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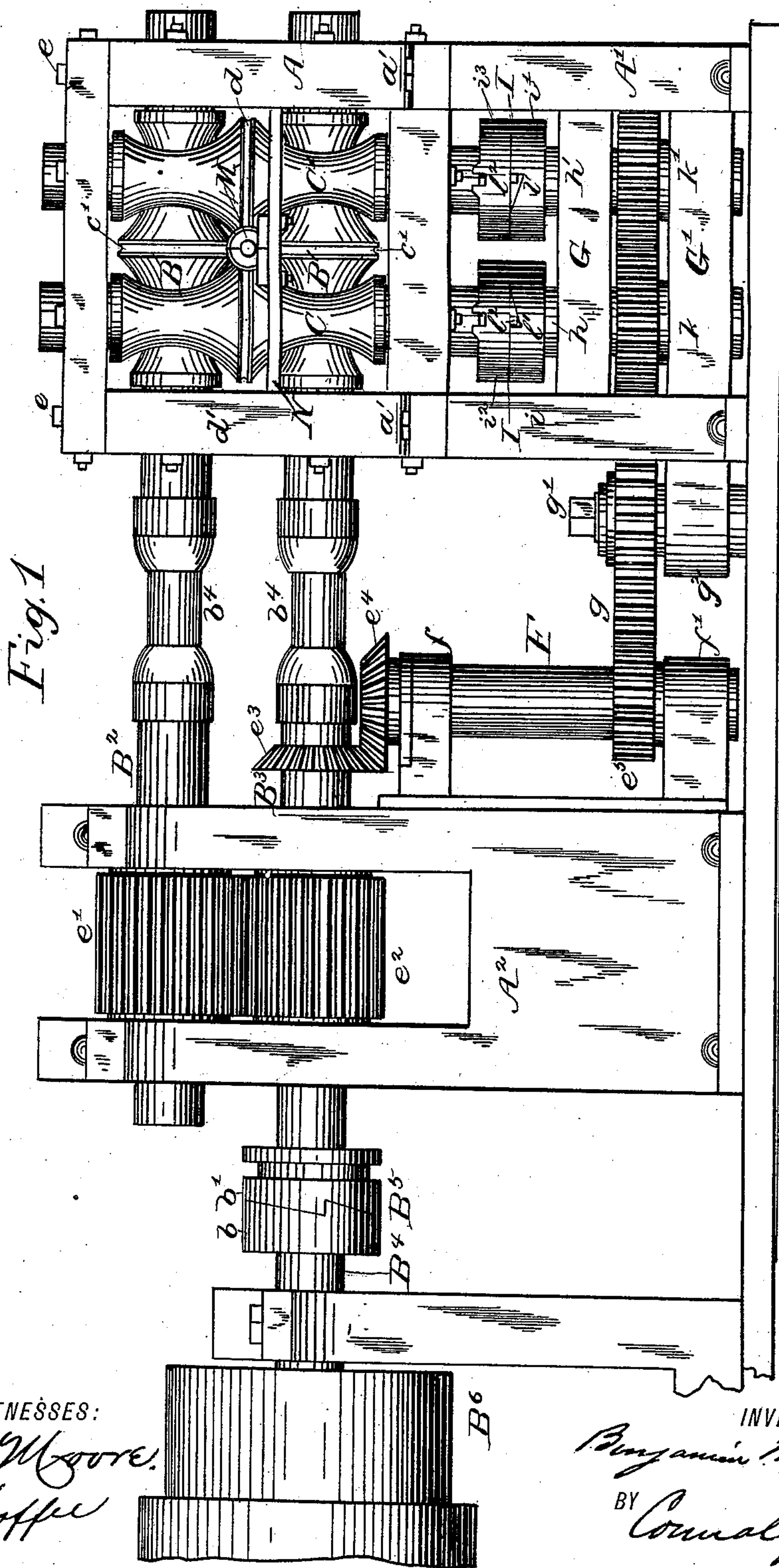
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B. WEAVER.

WIRE ROD ROLLING MILL.

No. 351,675.

Patented Oct. 26, 1886.



