

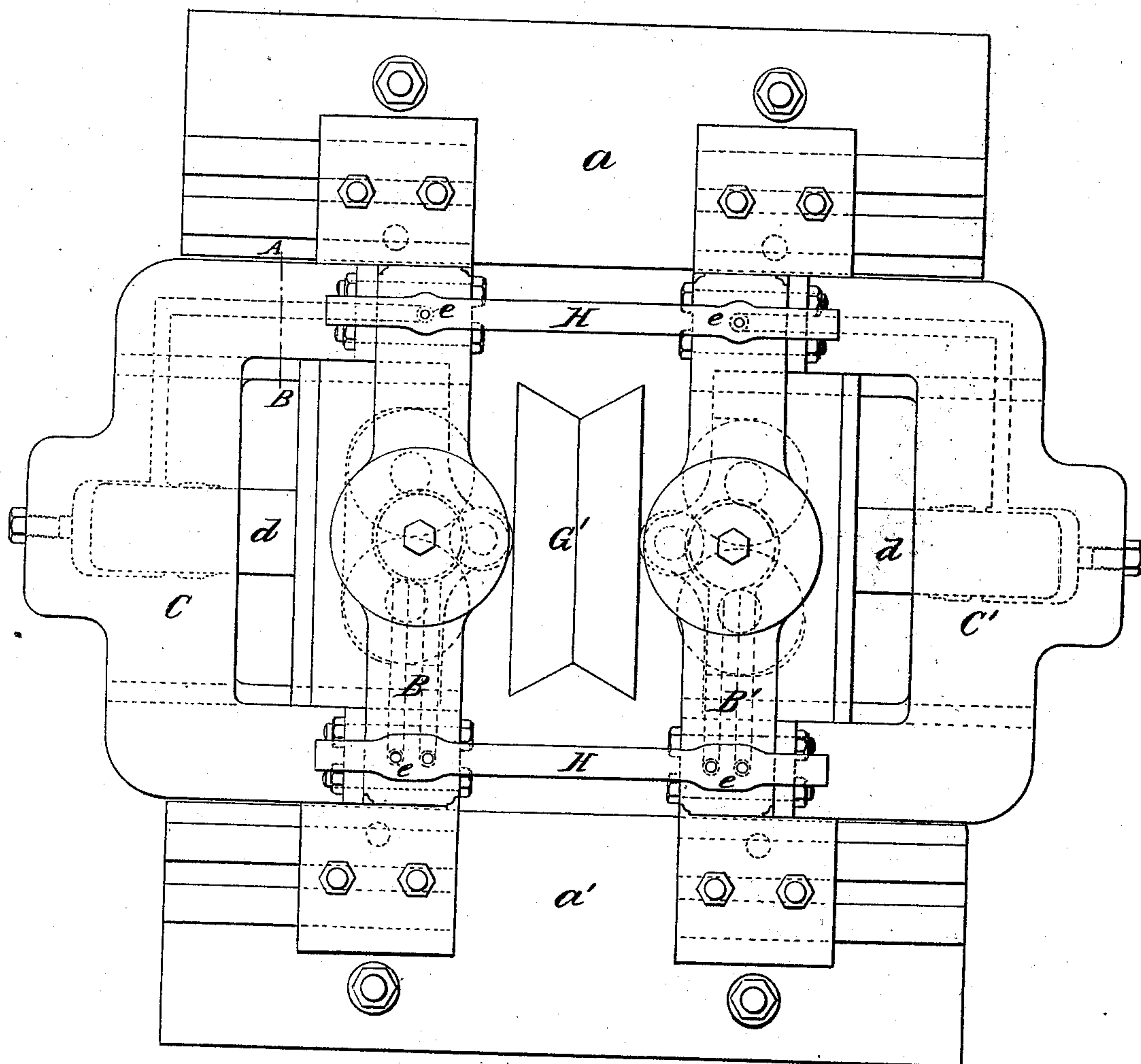
G. H. SELLERS.  
APPARATUS FOR ROLLING METAL.

