

W. Brown,

Rolling Plates, Bars, and Shafting.

N^o 84,086.

Patented Nov. 17, 1868.

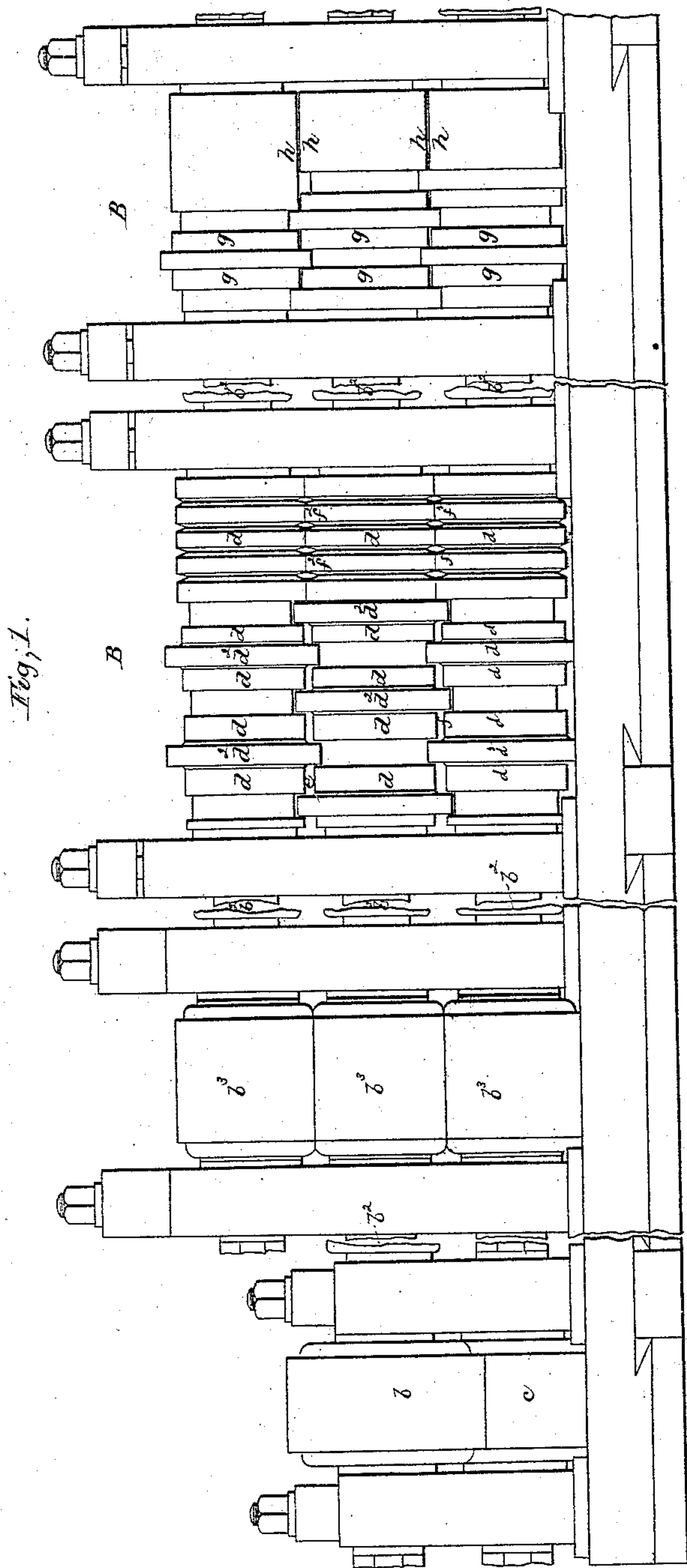


Fig. 1.