WITNESSES:

A. A. Moore.
W. C. Chaffee

INVENTOR

Benjamin Weaver

BY

Connelly Bros

ATTORNEYS

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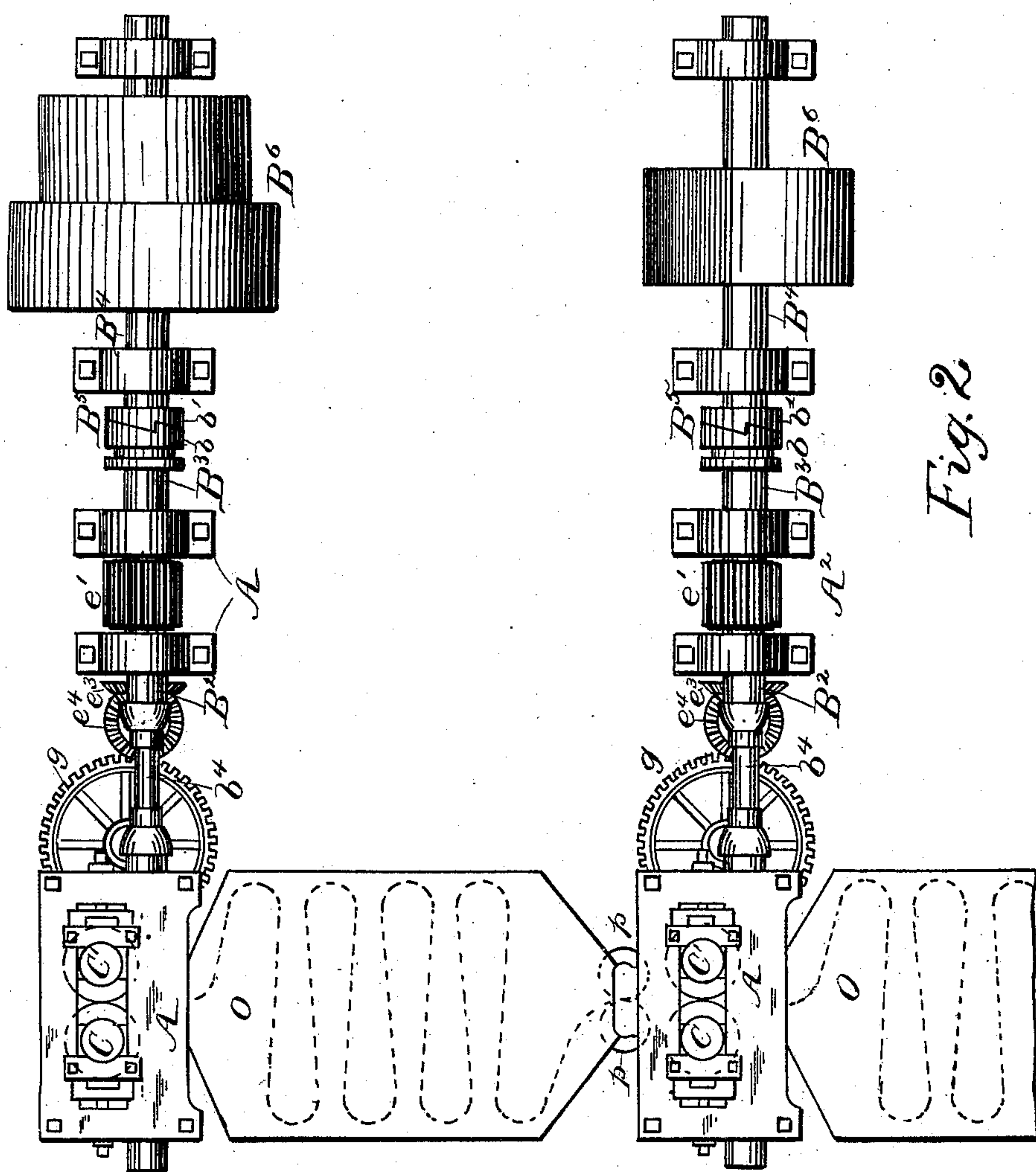
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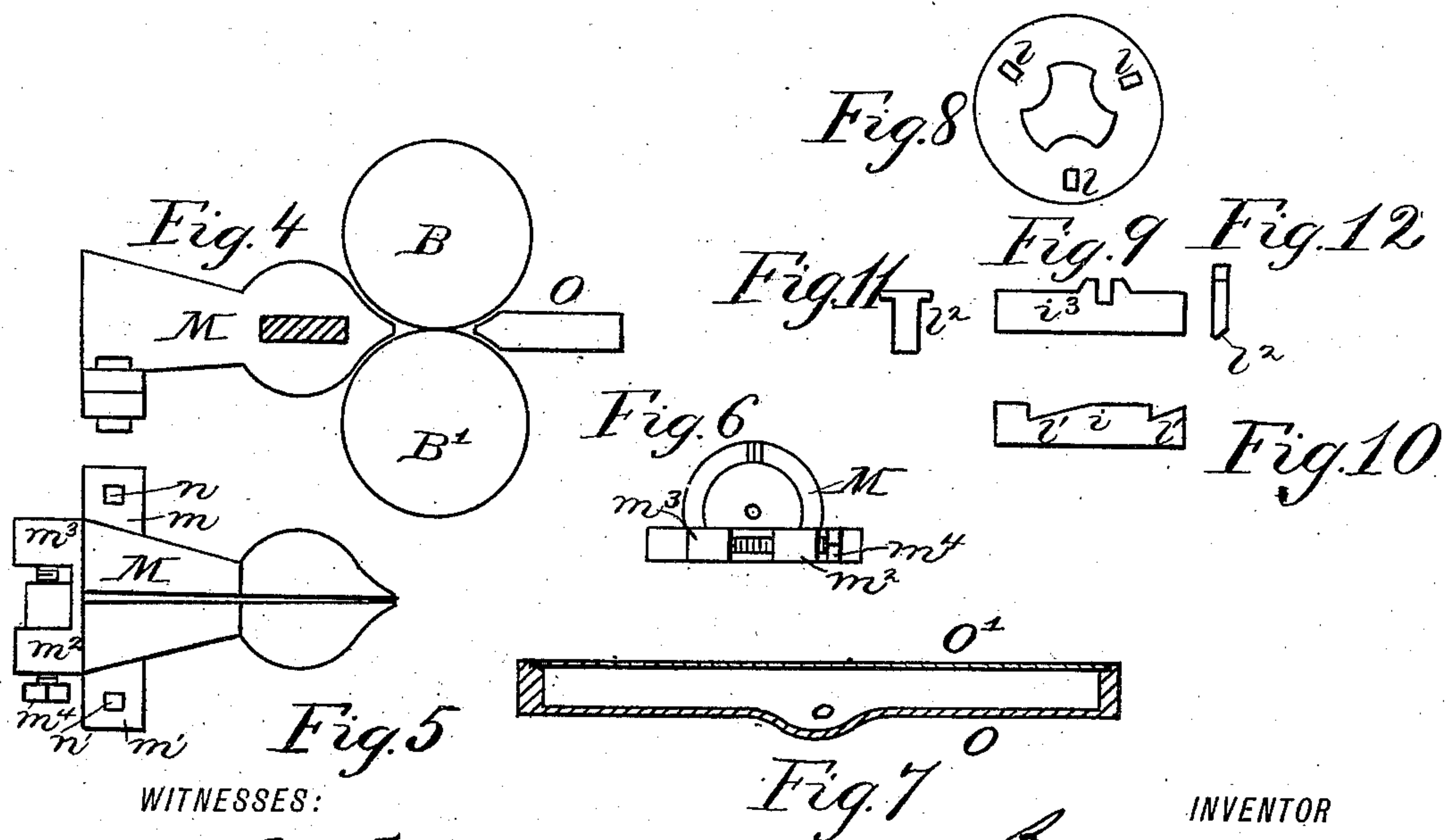
