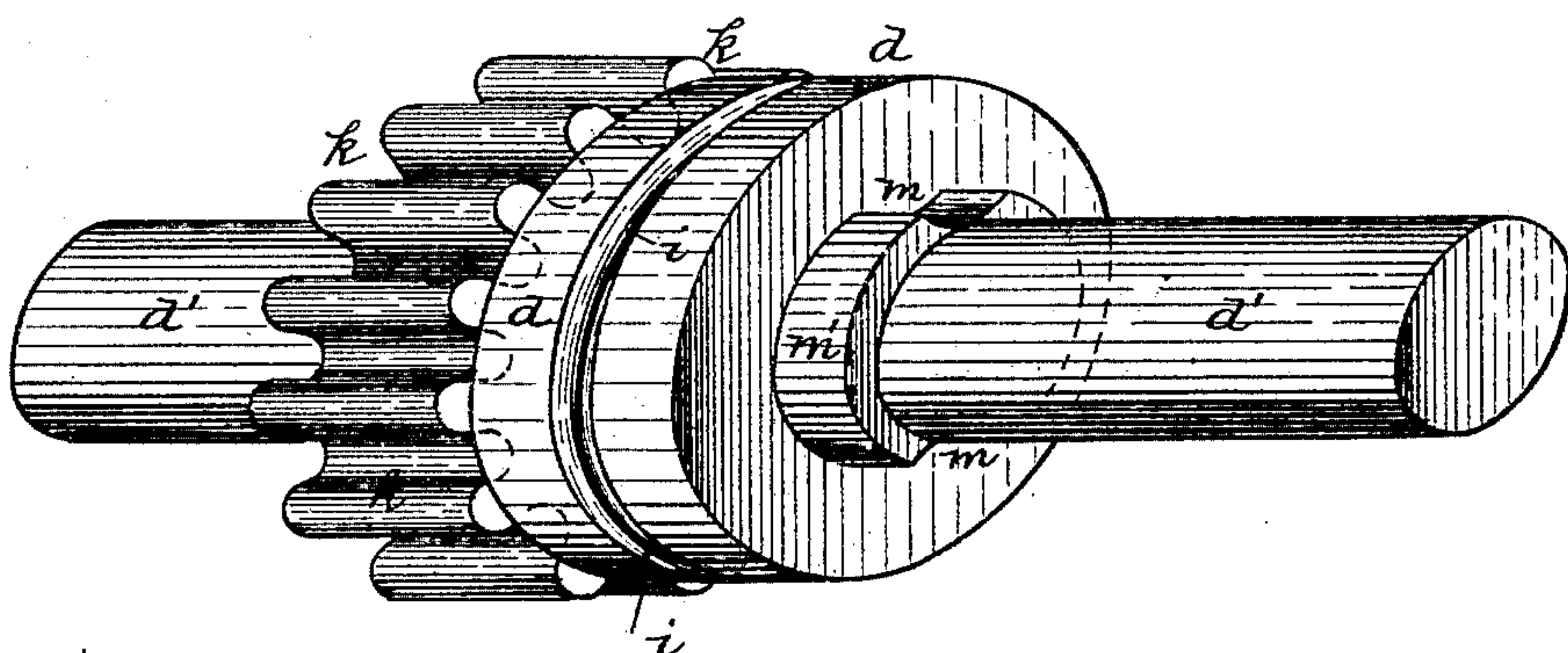


Fig. 4.

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UNITED STATES PATENT OFFICE.

JAMES HUNTER, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO THE DILWORTH, PORTER & COMPANY, LIMITED, OF SAME PLACE.

ROLLING-MILL.

SPECIFICATION forming part of Letters Patent No. 437,893, dated October 7, 1890.

Application filed July 17, 1890. Serial No. 359,027. (No model.)

To all whom it may concern:

Be it known that I, JAMES HUNTER, a resident 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.

My invention relates to rolling-mills, and is specially applicable, though not exclusively so, to what are known as "continuous rolling-mills"—namely, a line of housings having horizontal rolls mounted therein and forming a continuous train in which the billet or pile passes from the rolls in one housing to those in the next, and so on through the train, being operated on by each pair of rolls successively. These rolls are generally of small width, being only of sufficient width to form the single pass, and as generally constructed the two rolls are mounted horizontally in journals in the housings, and power is applied to one of the rolls, while the other roll is driven by pinions on the ends of the roll-shaft opposite to that to which power is applied.