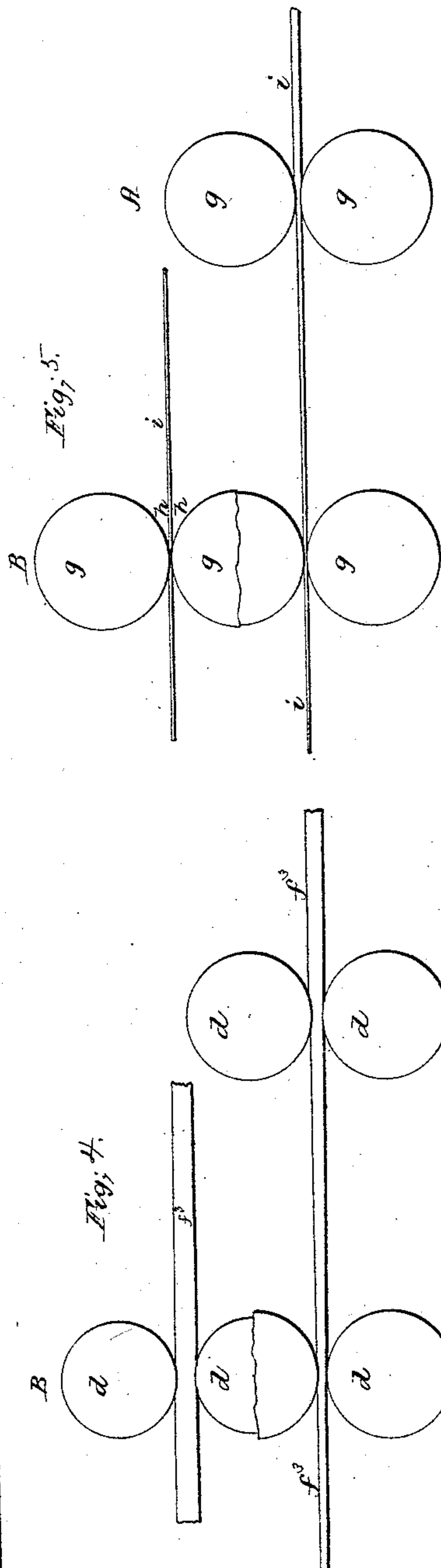


Fig. 5.