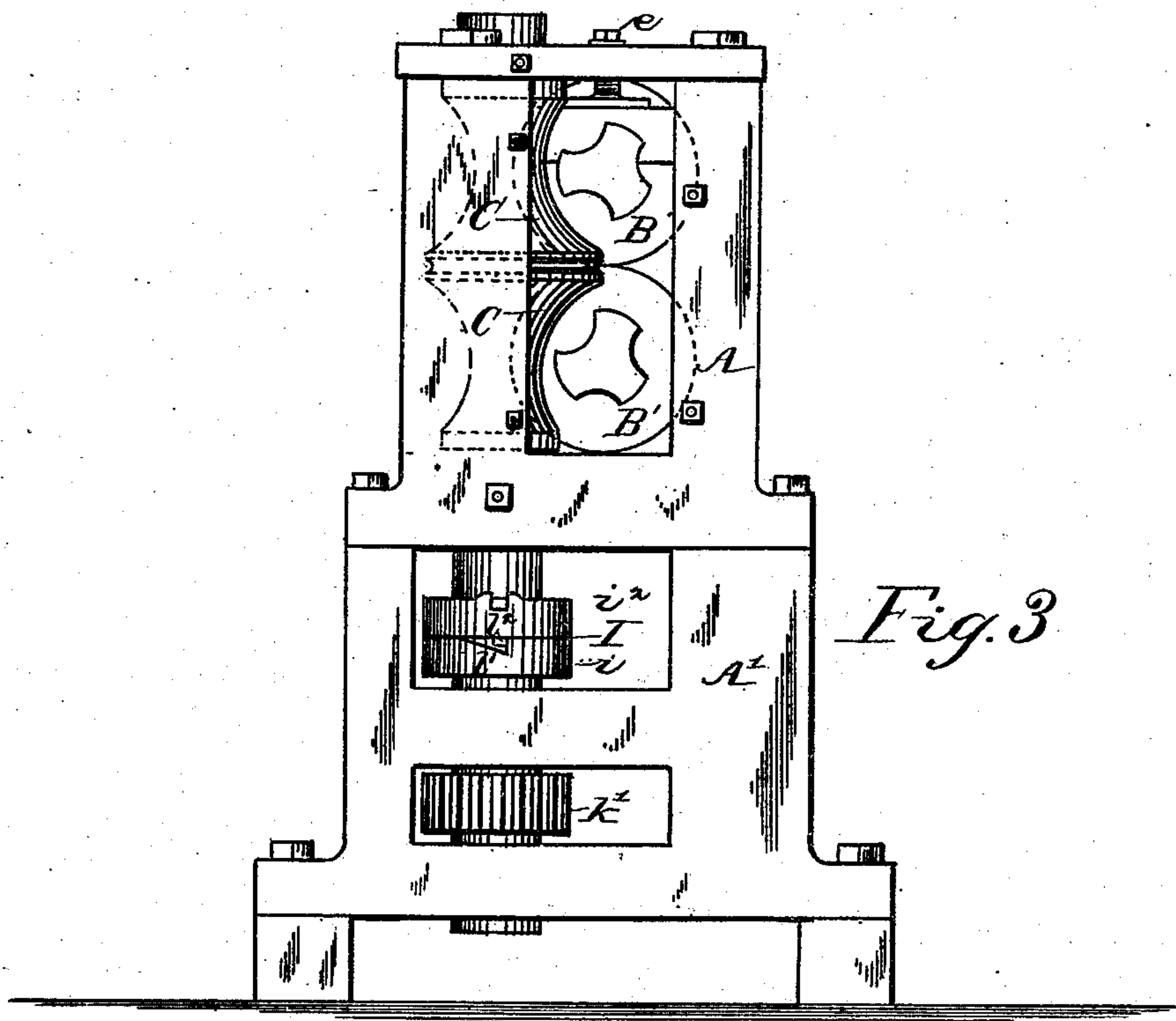
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UNITED STATES PATENT OFFICE.