In the use of these rolls it is found that the strain of driving the one roll from the other acts to throw the two rolls out of line with each other, the strain on, say, the lower pinion acting to throw the journal of that roll backwardly, while the strain on the pinion on the upper roll acts to throw the journal of that roll forwardly, and this difficulty in holding the two rolls in alignment has been one of the most serious difficulties encountered in continuous rolling-mills, leading in some cases to the coupling up of both rolls by means of wabblers-connections with gearing supported outside of and separate from the housings. The latter course is, however, not practical in the case of rolls having partible housings, such housings being extremely advantageous in continuous mills, as it provides for the opening up of the rolls and the withdrawing of any of the billets or bars which may have become stuck or wedged therein without the necessity of changing the adjustment of the rolls or the loss of time incurred in lifting the top roll from the bottom roll by hoisting mechanism in order to remove the metal caught or stuck therein. In rolls having these partible housings, however, it is found necessary to

apply the power to the lower roll and carry it thence to the upper rolls through suitable gearing, this gearing having been placed on the ends of the shaft projecting beyond the housings on the side opposite to the wabblers-connection.

The object of my invention is to overcome this difficulty in the driving of rolling-mills and to apply the power necessary for driving the rolls as near as possible to the working-point of the rolls and so to do away with the strain which has heretofore thrown the rolls out of line and caused the rapid wearing of the bearings and pinions.

To these ends my invention consists, generally stated, in combining with the housing of a rolling-mill horizontal rolls journaled therein and pinions on the roll-shafts connecting said rolls, said pinions being within the housing, such construction providing for the application of the power close to the point of strain or draft upon the rolls and so driving them parallel with each other and overcoming the tendency to draw out of line.

The particular improvements embodying my invention will be hereinafter more particularly set forth and claimed.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a sectional view of the housing, showing the rolls in full lines. Fig. 2 is a cross-section of two housings of a continuous mill, the housing on the left being shown on the line *xx*, Fig. 1, and the housing on the right being shown on the line *yy*, Fig. 1. Fig. 3 is a perspective view of the roll having the pinion applied on one side thereof, and Fig. 4 is a sectional perspective view of the pinion.

Like letters of reference indicate like parts in each.

My invention is illustrated in what is considered the most desirable form thereof, being shown in a continuous rolling-mill having partible housings, the housings being divided at or about the meeting line of the two rolls therein. It may be employed, however, with any ordinary rolling-mill, and except as to the particular features claimed the description and the drawings are simply given as an

illustration of the application of the invention.

In the drawings, the housing A is formed in two sections or parts *a b*, the upper part or section *b* being hinged to the lower part thereof at *a'*. The lower roll *c* is journaled in bearings *a²* in the housing-section *a*, the roll-shaft *c'* fitting therein and resting in the bearing-box *a²*, and the roll having at one end the wabblor-head *c²*, through which power is imparted to the roll, connection being made with said wabblor-head in the ordinary way. The upper roll *d* has its roll-shaft *d'* journaled in bearing-blocks *b'*, the roll being also supported in a frame secured to the housing-section *b*. This frame consists of the bracket *e*, fitting in the housing-section and having at the upper end thereof the loops *e'*, with which the yoke *f* engages, this yoke being connected to the upper part of the housing-section *b* by a bolt *f'*, the frame so formed of the brackets *e* and the yoke *f* securing the upper roll *d* in the housing-section, so that when said section is raised it will carry the roll with it. The bearing-blocks or brasses *b'* of the upper roll fits in seats in the brackets *e*, and the adjusting-screws *b²* pass through the housing-section *b* and bear upon these blocks to adjust the rolls. The upper roll can thus be firmly held within the upper housing-section, the frame lifting the same, while the adjusting-screws press down upon the same and provide for the adjustment thereof.

The rolls *c d* have any desired groove or pass formed therein, according to the work to be performed, that shown in the drawings being the ordinary groove *i* for a bar-mill.

In Fig. 2 the guides between the rolls are shown as at *g*, and the twisters *g'* act to give a quarter-turn to the bar as it passes between each set of rolls in the mill, these twisters being formed of loosely-running vertical rolls, slightly tapering, and being known as the "Swett twister."