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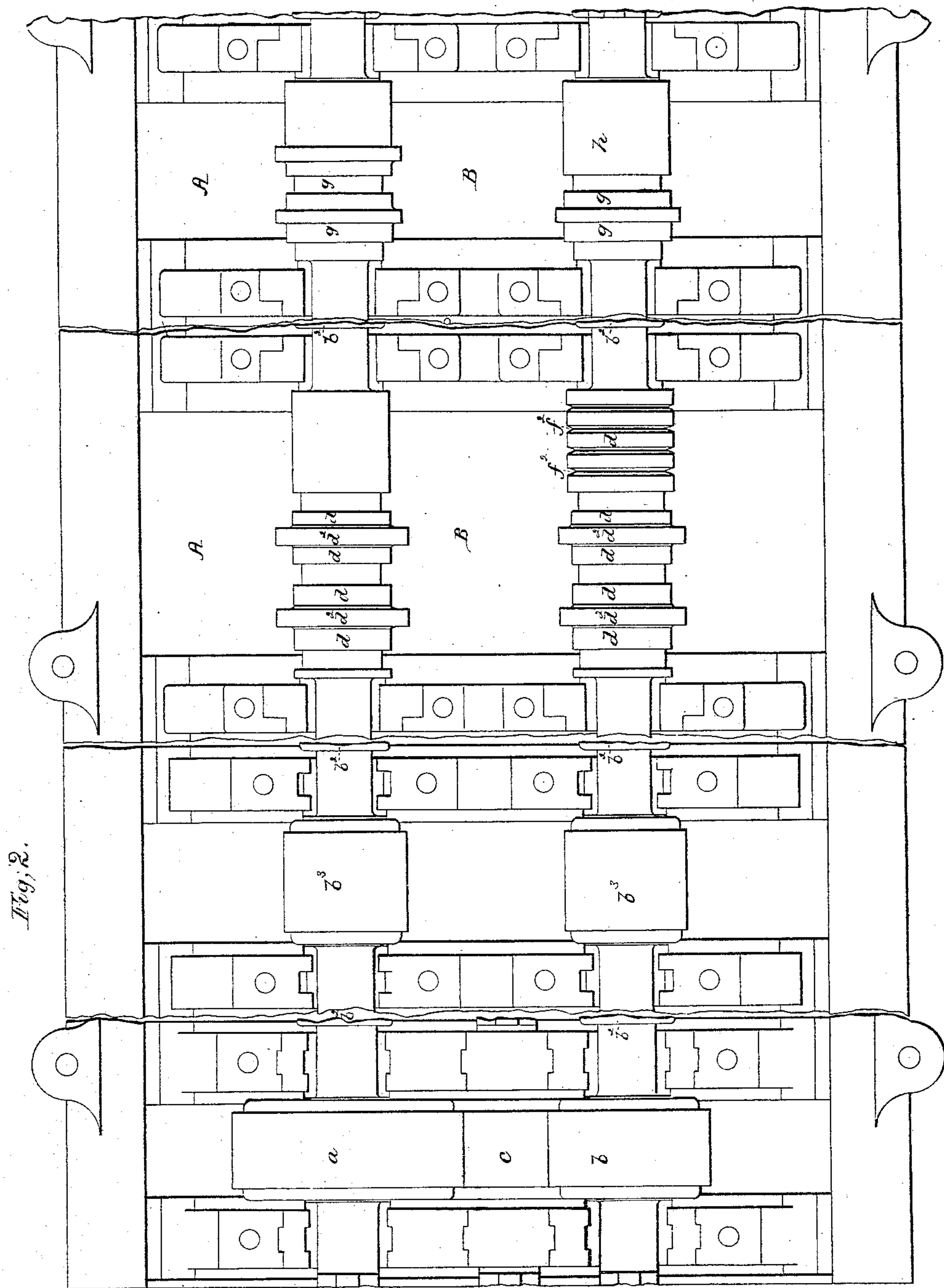
Inventor;
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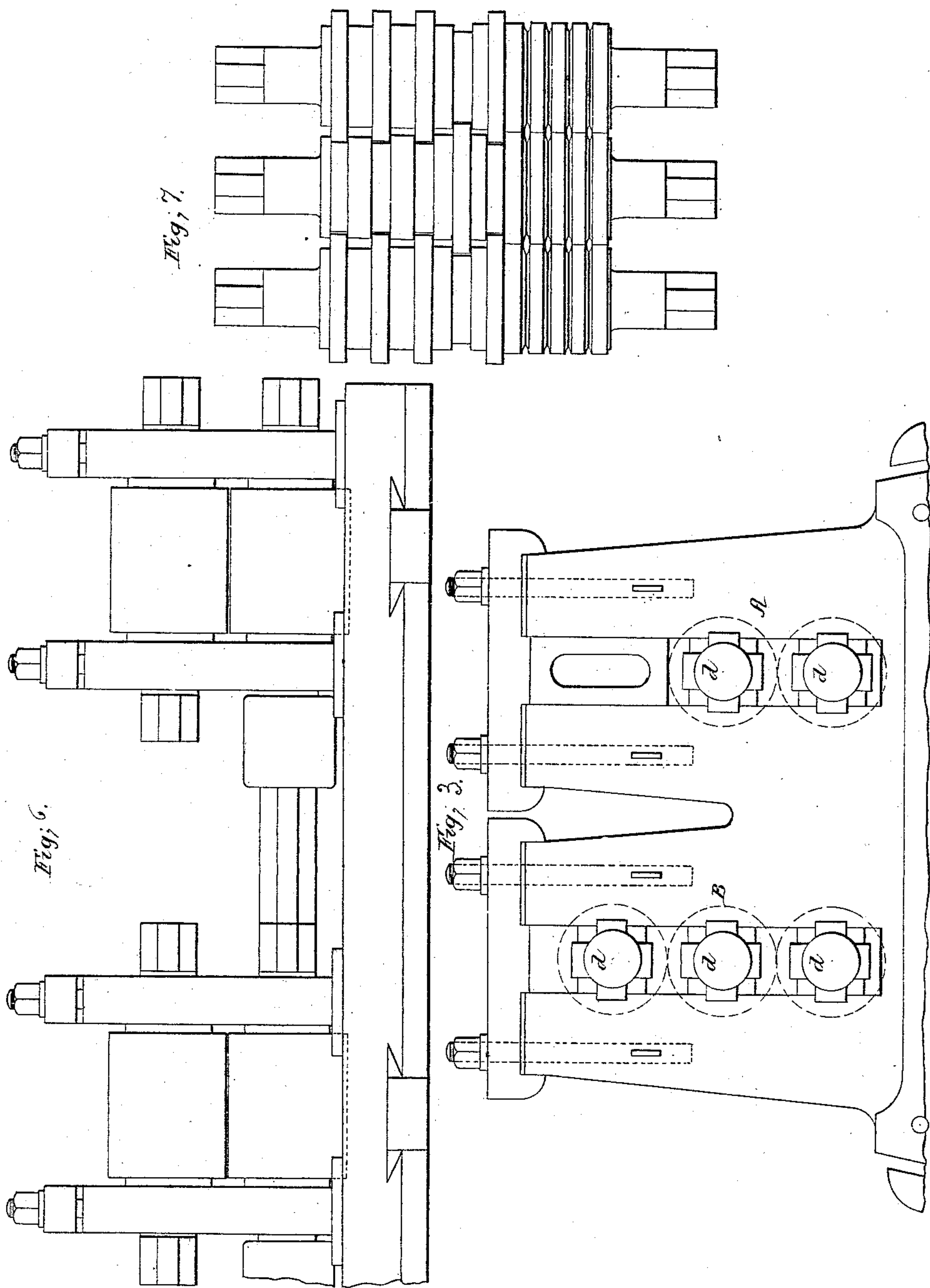
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UNITED STATES PATENT OFFICE.

