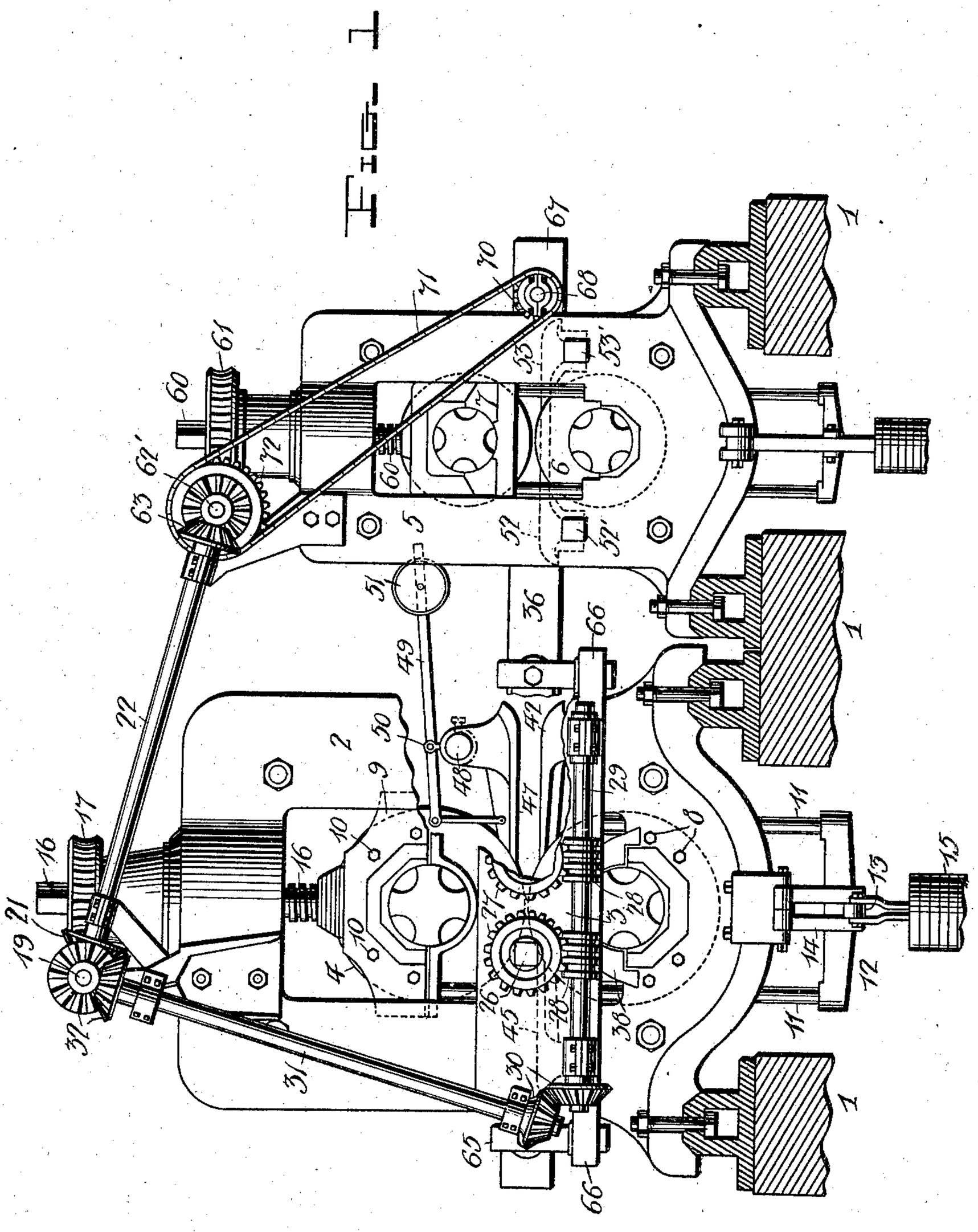
No. 709,085. Patented Sept. 16, 1902.

W. A. DUNN.

MACHINE FOR ROLLING METAL I-BEAMS, CHANNEL BEAMS, &c.

(Application filed June 23, 1902.)

(No Model.) 4 Sheets—Sheet 1.



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(No Model.) 4 Sheets—Sheet 2.