4 Sheets—Sheet 1.

No. 98,807.

Patented Jan. 11, 1870.

*Fig. 1.*



*Witnesses*

*J. Snowden Bell*  
*Joe Heyton.*

*Inventor.*

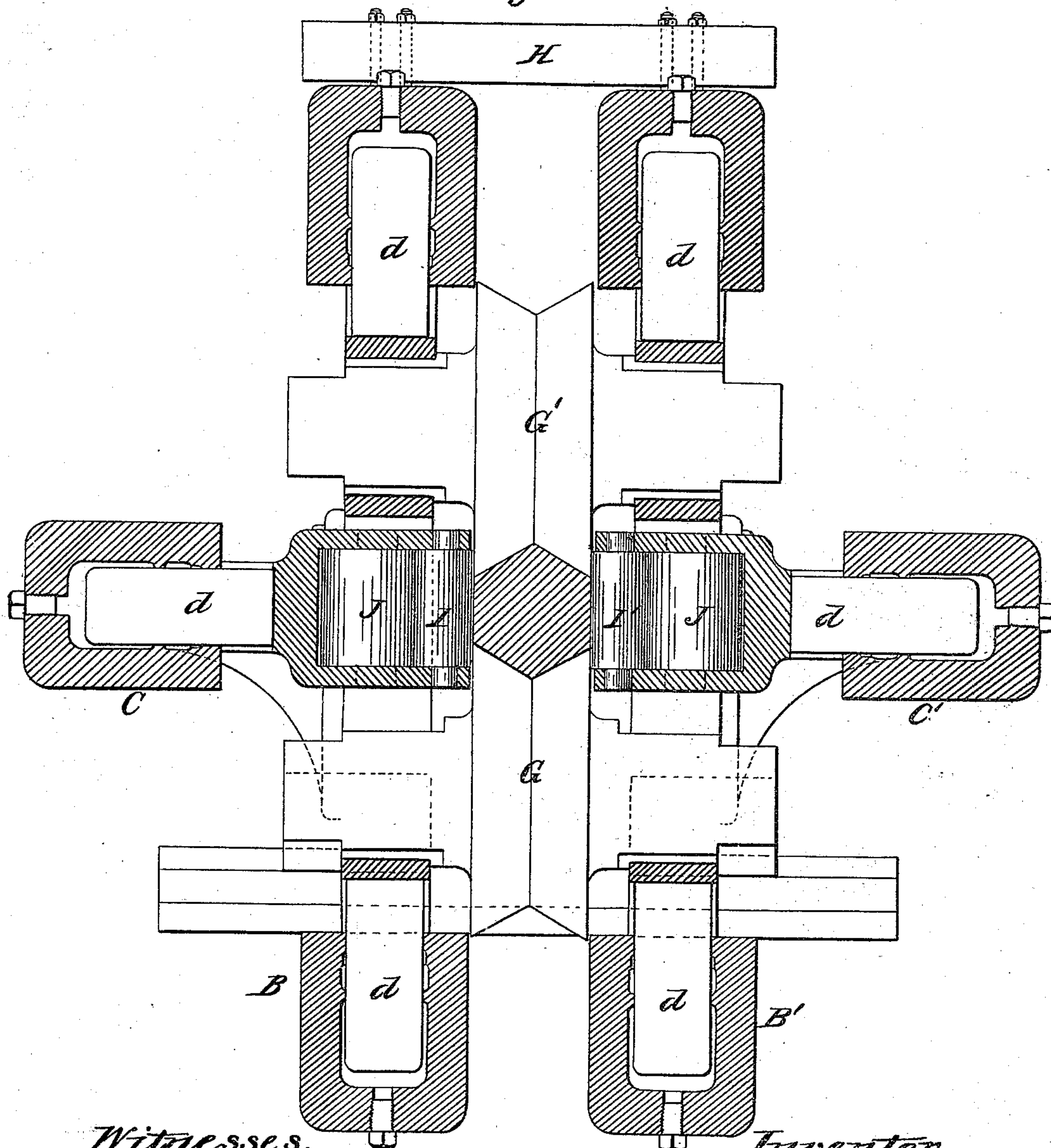
*G. H. Sellers*  
*by his Atty*  
*Wm. D. Baldwin*

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Fig. 2.