WILLIAM BROWN, OF SMETHWICK, ENGLAND.

IMPROVEMENT IN ROLLING-MILLS.

Specification forming part of Letters Patent No. 84,086, dated November 17, 1868.

To all whom it may concern:

Be it known that I, WILLIAM BROWN, of Smethwick, in the county of Stafford, England, iron-master, a subject of the Queen of Great Britain, have invented or discovered new and useful Improvements in Machinery for Rolling Hoops, Strips, and Flat Bars of Iron and Steel; and I, the said WILLIAM BROWN, do hereby declare the nature of the said invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof—that is to say:

My invention consists in constructing and arranging, in the manner hereinafter described, rolls for rolling hoops, strips, and flat bars of iron and steel.

I mount two sets of pinions and two sets of rolls, one set of rolls consisting of three-high rolls and the other set of two-high rolls. The said rolls and pinions are connected in the usual way.

In order to give different speeds to the two sets of rolls, I make the wheels which give motion to each set of rolls of different diameters, and the driving-wheel, situated between them, consequently gives a different speed to each set of rolls. The first or preparing rolls are thus driven at a slower speed than the second or receiving rolls. The bar is thus kept continually on the stretch, and passes through the second set of rolls with the greatest regularity. The same object may be effected by driving the rolls at the same speed and making the second set of rolls of greater diameter than the first set. I first pass the billet or pile of iron or steel through the middle and top roll of one set, and return it through the two pairs of rolls of both sets.

The rolls have each a collar on the side of the groove to prevent the formation of a fin on the bar; or two collars may be put on one roll of each pair, the collars being on the bottom roll of the first pair and on the top roll of the second pair, or the reverse.

After the bar has been passed through the rolls described, I pass it through an edging-groove, one half of the said groove being made in one roll and the other half in the other roll. In this way the angles of the bars are blunted and the formation of a fin in the following op-

eration is prevented. In some cases I pass the bar through a flat groove instead of an edging-groove.

After the bars have been treated as described they are passed forward to the strand-rolls, or the next set of rolls. I pass the bar once forward through two pairs of the rolls and back again through one pair of the said rolls. The bar is now ready to pass through the hard or planishing rolls, as in the ordinary method of rolling hoop or strip iron.

Instead of one pair of hard or planishing rolls, as is ordinarily used, two or more pairs of hard rolls are required by my invention.