BENJAMIN WEAVER, OF PITTSBURG, PENNSYLVANIA.

WIRE-ROD-ROLLING MILL.

SPECIFICATION forming part of Letters Patent No. 351,675, dated October 26, 1886.

Application filed March 2, 1886. Serial No. 193,769. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN WEAVER, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Wire-Rod-Rolling Mills; and I do hereby declare the following to be a full, clear, and exact description of the invention, reference being had to the accompanying drawings, which form part of this specification.

This invention has relation to rolling-mills, and particularly to that class of mills known as "wire-rod-rolling" mills, in which the rolling is effected by several sets of rolls, each set comprising a pair of vertical and a pair of horizontal rolls.

This invention consists, first, in the peculiar construction and arrangement of the sets of rolls and their housings and bearings, whereby any of the sets in a series may be readily removed and replaced by a different set; secondly, in the peculiar construction and arrangement of the driving mechanism of each set of vertical rolls, whereby the said vertical rolls will be automatically uncoupled from their driving-shafts, and said rolls operated by the metal which is being drawn between them by the action of the horizontal rolls; thirdly, in the peculiar construction and combination of devices, whereby each set of rolls is operated independently of the other sets in the series; fourthly, in the provision of a novel and simple form of guide adapted to be placed in close proximity to each set of rolls, whereby the metal is caused to pass from the accumulator through the set of rolls without danger of sticking or buckling; fifthly, in the construction, combination, and arrangement of parts, as hereinafter more fully described and specifically claimed.

Referring to the accompanying drawings, Figure 1 is a side elevation of one of the sets of rolls with driving-shafts and power-pulleys in position. Fig. 2 is top or plan view of two sets of rolls with the accumulator in position between them. Fig. 3 is an end view of one set of rolls. Fig. 4 is a sectional view, Fig. 5 a top view, and 6 an end view, of the guide. Fig. 7 is a transverse sectional view of the accumulator. Fig. 8 is a top view of the clutch mechanism by which the vertical rolls are at-

tached to their driving mechanism. Figs. 9 and 10 are side views of the two parts of the same clutch mechanism. Figs. 11 and 12 are side views of the connecting-bolt used with the clutch.

A represents the housing of the rolls, which is made separate from that of the power mechanism, in order that the rolls may be removed and replaced with as little loss of time as possible.

A' represents the housing for the gear mechanism of the vertical rolls, and A² the housings for the gearing of the horizontal rolls. The housing A is of such dimensions and construction as to be adapted to be placed directly over the housing A', being retained in position thereon by means of bolts *a a'*, &c., passing through cleats on the corners of housing A into the top frame of A'. By loosening and removing these bolts *a a'* the top housing may be readily detached from the housing A'. The housing or frame A² is at one side of the rolls, and is permanently fastened to the bed-frame or anchored to the ground.

The horizontal rolls B B' and vertical rolls C C', having enlarged and grooved central portions *c c'* and *d d'*, respectively, have their bearings in the frame-work of the upper housing, A, the peculiar form of these rolls permitting their being placed closer together than if the rolls were of the same diameter throughout, adjusting-screws *e e e*, &c., being provided by which the relative position of the rolls may be regulated. The shafts of the rolls B B' extend through their bearings at the inner side of the housing, and are attached to the power-shafts B² B³ by spindles and coupling-boxes, as shown at *b⁴*. The shafts B² B³ have their bearings in the frame or housing A², the shaft B³ extending beyond said housing and being connected to the pulley-shaft B⁴ through the medium of the clutch B⁵, its members *b b'* being attached, respectively, to the shafts B³ B⁴. The shaft B⁴ is provided with stop-pulley B⁶, by which power is transmitted to it.

Power is transmitted to the shaft B² by means of a gear-wheel, *e'*, meshing with a like wheel, *e²*, on the shaft B³. These wheels being of the same diameter, the rolls B and B' will move at the same speed.

Fastened to and moving with the shaft B³ is

a beveled gear, e^3 , which meshes with a like beveled gear, e^4 , upon the end of the vertical shaft F. The vertical shaft F has bearings f f' attached to one side of the housing A².

- 5 Above the bearing f' there is attached to the shaft F a gear-wheel, e^5 , which meshes with an idler, g , mounted on and turning around a shaft, g' , which is firmly fastened in or to the frame g^2 , upon the inner side of the housing A¹.
- 10 Within the housing A¹, and having bearings in the cross-pieces G G', are two vertical shafts, h h' , having firmly attached to their upper ends the clutch-members i i' . Attached to the same shafts h h' , and between the frame-pieces
- 15 G G', are intermeshing gear-wheels k k' of exactly the same diameter, the gear k meshing with the idler g , and receiving its power therefrom. The gear-wheels k k' being of greater diameter than e^5 , they will revolve at a slower
- 20 speed than the shaft F.