FIG. 5

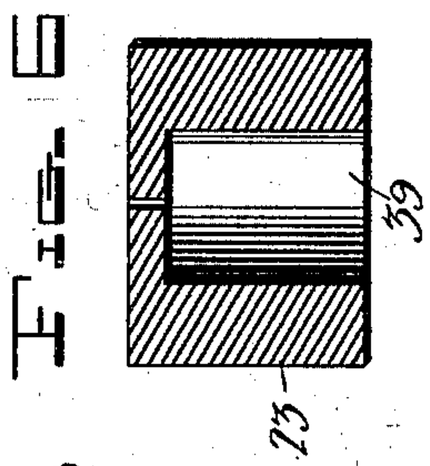


FIG. 7

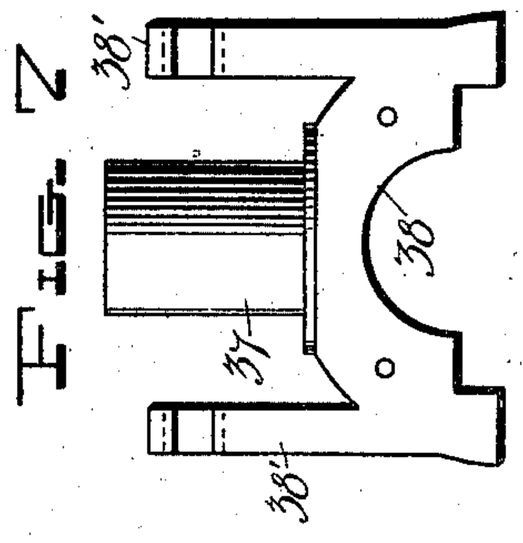
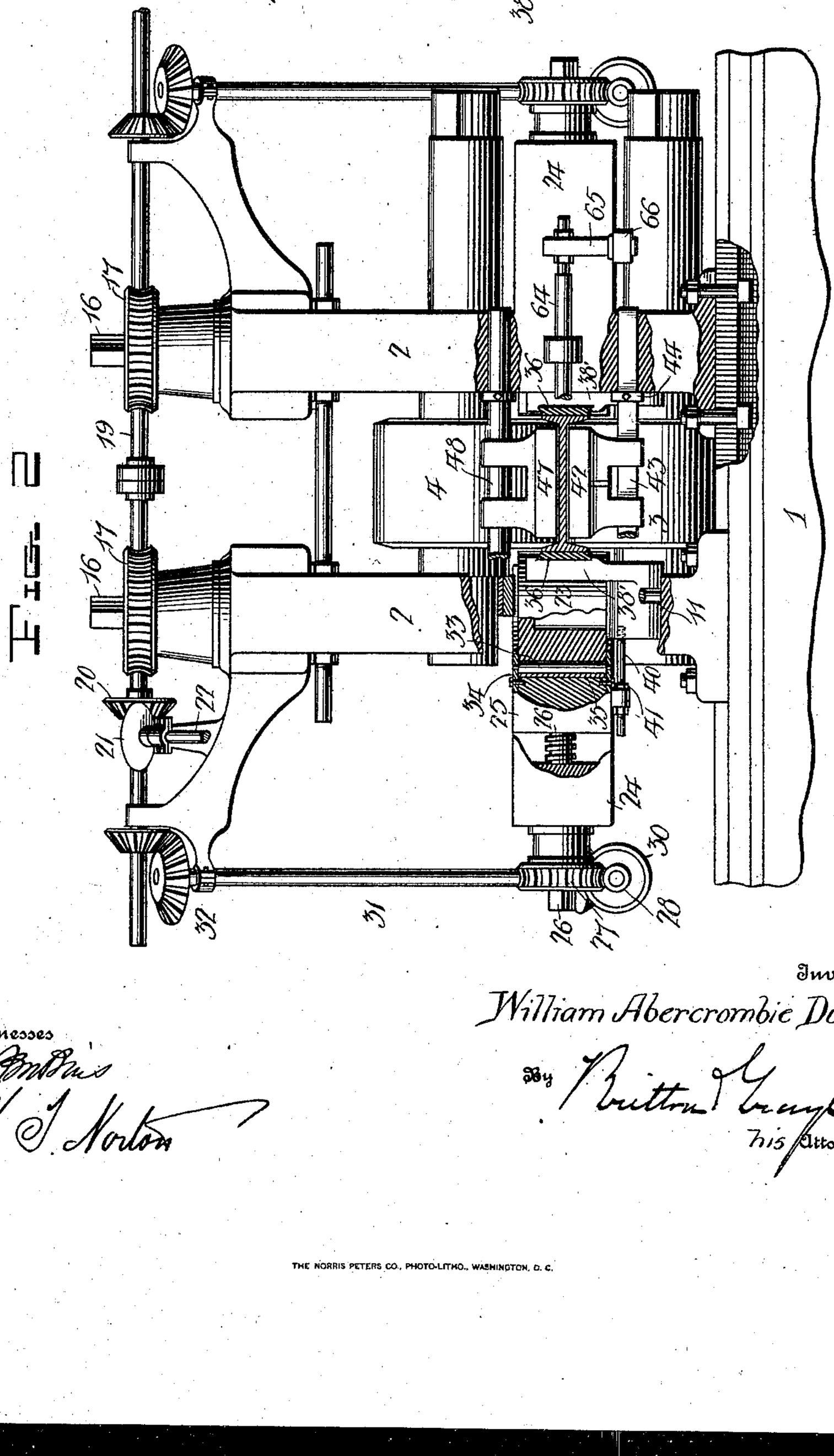