I sometimes use a pile of double the ordinary weight to make two hoop bars or strips, or sometimes three or four times the ordinary weight, and cut the same through after the bar has been passed through the edging-grooves, and again after the bar has been passed through the strand-rolls, thus subdividing the bar in the process of rolling down; hence the necessity, by my invention, of many separate pairs of hard or planishing rolls, several bars being made from the one pile first operated upon.

The cutting or dividing of the bars is effected by shears, either worked by hand or by motive power.

In rolling the hoops, strips, and flats, I sometimes use only the first series of rolls to prepare the pile or billet for the ordinary finishing-grooves in the finishing-rolls. I prefer, however, to use a double series of rolls.

Where large quantities of bars are required from one mill, I place one series of billeting-rolls between two series of strand-rolls.

Having explained the nature of my invention, I will proceed to describe with reference to the accompanying drawings the manner in which the same is to be performed.

Figure 1 represents in side elevation, and Fig. 2 in plan, a machine for rolling hoops and strips of iron and steel, constructed and arranged according to my invention. Fig. 3 is an end elevation, and Figs. 4 and 5 are cross-sections, of the said machine, as hereinafter explained.

The same letters of reference indicate the same parts in each figure of the drawings.

The said rolling-machine consists of two

sets of rolls. (Marked, respectively, A and B.) The set of rolls marked A consists of two-high rolls, and the set marked B consists of three-high rolls, as will be seen by reference to the side elevation, Fig. 1, and the end elevation, Fig. 3. The said sets of rolls A B are coupled together by the speed or toothed wheels $a b$ at one end of the rolls, the said wheels $a b$ being driven by the driver or middle toothed wheel c . The toothed wheels $a b$ are of different diameters, so that the driving-wheel c gives a different speed to each set of rolls, the set of rolls A being driven at a slower speed than the other set of rolls, B; or the same object may be effected by making the toothed wheels $a b$ of the same diameter and making the set of rolls B of greater diameter than that of the set A.

The shafts of the toothed wheels $a b$ are coupled to the shafts of their respective set of rolls, and the said rolls are geared together by coupling-boxes and spindles b^2 and pinions b^3 , of the ordinary kind, as illustrated in the drawing.

The pile, billet, or bar of iron or steel from the forge-rolls to be made into hoops or strips is first brought to the bolting-down or billetting rolls. These rolls are marked $d d$ in each of the two sets of rolls A B. A cross-section of the said rolls $d d$ is represented in Fig. 4.

The said billetting-rolls $d d$, instead of being provided with grooves of the ordinary shape, are provided with flattening-grooves in one part and edging-grooves in the other part, as represented.

If a large pile or billet is to be operated upon, I pass it through the said rolls $d d$ in the following order: I first pass the pile or billet through the groove e of the quick set of rolls, B, and return it through the next groove in the slow set of rolls, A, and through the groove f in the quick set of rolls, B, opposite the said groove in the slow set of rolls. The pile or billet is thus passed through one pair of rolls and returned through two pairs of rolls, the bar passing from the slow or preparing set of rolls into the quick or receiving rolls. The said bar is thereby kept continually on the stretch, and passes through the second set of rolls with the greatest regularity.

The bar being rolled is guided between the grooves of the two sets of rolls by trough or guide plates situated between the rolls. The bar is passed through the flattening-grooves of the billetting-rolls $d d$ in the order described as many times as may be required to bring it to the proper size. If a small pile is being rolled, I pass it first through the flattening-grooves in the slow set, A, of the rolls $d d$, and afterward through the quick set of rolls $d d$, the bar being passed through two pairs of rolls and returned through one pair of rolls.

The rolls $d d$ are furnished with collars, situated on each side of the grooves, to prevent the formation of a fin on the bar. These collars are marked d^2 ; or the collars may be put on one roll of each pair.

By the operation of the flattening-grooves of both sets of the rolls $d d$ upon the pile or billet, it is reduced to a flattened bar. The flattened bar is next passed edgewise through the edging-grooves f^2 of the fast set of billetting-rolls $d d$.

By the last-described treatment of the bar its angles are blunted or crushed inward, and the formation of a fin in the subsequent operation prevented, the pressure of the edging-grooves upon the bar being in a direction at right angles to that of the flattening-grooves through which it was previously passed.

