

(No Model.)

3 Sheets—Sheet 1.

W. E. HARRIS.

THREE HIGH ROLLING MILL.

No. 353,450.

Patented Nov. 30, 1886.

Fig. 1.

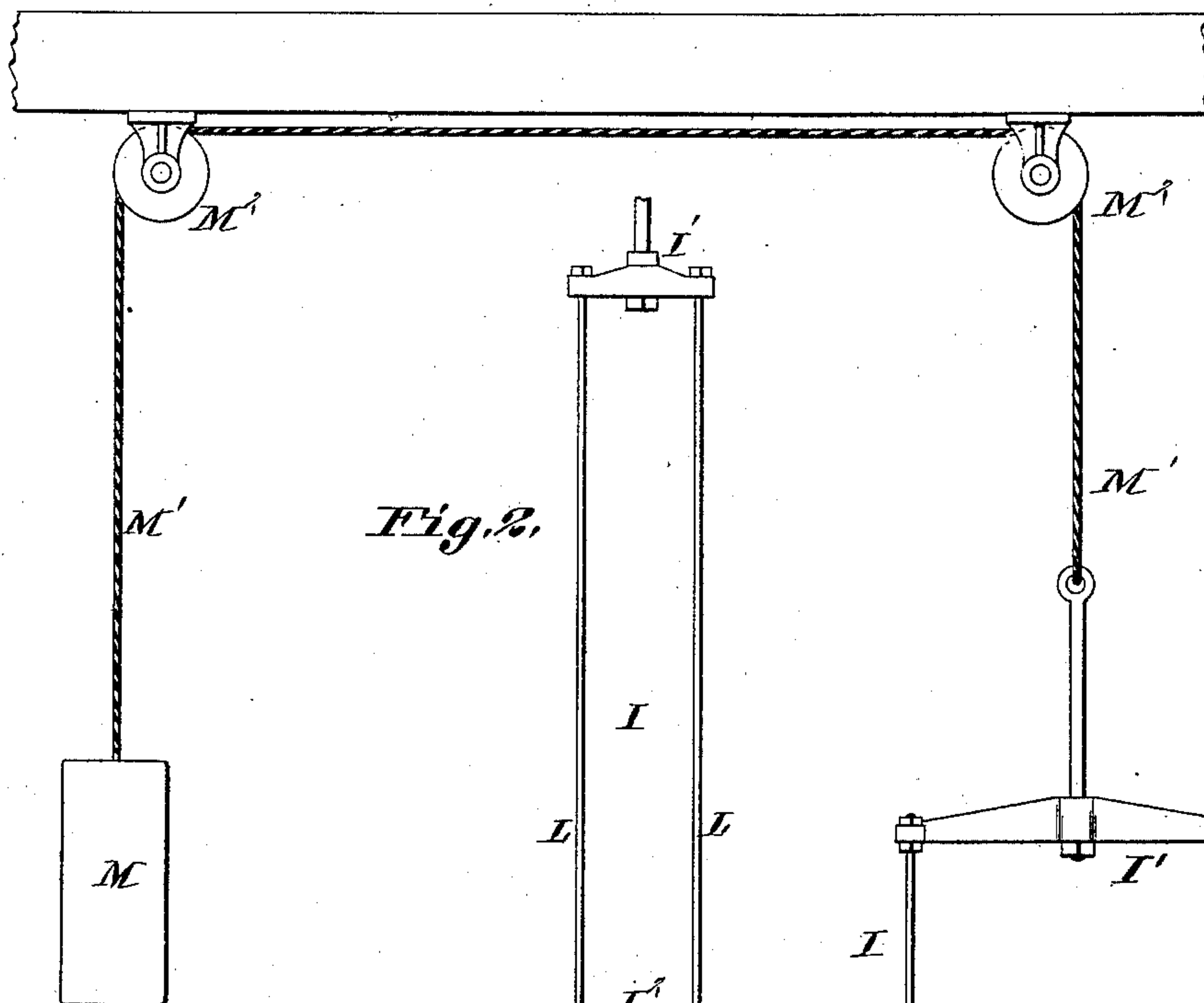
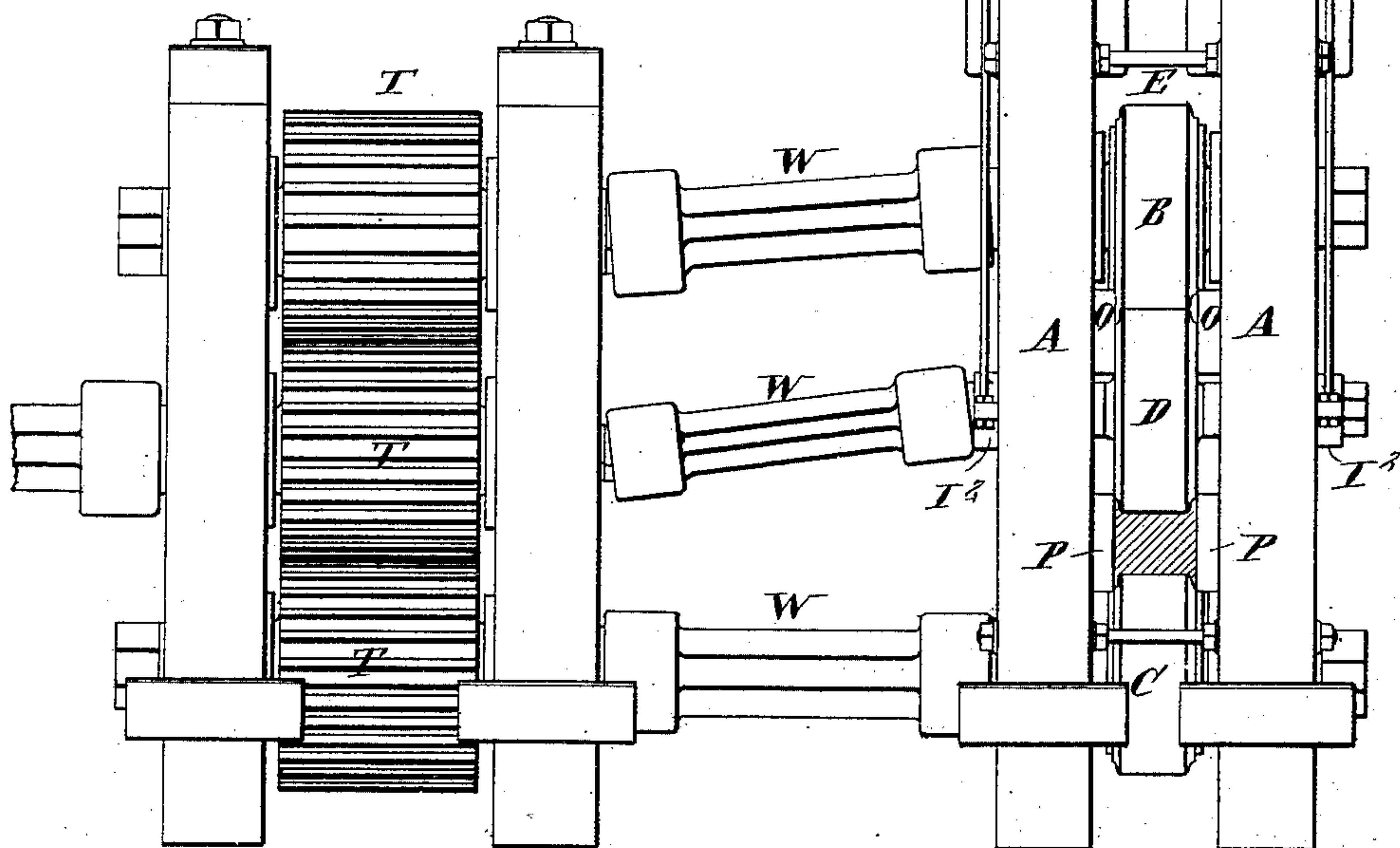