Witnesses.

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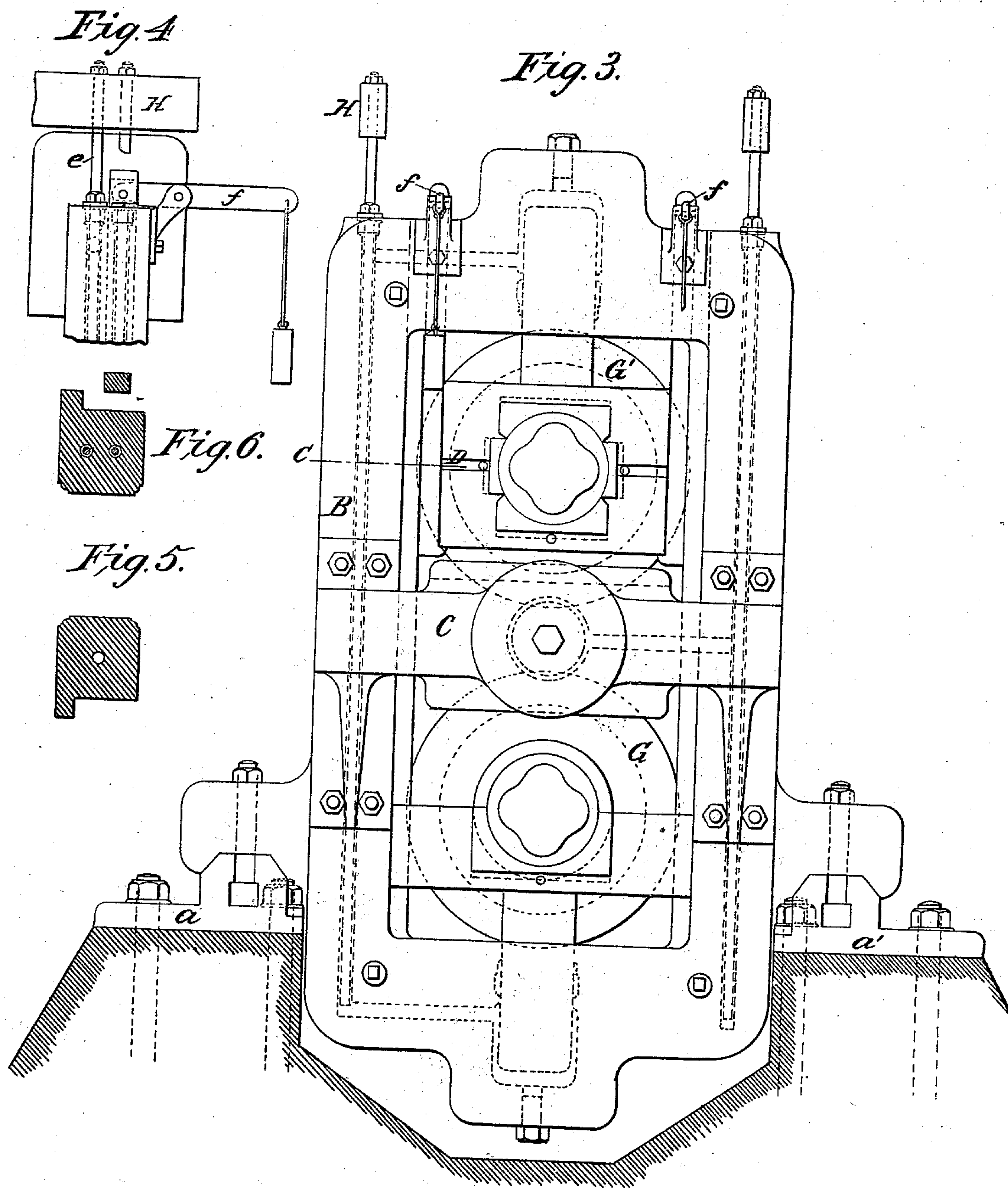