FIG. 2



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(No Model.) 4 Sheets—Sheet 3.

FIG. 5

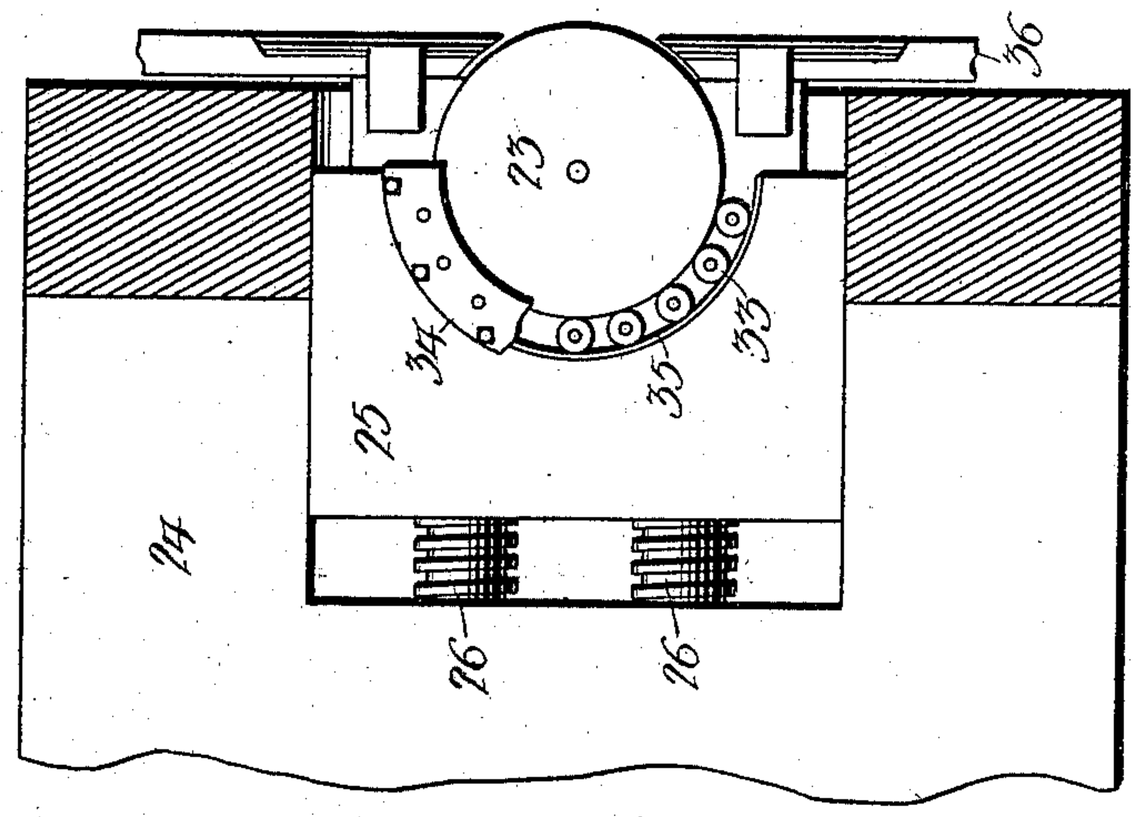
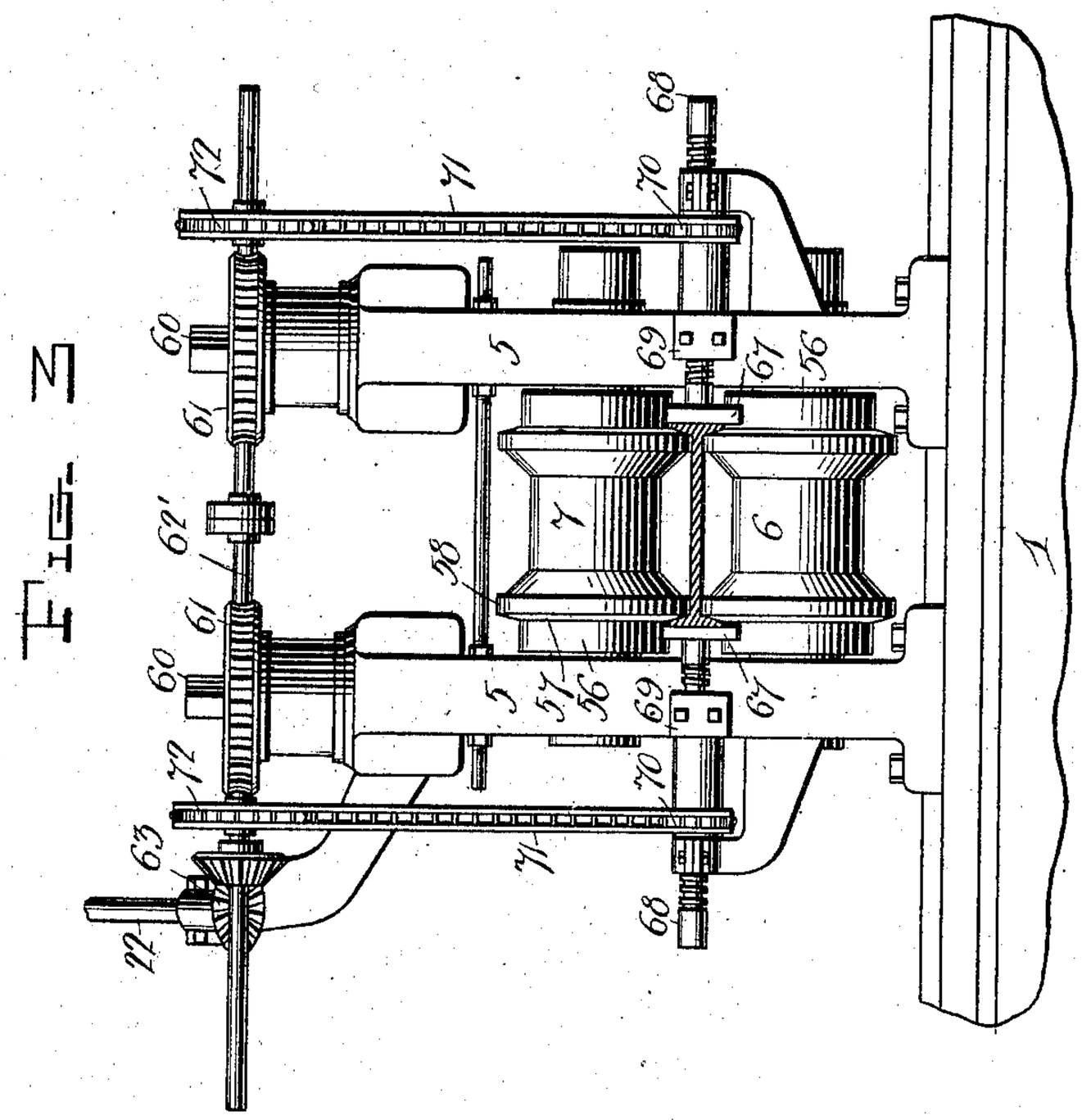


FIG. 4



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No. 709,085. Patented Sept. 16, 1902.

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MACHINE FOR ROLLING METAL I-BEAMS, CHANNEL BEAMS, &c.