Fig. 2.



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Fig. 3.

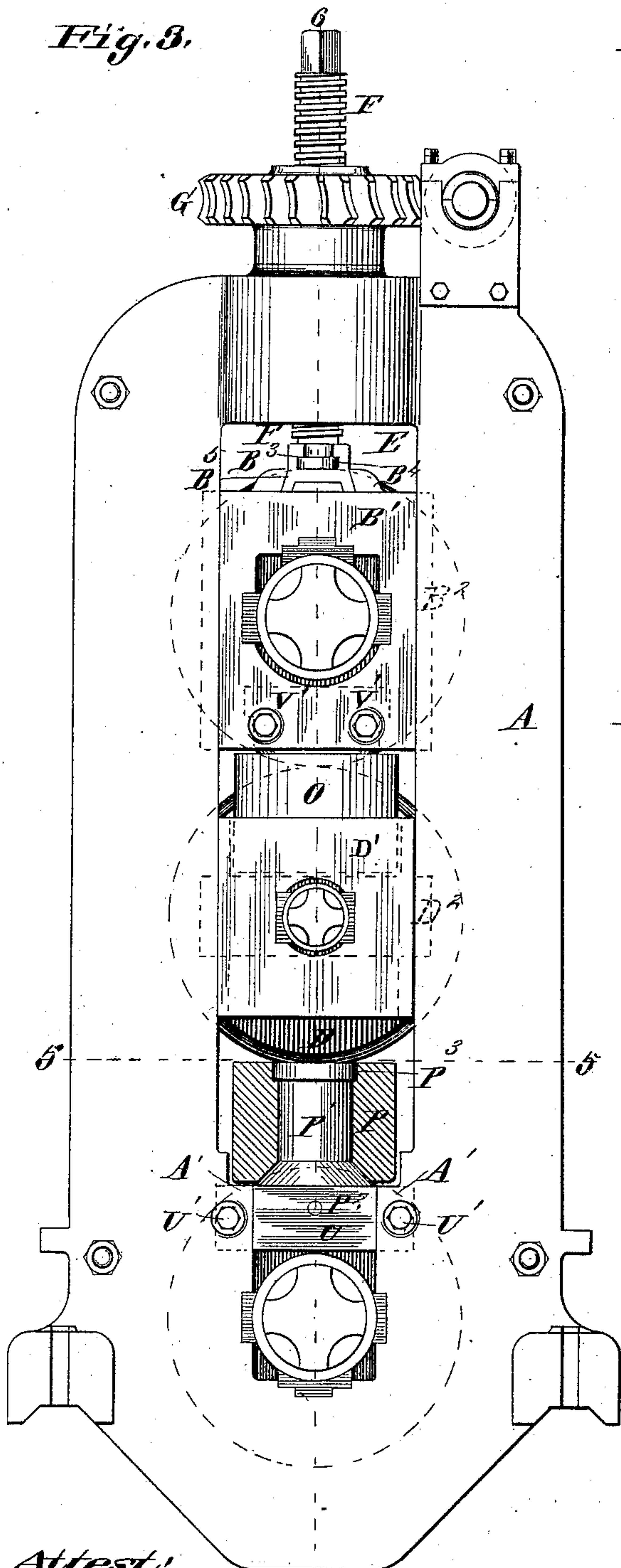


Fig. 4.