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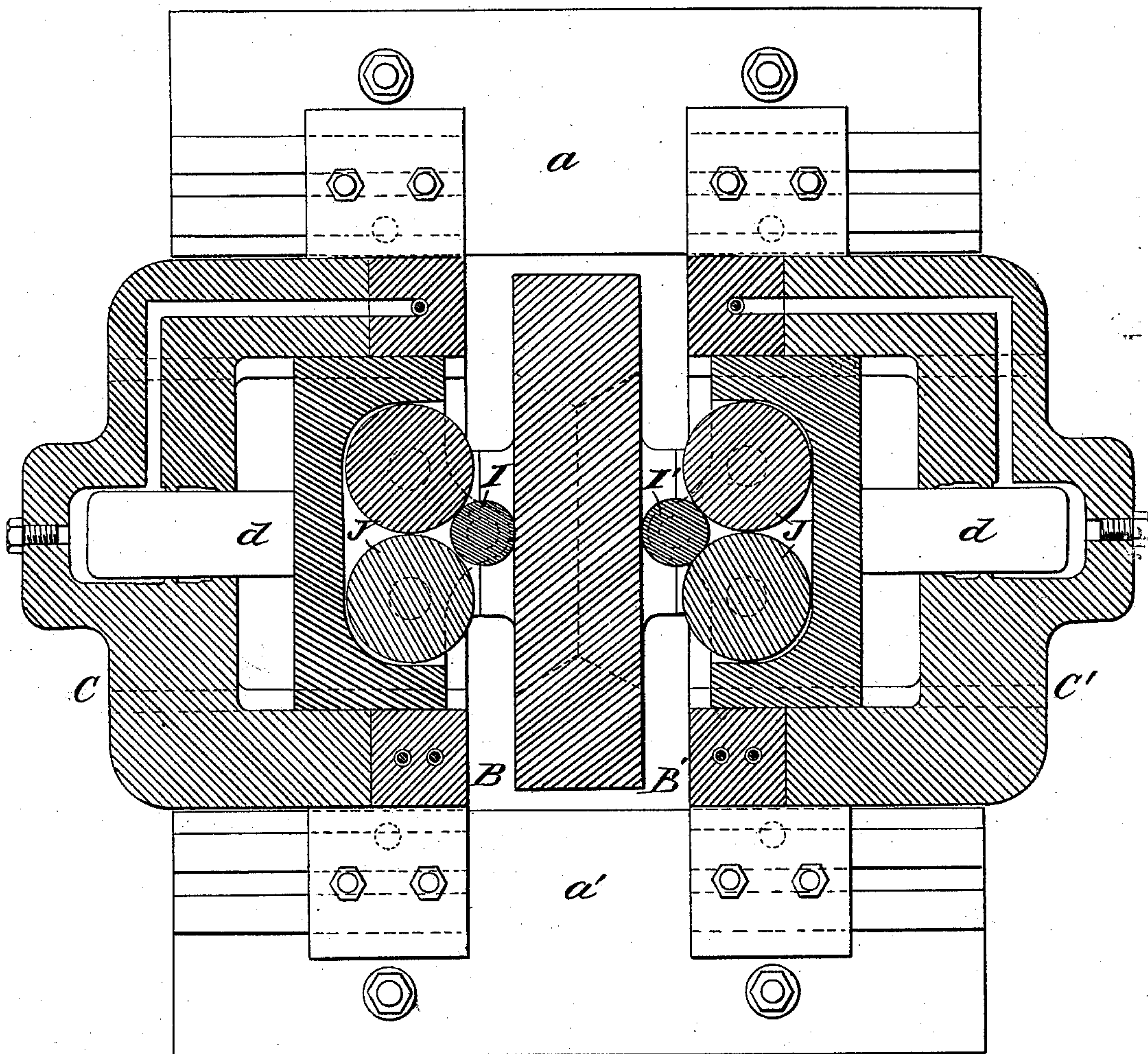


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Fig. 7.