(Application filed June 23, 1902.)

(No Model.) 4 Sheets—Sheet 4.

Fig. 3

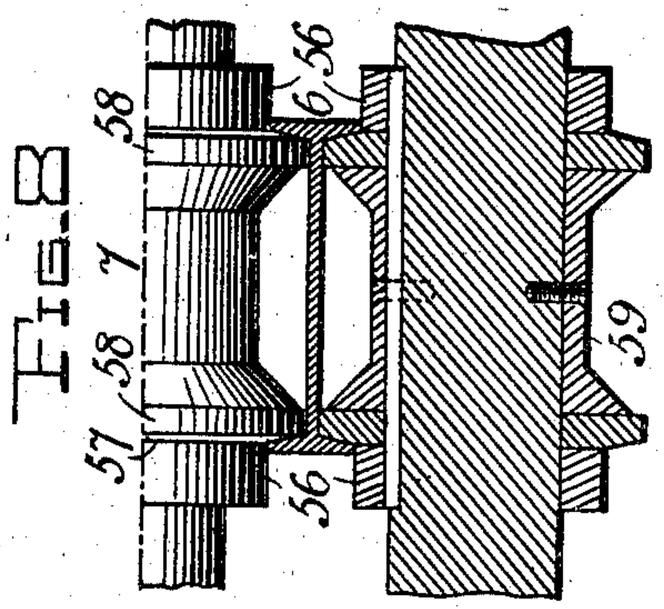
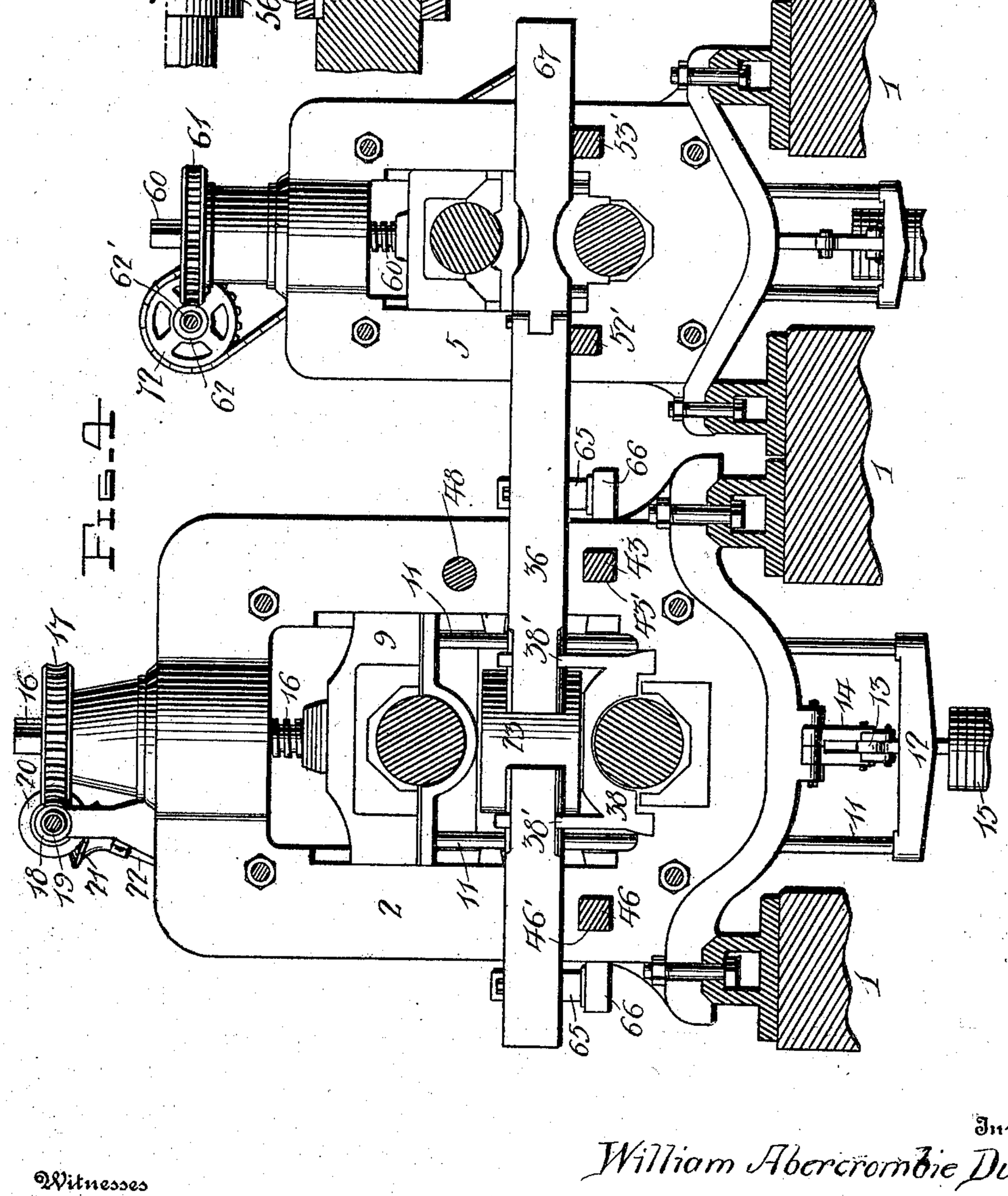