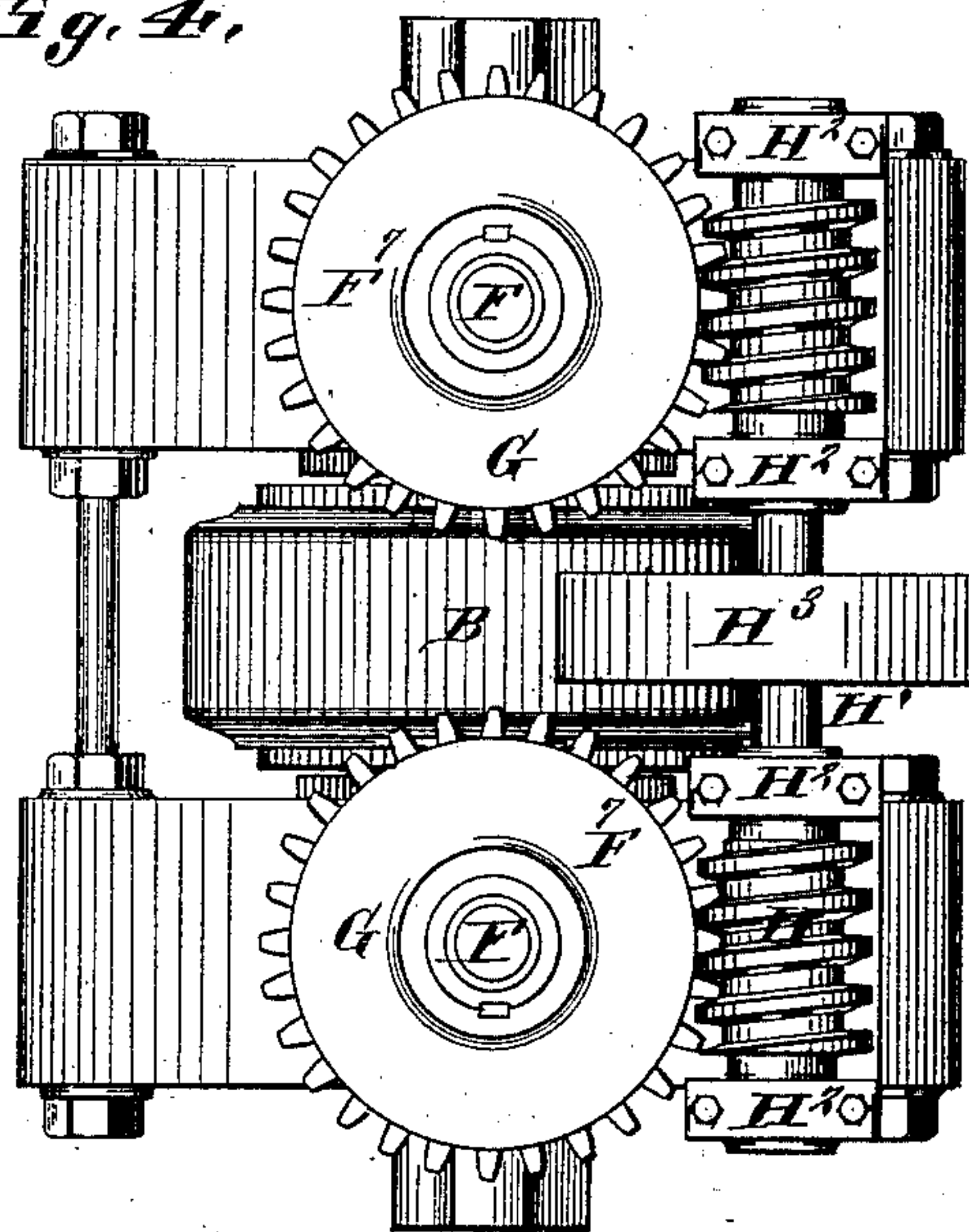
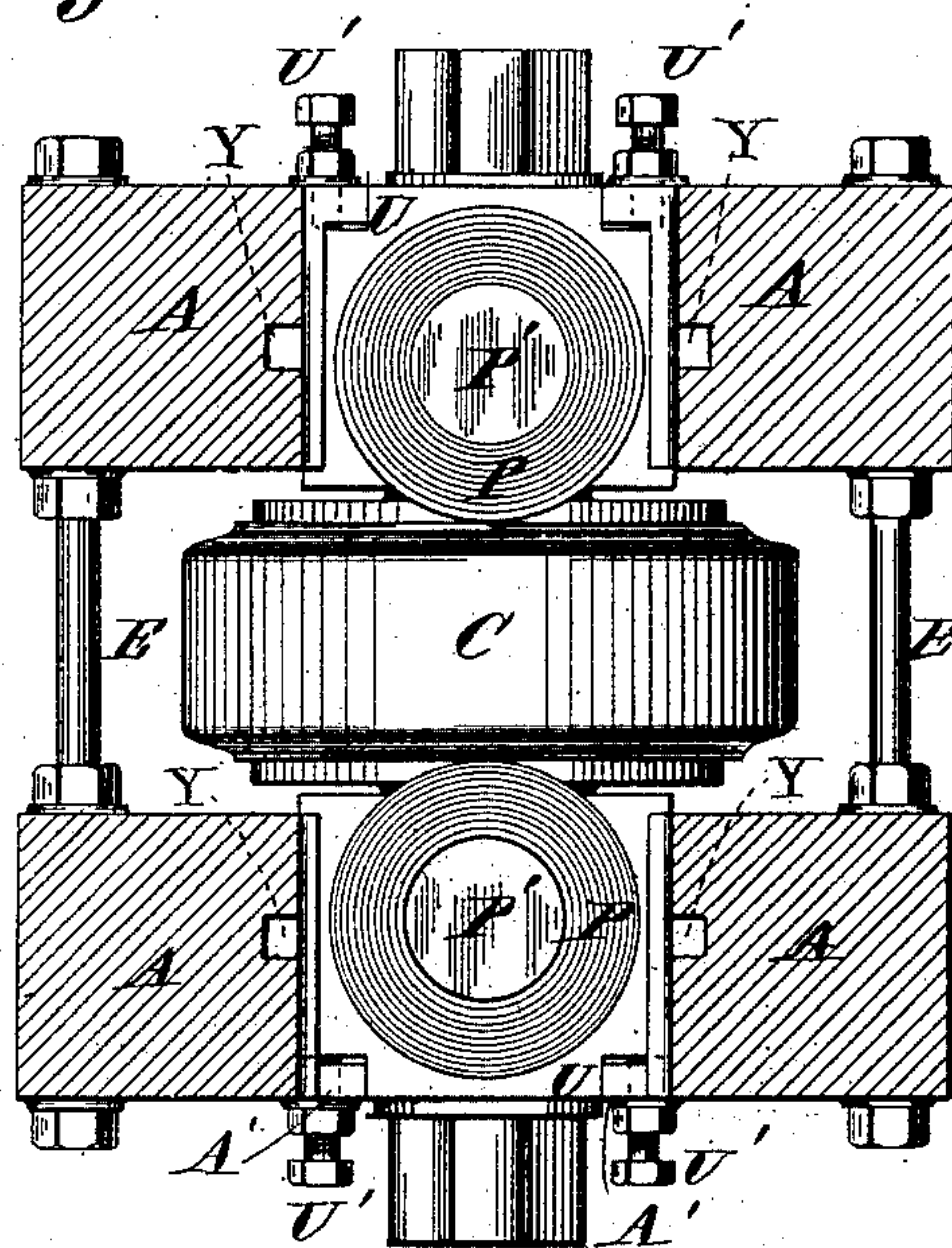