Witnesses

*John W. Bell*  
*John Peyton*

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# UNITED STATES PATENT OFFICE.

GEORGE H. SELLERS, OF WILMINGTON, DELAWARE

## IMPROVED APPARATUS FOR ROLLING METALS.

Specification forming part of Letters Patent No. 98,807, dated January 11, 1870.

*To all whom it may concern:*

Be it known that I, GEORGE H. SELLERS, of Wilmington, in the county of New Castle and State of Delaware, have invented certain new and useful Improvements in Roll-Trains for Rolling Metals, of which the following is a full, clear, and exact description.

In rolling metals into rectangular bars or into irregular shapes, such as I-beams, channels, Ts, &c., by the methods heretofore employed, the rolls are placed one above the other, and have their surfaces cut into grooves which form counterparts of the finished bars, and are such in size and number as gradually to reduce the shaped pile to the finished bar. These grooves are frequently so numerous that two sets of rolls (one set called "roughers" and the other set "finishers") are required, through which the piles must be successively passed.

As the first set of grooves must be large enough to admit the pile the rolls are necessarily weakened by being cut away so much at this point, and are consequently liable to fracture. Moreover, the irregular surfaces of the grooves must necessarily be at different distances from the axes of the rolls. These surfaces consequently move at different velocities, thereby causing the iron, as it passes through the rolls, to slip more or less, and rendering it liable to be torn or buckled.

For transferring the pile from groove to groove under this system, suspended hooks are so arranged as to be operated by the workman.

The object of my invention is to diminish the number of grooves heretofore required for finishing the shaped bar or beam, and also to save much of the handling incident to the system above mentioned; and my improvement consists, first, in combining, shaping, and compressing rolls with mechanism which renders each roll adjustable relatively to a common axial line or center, substantially as hereinafter set forth; second, in combining adjustable horizontal shaping-rolls with adjustable vertical compressing-rolls and supporting friction-rolls, both the compressing-rolls and the supporting friction-rolls being mounted in a common adjustable frame arranged between the bearings of the shaping-rolls.

In the accompanying drawings, which make

part of this specification, Figure 1 represents a plan or top view of so much of my improved roll-train as is necessary to exemplify the invention herein claimed; Fig. 2, a vertical transverse section through the same; Fig. 3, a view in elevation of the same as seen from one end; Fig. 4, a view of a portion of the mechanism, showing the mode of counterbalancing the pistons; Fig. 5, a horizontal transverse section through the housing at the line A B of Fig. 1, and Fig. 6 a similar section at the line C D of Fig. 3; Fig. 7, a horizontal section through the machine at the line *x x* of Fig. 2.

Upon bed-plates *a a'*, solidly secured in any proper well-known way, are mounted vertical housings *b b'*, which are in turn firmly united with horizontal housings *C C'*. These housings differ from those ordinarily used in having in place of screws for adjusting the rolls cylinders containing suitably-packed pistons *d*, moving water-tight in the cylinders and acting on the roll-necks by means of water or other fluid. The cylinders are connected by ducts in the housings, or by external pipes, with chambers containing pistons *e* of smaller area, whose stroke is to that of the larger pistons as the differences of their areas.

The upper shaping-roll, *G'*, and the two side compressing-rolls *I I'* are respectively counterweighted by weighted levers *f*, Fig. 4, and bear upon their corresponding pistons *d* in such manner that any movement of the smaller pistons *e* would, by displacing the fluid, cause their corresponding pistons *d* to move relatively, thus moving its roll toward or from the common center and correspondingly increasing or diminishing the area of the aperture between the rolls through which the pile passes. In this instance the horizontal or shaping rolls *G G'* are shown as mounted in strong bearings, adjustable vertically in the housings *b*. The driving-power is applied to these rolls in any of the usual well-known ways. The compressing or vertical rolls *I I'* are mounted in bearings adjustable horizontally in the bearings *C*, and are revolved by friction upon the pile in passing through the rolls, the principal function of the vertical rolls being to prevent the lateral spread of the metal.