Fig. 4



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UNITED STATES PATENT OFFICE.

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MACHINE FOR ROLLING METAL I-BEAMS, CHANNEL-BEAMS, &c.

SPECIFICATION forming part of Letters Patent No. 709,085, dated September 16, 1902.

Original application filed January 3, 1902, Serial No. 88,304. Divided and this application filed June 23, 1902. Serial No. 112,862. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM ABERCROMBIE DUNN, a citizen of the United States, residing at Smithville, in the county of St. Louis and State of Minnesota, have invented certain new and useful Improvements in Machines for Rolling Metal I-Beams, Channel-Beams, &c.; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to an improved roller-mill designed for the further treatment of metal I-beams, channel-beams, and the like which have previously been partly formed in a shaping-mill, such as the type forming the subject-matter of an application filed by me January 3, 1902, Serial No. 88,301.

The present invention is a divisional part of my application for patent filed January 3, 1902, Serial No. 88,304.

The nature of my invention will be readily comprehended, reference being had to the following detailed description and to the accompanying drawings, in which—

Figure 1 is a side elevation of a roller-mill embodying my invention. Fig. 2 is a front elevation. Fig. 3 is a rear elevation. Fig. 4 is a longitudinal sectional view. Fig. 5 is an enlarged detail plan view of the carrier for the side rolls. Figs. 6 and 7 are enlarged detail views of one of the side rolls and its support. Fig. 8 is a view of the flange-rolls.

Referring to the drawings by numerals, 1 1 denote the foundations upon which are erected the frames or housings 2 2 for the web-rolls 3 4, and the frames or housings 5 5 of the flange-rolls 6 7, the latter being arranged immediately to the rear of the web-rolls, as indicated more clearly in Figs. 1 and 4. The frames or housings are laterally adjustable to accommodate different sizes of rolls for rolling different sizes of beams, being bolted to slotted tracks secured to the foundations, as shown. By such adjustment the mill may be employed for rolling all sizes of beams, and the bearings for the roll-necks may be brought close to the rolls, and thereby reduce the bending strain to which the rolls and necks are subjected.

The lower web-roll 3 is mounted horizontally, the necks thereof being journaled in fixed bearings, which are provided with brasses adjustable through the medium of set-bolts 8 8 to compensate for wear and to maintain the roll centrally and in alinement with the upper horizontal roll 4.

9 9 designate the bearings for the upper roll, which are similarly provided with brasses adjustable by set-bolts 10 10 and which are vertically movable in the frames or housings 2 2 to adjust the upper roll to and from the lower roll. The upper roll is counterbalanced to permit of its being moved by the expenditure of little power, the counterbalancing means consisting of vertically disposed and guided rods 11 11 at each side of the mill, which rods bear at their upper ends against the under side of the upper bearing and are connected together at their lower ends by a yoke 12, to which is connected one end of a lever 13, fulcrumed to a bracket 14, depending from the bottom of the housing and having connected to its other end a weight 15. The weight is shown adjustable, whereby to exactly counterbalance the weight of the upper roll 4. The upper roll is depressed and elevated through the medium of screw-rods 16, each of which is swiveled at its lower end to one of the bearings and engages at its threaded portion a threaded opening in the top of the housing. The upper end of the rod 16 is of square or preferably octagonal form in cross-section, and fitting thereon is a pinion 17, the teeth of which are engaged by a worm 18, keyed to a shaft 19. The rotation of the pinion operates through the screw-rod to raise and lower the upper roll, the screw-rod being slidable in the pinion-opening. By reference to Fig. 2 it will be seen that the ends or necks of the upper roll are moved in unison, each bearing being similarly connected to a screw-rod provided with a pinion meshing with a worm on the shaft 19. On the shaft 19 is keyed a bevel gear-wheel 20, which meshes with a bevel gear-wheel 21, fixed to a shaft 22, the purpose of which will be presently