Mounted within the housings and preferably adjoining the working-faces of the rolls are the pinions *h k*, these pinions fitting around the roll-shafts and being connected to the same by lugs *l* on the pinions fitting in seats *m*, formed in the rolls, these seats being preferably formed in collars *m'*, close to the working-bodies of the rolls and between the same and the roll-shafts. In such case the pinions have the seats *p*, adapted to receive the collars *m'* of the roll, while the lugs *l* enter the seats or recesses *m* in said collars, so firmly locking the pinions to the rolls, the pinions adjoining the working-bodies of the rolls.

I prefer to employ two sets of pinions in each housing—one set on each side of the working-bodies of the rolls—so that all liability of the rolls being thrown out of line is precluded. I find, however, that practically perfect results are obtained by the employment of these pinions on one side only of the rolls, the pinions being close to or adjoining

the working-bodies thereof and being within the housing, and by placing plain collars *r*, of substantially the same diameter as the roll-bodies, on the opposite side to the pinions *h k*, these plain collars being principally employed to balance the weight of the pinions, but also to hold the rolls in proper line and to form bearing-faces beyond the working-bodies of the rolls, so practically increasing the width of the bodies of the rolls.

In the use of rolling-mills embodying my invention the power is transmitted to each set of rolls in each housing by connections with the wabblor-head *c²* of the lower roll, and from said roll through the pinions *h k*, located within the housing and close to the center line of work, to the upper roll—such as close to the grooves *i i*—the pinions thus serving to rotate the rolls without creating any great tendency to twisting or drawing out of line with each other. For example, the rotation of the lower roll in a forward course naturally forces its shafts back against the rear faces of the boxes, and the rotation of the upper roll through the pinions *h k* naturally forces the upper roller forward against its bearing-blocks. As the pinions are within the housing, however, and the journals of the rolls are a greater distance from the center thereof than the driving-pinions, the power is applied at a point which has practically little leverage for twisting or throwing the rolls out of line, and instead of imparting a twisting strain to each roll, and so throwing the one bearing of each roll forward and another bearing on each roll back, the strain acts to hold the two rolls practically parallel and prevents the rolls from feeding the metal out therefrom at an incline or angle to the guide-box, which has a tendency to bend the metal and prevent its proper feeding into the next pass, and also acts to prevent the rapid wear of the journals, blocks, or pinions. Where the two sets of pinions are employed within each housing—one on each side of and close to the working-bodies of the rolls—this strain is of course entirely precluded, the rolls being forced by a direct pressure back against that bearing. At the same time, in case a partible housing is employed, the pinions within the housing offer no obstruction to the opening of the housing, the pinions being simply drawn out of mesh when the upper section of the housing is raised, as is shown in dotted lines, Fig 1.

Practical and continued use of rolling-mills embodying the above-described improvements have proven a saving of fifty percent in wear of rolls, pinions, and bearings, and it is also found that the rolls run much more regularly and the formation of scrap is reduced to about twenty percent. of that formed in the same train with the pinions outside of the housings.

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

1. In a rolling-mill, the combination of a

housing, horizontal rolls journaled therein, and connecting-pinions within the housing and close to the working-bodies of the rolls, substantially as and for the purposes set forth.

2. In a continuous rolling-mill, the combination of a series of housings, horizontal rolls journaled therein and having working-bodies each provided with a single pass or groove, and pinions for connecting said horizontal rolls within the housings and adjoining the working-bodies thereof, substantially as and for the purposes set forth.

3. In a rolling-mill, the combination of a housing, horizontal rolls journaled therein, pinions for connecting said rolls within the housing and adjoining one side of the working-bodies, and plain-faced collars within the housing and adjoining the opposite side of the working-bodies of the rolls, substantially as and for the purposes set forth.

4. In a rolling-mill, the combination of a

housing divided horizontally into two sections at or about the meeting line of the rolls therein, horizontal rolls, one in the lower section and the other hung in the upper section, and pinions connecting said rolls on the roll-shafts and within said housing-sections, substantially as and for the purposes set forth.

5. In rolling-mills, the rolls having the working-bodies, the roll-shafts, and collar between the working-bodies and roll-shafts, provided with recesses *m* in said collars, in combination with the pinions fitting around said roll-shafts and having the lugs *l* entering the said recesses to connect the pinions to the rolls, substantially as and for the purposes set forth.

In testimony whereof I, the said JAMES HUNTER, have hereunto set my hand.

JAMES HUNTER.

Witnesses:

JAMES I. KAY,
J. N. COOKE.