As the vertical rolls are located between the shaping-rolls, their bearings are necessarily too short to sustain, of themselves alone, the pressure to which they are subjected. To adapt them to sustain this pressure, I support these rolls I I' by means of friction-rolls J J, which have their bearings in the same adjustable frames as the rolls I I', and are arranged at such a distance apart that the journals of the horizontal rolls G G' may pass between them, thus securing firm bearings for all the rolls. (See Figs. 2 and 7.)

The small pistons *e* may be connected by the cross-heads H, to which screws, racks, and pinions, or other equivalent devices, may be attached, to enable the workmen to operate all the pistons simultaneously or successively.

The drawings represent a machine having grooved shaping-rolls, adapted to rolling hexagonal bars, the method of doing which is as follows: The pistons *e* being retracted by the operator, the rolls are thereby opened and ready to receive the heated pile. The rolls G G' being rotated in the proper direction, the pile, when placed in the groove, will be drawn through between the rolls, the pile itself revolving the rolls I I' by friction.

After the pile has been passed through the rolls the workman forces the small pistons *e* into their respective chambers, which movement causes the fluid contained in the chambers to force out the large pistons *d* from their chambers, thus causing all the rolls simultaneously to converge toward a common center, and reducing the aperture between the rolls.

The adjustment of either or any of the rolls relatively to the others may be regulated independently by adjusting the position of the corresponding cross-heads, and thus increasing or diminishing the range of movement of the corresponding pistons.

When the rolls have been adjusted and the aperture between them thus reduced, their movement is reversed in any well-known way—for example, by simply reversing the engine, or by reversing-gear, and the pile drawn back through the rolls to the side from which it first started. This process of diminishing or contracting the aperture between the rolls and repassing the pile through them from side to side is repeated until the bar is finished.

After each passage through the rolls the pile is turned so as to present a new angle of the hexagon to the action of the shaping-rolls.

By changing the rolls G G' for others having grooves of proper outline, I-beams, chan-

nels, or other shaped bars may be produced; or for rectangular bars it is only necessary to substitute plane-surfaced shaping-rolls.

One great advantage of a mill of this construction is that, as the pile simply traverses back and forth through the same grooves until finished, suspended hooks are dispensed with, and a saving effected of the labor heretofore required to transfer the pile from groove to groove, as well as of the time and loss of heat in making such transfers.

For rolling tubular work, a ball or mandrel is rigidly fixed in the center of the groove by rods, which hold the ball stationary while the pile is drawn over it, and the rolls are adjusted after each passage of the pile, as before described.

I prefer the hydraulic arrangement for heavy work, but do not confine myself to that device for adjusting the rolls, as they may be regulated by screws or other devices.

I am aware that roll-trains have heretofore been made adjustable in various ways; but such adjustments have always involved a change in the axial line of movement of the pile or ingot in its passage through the rolls. I am, however, not aware that a roll-train ever heretofore has been made so adjustable that all the rolls could be moved toward or from each other to vary the area of the opening between them without changing the axial line of movement of the pile or ingot in its passage through the rolls, and this capability of rolling in a constant axial line is the distinguishing characteristic of my invention.

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

1. The combination, with the compressing-rolls and the shaping-rolls, all having their axes in the same vertical plane, of mechanism to move all of said rolls toward or from a common center or fixed axial line, as and for the purpose set forth.

2. The combination, with the adjustable horizontal shaping-rolls, of the vertical compressing-rolls and their supporting friction-rolls, the compressing and friction rolls being located between the bearings of the shaping-rolls and mounted in a common adjustable frame, substantially as set forth.

I testimony whereof I have hereunto subscribed my name.

GEORGE H. SELLERS.

Witnesses:

ELI GARRETT,  
WM. B. WIGGINS.