explained. The shaft 19 is connected with a suitable source of power. (Not shown.)

The rolls 3 4 are of similar form, being provided with a cylindrical periphery which in practice acts against the web of the beam and with slightly-beveled sides which act upon the inner surfaces of the flanges of the beam. The outer surfaces of the beam-flanges are acted upon by vertical rolls 23 23, the construction of which I will now describe.

Inside extensions 24 24 of the housings are slidably mounted horizontally-movable carriages 25, which form the lateral supports for the vertical rolls 23. Each carriage is guided in its movement by dovetail connections with the extensions, and said carriages and rolls are advanced simultaneously with the adjustment of the upper roll 4 by screw-rods 26 26, which are driven through connection with the shaft 19, the screw-rods being provided with pinions 27 27, meshing with worms 28 28 on a shaft 29, which shaft is operatively connected with the shaft 19 through the bevel-gearing 30, shaft 31, and bevel-gearing 32. By reference to Fig. 1 it will be seen that the carriages 25 25 are both connected with the shaft 19 and are operated in unison to move both vertical rolls simultaneously with the upper roll 4. Referring again to Fig. 1, and more especially to Fig. 5, it will be observed that two feed screw-rods are employed to each carriage and that said rods are disposed equidistantly from the center of the carriage, and consequently the center of the roll. By this arrangement the carriage is firmly held against turning and the strain exerted by the backward thrust of the roll is evenly distributed. The carriage, as above stated, forms the lateral support for the roll, which latter is rotated by the metal as it passes through the mill. To reduce friction between the roll and carriage, which is recessed to receive the roll, I provide vertically-disposed bearing-rollers 33 33, the reduced ends of which are journaled in upper and lower plates 34. The roll contacts with the bearing-rollers, and between the rear of the latter and the carriage I preferably interpose a removable wear-plate 35.

36 36 designate longitudinal bars forming side guides for the movement of the metal.

The vertical rolls 23 are each supported on a spindle 37, formed, preferably, integrally with and extending vertically from a saddle 38, which straddles the neck of the lower roll 3 and is supported by the housing at the sides of the lower bearing. The spindle 37 fits a corresponding opening 39 in the roll, and the latter freely rotates thereon. The saddle is adjustably connected with the carriage 25 through the medium of bolts and nuts 40 41, there being two bolts for each saddle. On the saddle, at each side of the spindle, is a bracket-arm 38′, having in its outer side a horizontally-disposed dovetail groove, which grooves receive the dovetailed ends of the side guide-bars 36. The guide-bars are each formed in sections, and their inner ends approach as closely as possible to the rolls. The metal in passing between the rolls is directed by a bottom guard 42, which consists of a plate mounted at its outer end on a square shaft 43, secured in the housings against turning and held against endwise movement by a set-collar 44. The inner end of the guard-plate rests on the lower roll 3. At the opposite side is a similar guard-plate 45, supported by a square shaft 46. Obviously by employing different sizes of guard-plates for different sizes of beams the same shafts may be employed. The ends of the shafts 43 46, as shown, loosely occupy and extend through correspondingly-formed openings 43′ 46′ in the housings, whereby not only is the described adjustment of the housings thereby permitted, but, as above stated, the same shafts may be employed regardless of the adjusted positions of the housings.

47 designates a top guard for the metal, consisting of a plate mounted near its outer end on a shaft 48, the ends of which extend through the housings in the manner and for the purpose described with reference to the shafts 43 46. The inner end of the guard is elevated against the periphery of the upper roll by a weighted lever 49, fulcrumed at 50 and connected at its inner end to the inner end of the guard. The weight 51 is adjustable on the outer end of the lever.