Fig. 5.



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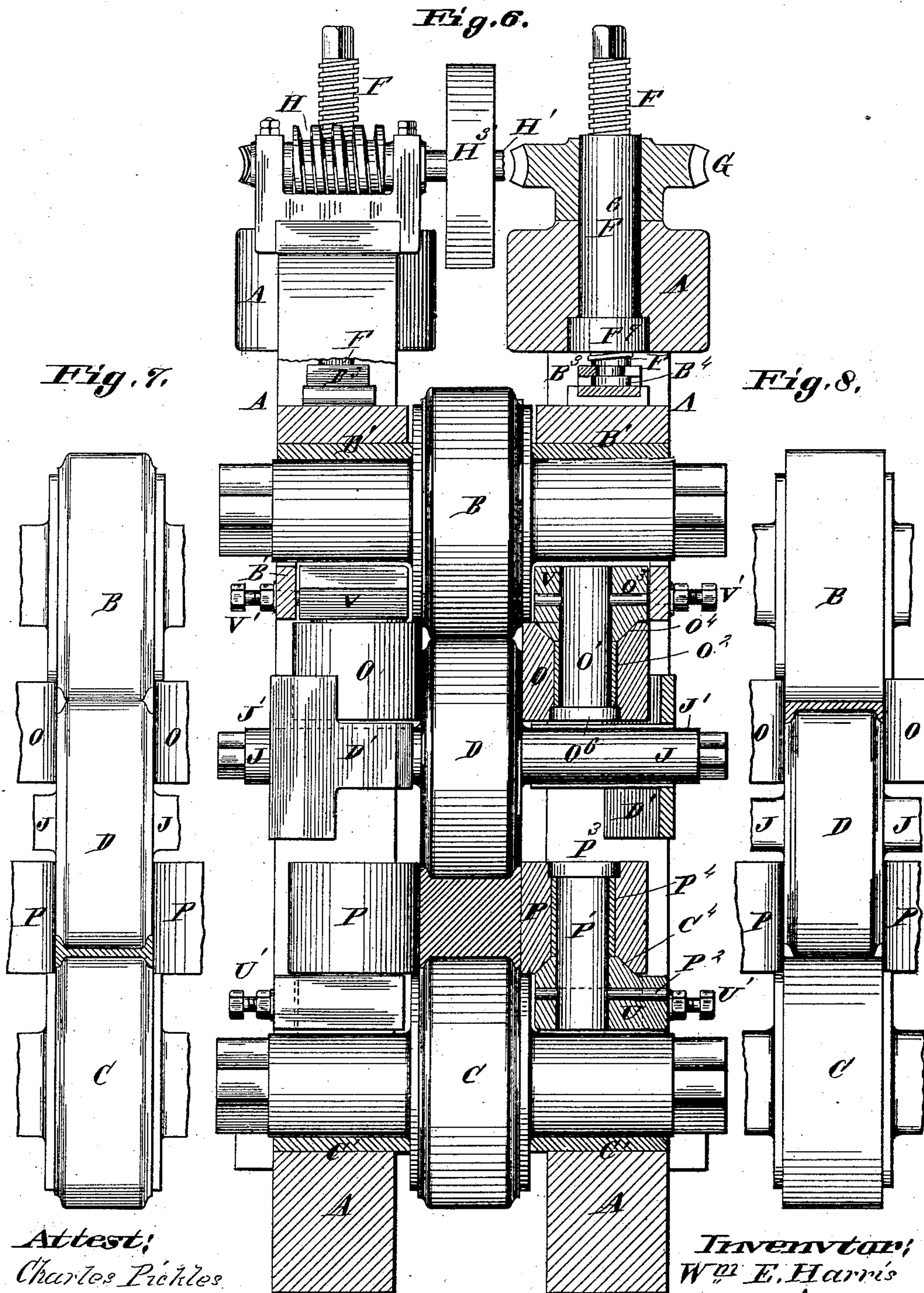
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3 Sheets—Sheet 3.