To the lower ends of the shafts of the vertical rolls C C' are attached, by "tri-wabblers," the upper members, i^2 i^3 , of the clutch mechanism I. These clutch-members i^2 i^3 are provided with openings l l' , near their edges, which extend through said members.

The under disks or half of the clutch have corresponding indentations, l' , extending partially through them, and having one of the edges thereof at a right angle with the face of the disk, the other side of the indentation extending in an angular plane to the face of the disk.

The object of the opening through the disks i^2 i^3 and the indentations in the disks i i' is that the two parts may be coupled together by a bolt, l^2 , passed through the openings in the upper disks, the end of the bolt resting in the indentation in the lower disk. As the lower

40 disk is revolved, the edge of the indentation presses against the bolt, and thus causes the upper disk and its attached shaft and roll to revolve with it.

Across the upper housing, A, and directly in front of the vertical rolls, is fastened a rest-rod, N, to which is attached a guide, M. This guide is made of two pieces of steel, as shown in Figs. 4, 5, and 6, and tapers from the front toward the end which is nearest to the rolls, its interior bore being of the same general configuration as the exterior. This guide is attached to the rest-rod N by means of bolts n n' , passing through lugs m m' on each side thereof, near the front end, and into the rest-rod N.

55 At the front of the guide M and on each of the halves thereof are lugs m^2 m^3 , the lug m^2 having through it a screw-threaded opening, through which passes a screw, m^4 , its end pressing against the inner side of the lug m^3 .

60 By causing the screw m^4 to press against the lug m^3 , as described, the two pieces comprising the guide are forced apart at their front ends, thus bringing the two sections closer together at the point where the rod passes from the vertical to the horizontal rolls. The rod being oval in cross-section as it leaves the ver-

tical rolls, the interior bore of the guide is made to conform in shape to that of the rod at this point, the object being to prevent the oval-shaped rod from twisting or turning while passing through the horizontal rolls. The closing in of the guide-pieces, as hereinbefore described, becomes necessary from the wear and tear caused by the rubbing of the rod as it passes through between them.

The accumulator, as shown in Fig. 7, consists of a shallow metal box, O, having a groove or indentation, o , running through it from end to end. This box is provided with a metal lid or cover, o' , resting on and if necessary fastened to the vertical sides of the box, the sides of the box or accumulator being of such a height that the accumulated metal therein will be caused to lie on the bottom in sinuous folds, the lid preventing its doubling over on itself. When the accumulator is in proper position between two of the sets of rolls, the groove o in the bottom thereof is in the direct line of feed of the rolls, so that the rod in passing from one set will follow the groove in the accumulator, and thus be led into the guide of the adjacent set of rolls. At one end of this accumulator is placed a pair of friction-rollers, p p' , between which the rod passes as it enters the guide. The outer edges of the accumulator-box may be provided with holes, so as to act as a sieve to allow the scale from the rods to fall from the box, and thus prevent its accumulation upon the bottom of the box.

The operation of the mill is as follows: Rolls of the requisite size are placed in position in the upper housing, A, and properly adjusted in their relative position by means of the adjusting-screws. The housing A is then placed in position upon the lower portion, A', the ends of the shafts of the rolls C C' entering the disks i^2 i^3 , and the shafts of the rolls B B' being attached by spindles and coupling-boxes, as shown, to the shafts B² B³. Power is then communicated to the shaft B⁴ from the pulley B⁶, and thence by the mechanism, as described, to the rolls B B' and C C'. The rod to be rolled is then taken from the furnace, and its end being forced between the rolls C C' of the first set in the series, it is carried forward by the movement of said rolls till it enters between the rolls B B' of the same set, whence it is drawn forward by the action of said rolls, the rolls B B' moving, as described, at a greater speed than the rolls C C'. As the metal is passing through the rolls B B', it is drawn forward by said rolls, and by its frictional contact on the rolls C C' causes them to travel at a greater speed than they are driven by means of their gearing. As the rolls C C' are moved at an increased speed, the disks i^2 i^3 , to which they are attached, move with the same increase of speed, and thus revolve upon the lower disk, i i' , the pins or bolts l^2 in the upper disk being free to ride upon the bottom plane of the indentations l' l' in the lower disks without hindering the separate movement of the upper disks. It will be plainly