The metal after passing between the rolls 3 4 23 23 is directed, by means of the guides 36 and by guard-plates 52 53 on the housings 5 5, to horizontal rolls 6 7, by which latter the flanges of the beam are rolled to the proper depth. The guard-plates are mounted on shafts 52′ 53′, which extend at their ends through openings in the housings 5 5, as shown. Each of the rolls is provided with outer narrow cylindrical surfaces 56 56, which work upon the tops of the flanges, and with adjacent beveled portions 57 57, which work upon the bottoms of the flanges. Rims 58 58 engage the web during the passage of the beam, and thereby control the flange. The rims are preferably formed separately from the portions 56 and shaft of the roll, being keyed thereto, as shown in Fig. 8, and held against lateral movement by the central spacing-sleeve 59, which latter is secured to the roll-shaft in any suitable manner. By this construction the roll portions 56 may be used regardless of the size of beam, and rims of different sizes may be readily inserted as required. The upper roll, which is counterbalanced similarly to the upper roll 4, is adjusted by screw-rods 60, operated by a pinion 61, worm 62, shaft 62′, bevel-gearing 63, shaft 22, the bevel-gearing 20 21, and the shaft 19.

The side guides 36 in addition to being supported by the saddles 38 in the manner before described are braced by bars 64 64, secured thereto and to arms 65 65, attached to bars 66 66, fixed to the carriages 25. The guides have each a pivoted extension 67,

which directs the metal between the beam-flange rolls, and to adjust said guide extensions to extend outwardly previously to the passage of the metal there is provided the following means: Attached to each guide-extension end is a screw-rod 68, which engages a threaded box 69 on the housing and which is squared intermediately for connection with a sprocket-wheel 70. This wheel is connected by a chain 71 with a sprocket-wheel 72 on the shaft 62′, whereby upon the rotation of the latter the screw-rod is turned to move the guide extension. The rods 68 68 are right and left threaded and are simultaneously operated to move the guide extensions to and from each other. By the employment of a separate screw-rod for each guide extension the adjustment of the housings 5 5 for rolls of different sizes is permitted, and said guide extensions are therefore adjustable to accommodate any size of beam. The gear-wheels 70 are so proportioned with reference to the gear-wheels 72 as to cause the guide extensions to travel at approximately double the speed of the guides 36, whereby said extensions may separate at the proper time to readily admit the metal to the rolls. In the final pass of the beam the guide extensions are adjusted to provide a very slight clearance between them and the beam-flanges, and thus direct the beam properly to the finishing-mill.

I claim as my invention—

1. In a mill of the class described, the combination of frames or housings supported to be adjusted laterally to accommodate different-size rolls, horizontal rolls mounted in said frames or housings, a shaft extending at the maximum adjustment of the frames or housings loosely through the latter, and a guide-plate mounted at its outer end on said shaft and contacting at its inner end with one of said rolls.

2. In a mill of the class described, the combination of frames or housings supported to be adjusted laterally to accommodate different-size rolls, horizontal rolls mounted in said frames or housings, a shaft loosely extending at the maximum adjustment of the frames or housings through the latter, a guide-plate mounted at its outer end on said shaft, and means for elevating the inner end of the guide-plate against the upper roll said means including a weight.

3. In a mill of the class described, the combination of frames or housings supported to be adjusted laterally to accommodate different-size rolls, horizontal rolls mounted in said frames or housings, side guides for the metal, a separate screw-rod for each guide permitting said adjustment of the frames or housings, and means for simultaneously rotating said screw-rods.

4. In a mill of the class described, a roll consisting of a shaft, outer cylindrical roller portions, adjacent roller-rims, and a two-part spacing-sleeve between the rims secured to the shaft, said roller portions, rims and sleeve being removably keyed to the shaft.

5. In a mill of the class described, the combination of a vertical roll, a spindle supporting said roll vertically, a saddle at the lower end of the spindle, a frame, a carriage guided by the frame and forming the lateral supports for the roll, means for moving the carriage, an adjustable connection between the carriage and saddle, a bracket-arm extending from the saddle and having a dovetailed groove, and a guide for the metal having a dovetailed end seated in the groove.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM ABERCROMBIE DUNN.

Witnesses:

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F. L. BROWNE.