W. E. HARRIS.
THREE HIGH ROLLING MILL.

No. 353,450.

Patented Nov. 30, 1886.



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UNITED STATES PATENT OFFICE.

WILLIAM E. HARRIS, OF ST. LOUIS, MISSOURI.

THREE-HIGH ROLLING-MILL.

SPECIFICATION forming part of Letters Patent No. 353,450, dated November 30, 1886.

Application filed May 6, 1886. Serial No. 201,362. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. HARRIS, of the city of St. Louis, in the State of Missouri, have invented a certain new and useful Improvement in Three-High Rolls, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, and in which--

Figure 1 is a front elevation of my improved mill. Fig. 2 is a side view of the balancing-frame. Fig. 3 is a side view of the mill, part in section. Fig. 4 is a top view. Fig. 5 is a horizontal transverse section taken on line 5 5, Fig. 3. Fig. 6 is a view showing some of the parts in front elevation and some in vertical longitudinal section on line 6 6, Fig. 3. Fig. 7 is a diagram showing the rolls in the position they occupy when the article being rolled is about reduced, showing it between the lower and the middle roller, and showing the rolls of a form to produce angle-iron. Fig. 8 is a similar view, showing the metal between the upper and middle rolls, and showing the rolls of a form to produce half-angle iron.

My invention relates to an improvement in three-high rolling-mills for reducing metal into merchantable bars; and my invention consists in features of novelty hereinafter fully described, and pointed out in the claims.

Referring to the drawings, A represents the housings of the mill, between which are journaled an upper roll, B, a lower roll, C, and an intermediate roll, D. These rolls are journaled in boxes B', C', and D', respectively, the boxes fitting in vertical slots E of the housing, as shown in Figs. 1, 5, and 6. The boxes C' of the lower roll are stationary, while the boxes B' and D' are vertically movable in the frame, being held there by means of tongues or projections B² and D², respectively, which fit in grooves Y in the frame, as shown in Fig. 5, and by dotted lines, Fig. 3. The upper rolls are positively adjusted by means of vertical screws F, passing through screw-threaded sleeves F⁶ and secured to the boxes B' by means of blocks B³, in which the lower ends of the screws fit, and are held by collars B⁴ thereon. The collars permit of the turning of the sleeves, while at the same time they hold the screws firmly in the blocks. The blocks are dove-

tailed into the boxes, as shown at B⁵, Fig. 3. The screws are turned to adjust the upper roll by worm-wheels G, fixed to the sleeves F⁶, into which worm-wheels mesh worms H on a shaft, H', journaled in boxes H², secured to the top of the frame A, the shaft being provided with a pulley, H³, to receive a driving-belt. It will thus be seen that when the shaft H' is turned the screws will be moved vertically through means of the worms H and wheels G, thus causing the vertical movement of the upper roll, B. The belt passing over the pulley H³ would pass around a loose and tight pulley, from one to the other of which it is quickly shifted, so that the shaft H' can be turned intermittently, or when desired.

The wheels G prevent any downward movement of the sleeves F⁶, and their upward movement is prevented by collars F⁷ on their lower ends, and the sleeves are thus held in the sockets of the frame A, in which they fit.