seen that in this way the vertical rolls are free to be moved independent of the driving-gear of the other parts of the mill. If necessary, the upper disks are made with lugs or in-
 5 creases upon their faces at the points where the holes for the bolts are made, the object being to strengthen the disk at that point, and also to prevent the bolt, when it is raised by the increased movement of the upper roll, from
 10 being displaced. As the rod passes through the first set of rolls, it enters the accumulator, and following the groove in the bottom thereof is forced between the rollers on the end of the accumulators, and thence through the guide
 15 into the second set of rolls. After passing through the second set of rolls the rod is carried forward to the next set, as before.

The accumulator not alone answers as a track for the rod on its passage from one set
 20 of rolls to the next set, but as the metal passes through each set of rolls the rod is made longer and requires a greater length of time to pass through the next set of rolls. To prevent the rod from being bent upon itself or tangled in
 25 its passage from one roll to the other set, each set of rolls is caused to revolve at a greater speed than the set in front of it.

The method of regulating the speed of the several sets of rolls prevents, to a certain extent, the tangling of the rod; but it has been
 30 found impossible in actual practice to so regulate the relative speed of each set of rolls in a series as to altogether prevent the accumulation and consequent tangling and doubling of the bars between the sets of rolls. By the use
 35 of the accumulator, as described, all danger of the rod being doubled or tangled is obviated.

As the rod passes into the accumulator, it is carried directly in the line of feed to the next
 40 set of rolls in the series, and if the second set does not revolve with sufficient rapidity to take in a rod as it passes from the first set, it will form itself into a sinuous curve upon the bottom plate of the accumulator. If for any
 45 reason the rod becomes jammed between any of the rolls or in any of the guides, it can be easily removed by separating the guide, which, for this purpose, is made in two pieces.

By reason of the peculiar separable form of
 50 the roll-housing it is very easy to change the size of rolls to conform to the different classes of work to be done, as it is only necessary to stop the mill for a short time while one set of rolls with their housing are removed and another set, which have been properly adjusted
 55 in their housing, are placed in position.

In practical operation of this mill I propose to pass the rod through reducing-rolls before passing it through the rod-mill, and I also propose to so shape the grooves in the
 60 rolls that as the rod passes through the vertical pair of rolls it will be oval in cross-section, the horizontal rolls reducing it to a perfect round, so that as the rod emerges from each set of rolls it will be of a standard round
 65 gage and in a perfect condition for the market.

Having described my invention, what I desire to claim and secure by Letters Patent, is—

1. In a rolling-mill, the combination, with
 70 the housing for two pairs of rolls, one pair being vertical and the other horizontal, of separate housing for the driving mechanism of one of said pairs, the housing for the said driving mechanism being constructed and
 75 adapted to serve as a base for and being separable from the roll-housing, substantially as described.

2. In a rolling-mill comprising vertical and horizontal rolls and their driving-mechanism,
 80 the combination, with the shafts of the vertical rolls, disks secured thereto, and pins passing through holes in said disks, of clutch disks or members secured to the shafts of the driving mechanism and adapted to engage with
 85 said pins, substantially as described.

3. In a rolling-mill, the combination of the rolls thereof and a guide made in two sections, each of such sections being separately
 90 hinged upon a rest-bar, whereby said guide may be adjusted to accommodate rods or bars of different dimensions, substantially as described.

4. In a rolling-mill, the combination, with the rolls B B' C C', of the driving-gear for the
 95 rolls C C', attached thereto by clutches I, said clutches being composed each of two disks and a connecting-pin, whereby said rolls C C' are automatically uncoupled from their driving-gear by the action of the rod passing be-
 100 tween them and the rolls B B' and automatically coupled to their driving-gear when said rod has passed through both of said pairs of rolls, substantially as described.

In testimony that I claim the foregoing I
 105 have hereunto set my hand this 27th day of February, 1886.

BENJAMIN WEAVER.

Witnesses:

A. A. MOORE,
 JOHN F. ATCHESON.