The edging-grooves f^2 are made from the two rolls of each pair in the manner represented—that is, one half of the groove is in one roll and the other half in the other roll.

The manner in which the bar is passed through the flattening-rolls and edging-rolls will be readily understood by an examination of Fig. 4, where a bar, f^3 , is represented being passed through the flattening-grooves of the slow and fast sets of rolls, and also edgewise through the edging-rolls of the fast set.

After the bar has been passed through the edging-grooves it is cut or divided into the required lengths, and the said lengths or short bars are next passed to the grooves of the strand-rolls $g g$. The bar is first passed through the grooves of the slow set, A, of the strand-rolls g , and received in the grooves of the quick set, B, of the said strand-rolls. It is afterward returned through the plain part h of the quick strand-rolls B, and a hoop or strip is thereby produced.

The manner in which the bar is passed through the strand-rolls of the slow set, next through the strand-rolls of the quick set, and then through the plain part h of the said quick set of strand-rolls will be understood by an examination of Fig. 5, where a bar, i , is represented being operated upon by the rolls in the order described. The hoop or strip is finally passed to the hard or planishing rolls, (represented in Fig. 6,) two or more pairs of which I employ in combination with the rolling machinery described.

I prefer to arrange the planishing-rolls on one side of and parallel to the strand-rolls; but they may, if required, be geared with the slow set of rolls.

In place of the plain part h of the strand-rolls, separate plain rolls may be used in front of the strand-rolls $g g$; and instead of arranging the strand-rolls on one side only of the billetting-rolls $d d$, as represented in the drawing, a set of strand-rolls may be placed on each side of the billetting-rolls.

The long bar, produced when a large pile or billet is used by the operation of the flattening and edging grooves of the billetting-rolls, may be divided into short lengths or bars after it has passed through the said billetting-rolls; and the short bars thus formed may again be divided after they have passed through the strand-rolls $g g$, but before they are passed through the plain part h ; or the bar may only

be divided after it has passed through the strand-rolls.

I divide the bar by means of shears, worked by hand or by power, or in any other convenient manner. I prefer to arrange the shears on either side, or on both sides, of the billeting or strand rolls. By passing a large pile or billet through the two sets of rolls in the manner described and subdividing the long bar produced there is furnished a sufficient quantity of hoop-bars to supply two sets of strand-rolls, and also to supply two or more pairs of hard or planishing rolls.

I apply the billeting-rolls hereinbefore described, and represented in Figs. 1 and 2 of the drawings, to ordinary three-high rolls—that is, instead of making the grooves of the ordinary three-high rolls of an oval, square, or diamond shape, as usual, I make them with flattening and edging grooves, and bring the bar to the proper width and thickness in the said flattening and edging grooves before taking it to the strand-rolls. A set of ordinary three-high rolls, provided with flattening and edging grooves according to my invention, is represented in Fig. 7. These rolls may be provided with two collars on one roll or one on each roll.

Having now described the nature of my invention, and the manner in which the same is to be performed, I wish it to be understood that I do not claim, broadly, the combination of two sets of rolls moving at different speeds, for I am aware that such have been heretofore in use. The employment, however, of three-high rolls in one of the sets is product-

ive of advantages which have not heretofore been realized, for the bar, by this means, may be returned back again to the front of the rolls, the second rolling being effected during this return motion. Without this, the bar would have to be passed over the rolls without being operated on, and heat and time would be thus lost. The arrangement of the flattening and edging grooves in the rolls is also advantageous, as I thereby obviate the necessity for turning the bar on passing from one set to the other. Therefore,

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

1. The combination and arrangement, in rolling machinery such as described, of two sets of rolls having parallel axes, the one set consisting of two rolls and the other of three rolls, driven at different speeds, substantially in the manner and for the purposes herein set forth.

2. In conjunction with two sets of billeting or reducing rolls, the one consisting of two and the other of three rolls, driven at different speeds, and combined as herein specified, the arrangement of the flattening and edging grooves formed in said rolls, as described and shown, for preventing the necessity for turning the bar on passing from one set to another.

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