The intermediate roll, D, is balanced, so as to fit against either the upper roll, B, or the lower roll, C, as shown in Figs. 7 and 8, allowing the metal being worked upon to pass first between the middle and lower roll, and then back between the middle and upper roll, the roll D shifting up and down each time to allow this passage of the metal, and as it is reduced the upper roll, B, is lowered, as above described. The boxes of the middle roll move freely up and down in the frame, and this roll, as stated, is balanced, so as to be moved freely in either direction. As a means of balancing it I have shown a frame, I, consisting of a cross-head, I', blocks I², with openings I³ to fit over the outer ends, J', of journals J of the roll D. The blocks and cross-head are connected by vertical rods L, which form part of the frame. I secure to this frame a counter-balance, M, by means of a rope, cord, or other suitable connection, M', passing over suitable pulleys, M². This arrangement keeps the middle roll in a balanced position, so that it will move up and down freely, for the purpose already stated. In this manner the metal may be reduced from a large to a small bar as conveniently and rapidly as it can by being passed through a number of horizontal rolls with variable spaces between them, the result being a saving of rolls and space or room.

The rolls may be any desired shape to produce the desired shape of bar in cross-section. I have shown in Figs. 6 and 7 rolls to produce I-beams, and in Fig. 8 rolls of the shape to produce channel-iron.

The mill should be provided with edging-rolls, or rolls to work upon the edges of the metal. I have provided my mill with edging-rollers, there being a pair lettered O between the upper and middle rolls, and a pair lettered P between the lower and middle rolls, as shown most plainly in Fig. 6. These rolls I have shown journaled upon studs or pins O' and P', which pass through the rollers, the rolls P being secured to the upper sides of blocks U, fitting in or over the boxes C' by means of the journal-pins P', which are held in the blocks by means of rods P², as shown on the right-hand side of Fig. 6, and in Fig. 5. The upper parts of the blocks have conical projections O⁴, over which fit conical recesses or countersinks in the lower part of the rollers P to form a solid and secure bearing, which prevents any outward movement of the rollers P. The pins P' have heads P³, which are countersunk into the rollers, as shown on the right-hand side of Fig. 6, and thus the rollers are prevented from upward movement.

I prefer to place bushings P⁴ between the rollers and their respective journal-pins. The upper rollers, O, are likewise secured to the under sides of blocks V, in or under the boxes B', by means of journal-pins O', having heads O⁶ and bushings O², and which are held in the blocks by rods O³. These upper blocks likewise have conical projections O⁴, to receive countersinks in the upper ends of the rolls O. The blocks U may be adjusted to bring the edging-rollers near to the main rollers by means of set-screws U', that pass through extensions A' of the frame A, as shown in Figs. 3 and 5, and the block V may be adjusted to the main rollers by set-screws V', that pass through the boxes B', as shown in Figs. 3 and 5.

It will be seen that the rollers O will be carried up and down by the roller B, and that they are of sufficient length to always embrace

the roller D, whether in its upper or lower position.

The rollers may be driven in any desired manner. I have shown them driven by pinions T, with which they are connected by wabblers W, as usual.

I claim as my invention—

1. In a rolling-mill, the combination, with a roll and movable boxes in which it is journaled, of the edging-rollers carried by the boxes of the movable roll and adjustable toward and from the plane of the pass, substantially as set forth.

2. In a rolling-mill, the combination, with the rolls having the passes, of the journal-boxes therefor, each having a frusto-conical boss projecting from one side thereof, an edging-roll having a corresponding socket fitting said boss, and a journal pin or stud upon which said roller turns secured to said box, substantially as set forth.

3. In a roller-mill, the combination, with the housing and the movable journal-boxes, of the screws F, swiveled to said boxes, the internally-screw-threaded sleeves F⁶, fitted upon said screws and turning in bearings in the housing, the flanges F⁷ on said sleeves, the worm-wheels G, secured to said sleeves, and the worm-screw H, engaging said worm-wheels, substantially as and for the purposes set forth.

4. In a three-high rolling-mill, the combination of the upper and lower rolls, balanced middle roller, and vertically-movable edging-rollers, substantially as shown and described, for the purpose set forth.

5. In a three-high rolling-mill, in combination with the upper and lower rolls, the balanced middle roll, and edging-rollers secured to movable blocks in the boxes of the upper and lower rolls by means of journal-pins, substantially as shown and described, for the purpose set forth.

WILLIAM E. HARRIS.

In presence of—

GEO. H. KNIGHT,
JOE WAHLE.