(No Model.) 3 Sheets—Sheet 1.

H. C. KRIETE.

ROLLING MILL.

No. 420,498. Patented Feb. 4, 1890.

Fig. 5

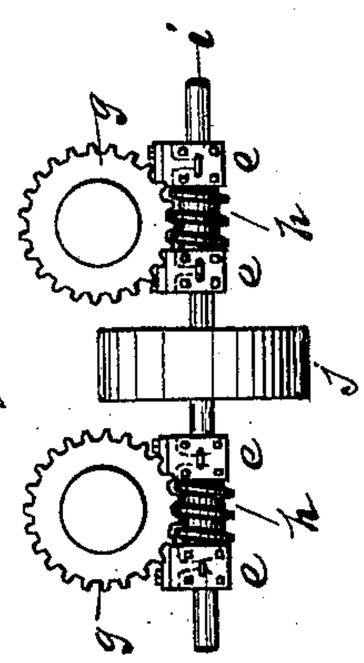

Fig. 1

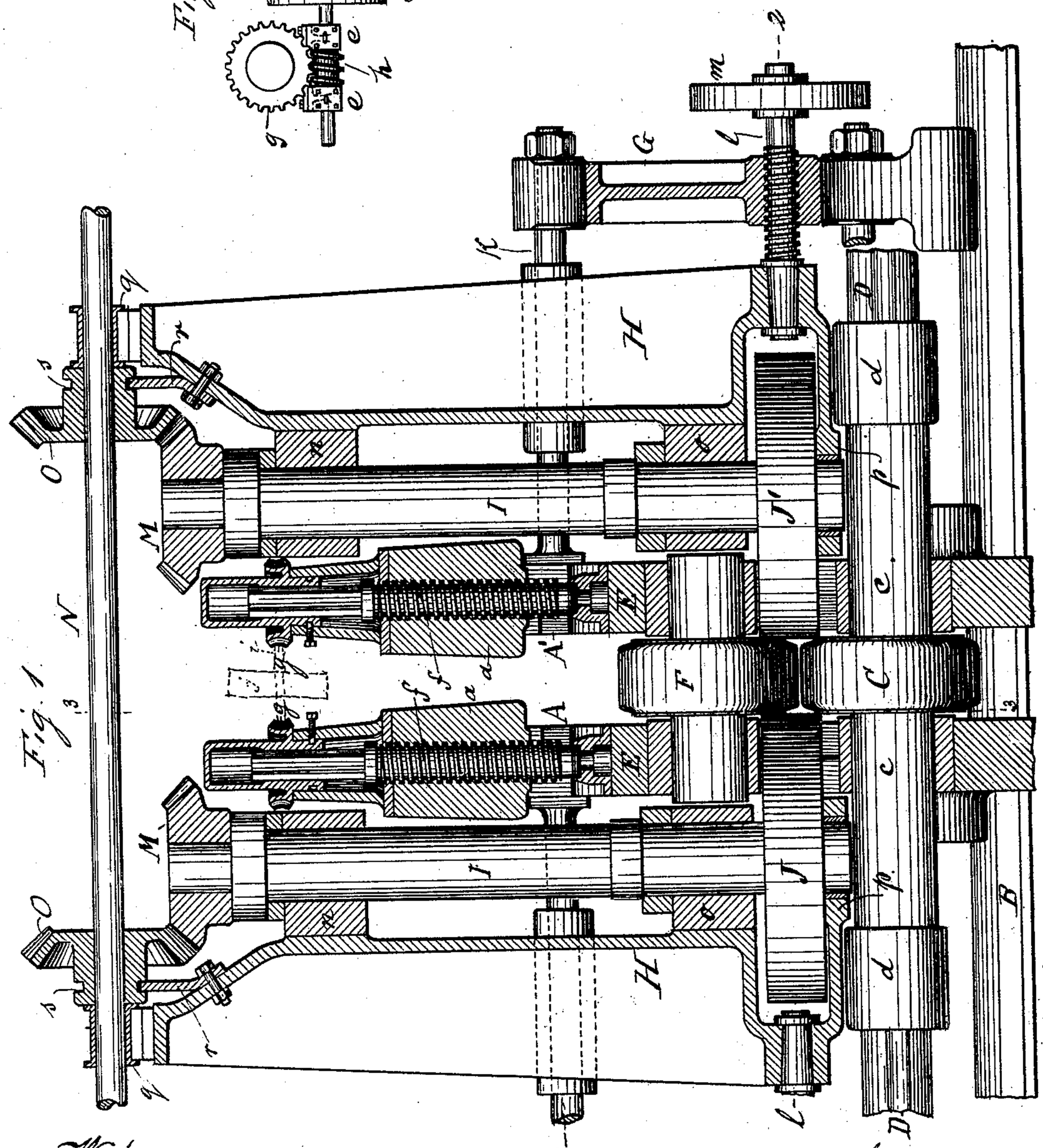

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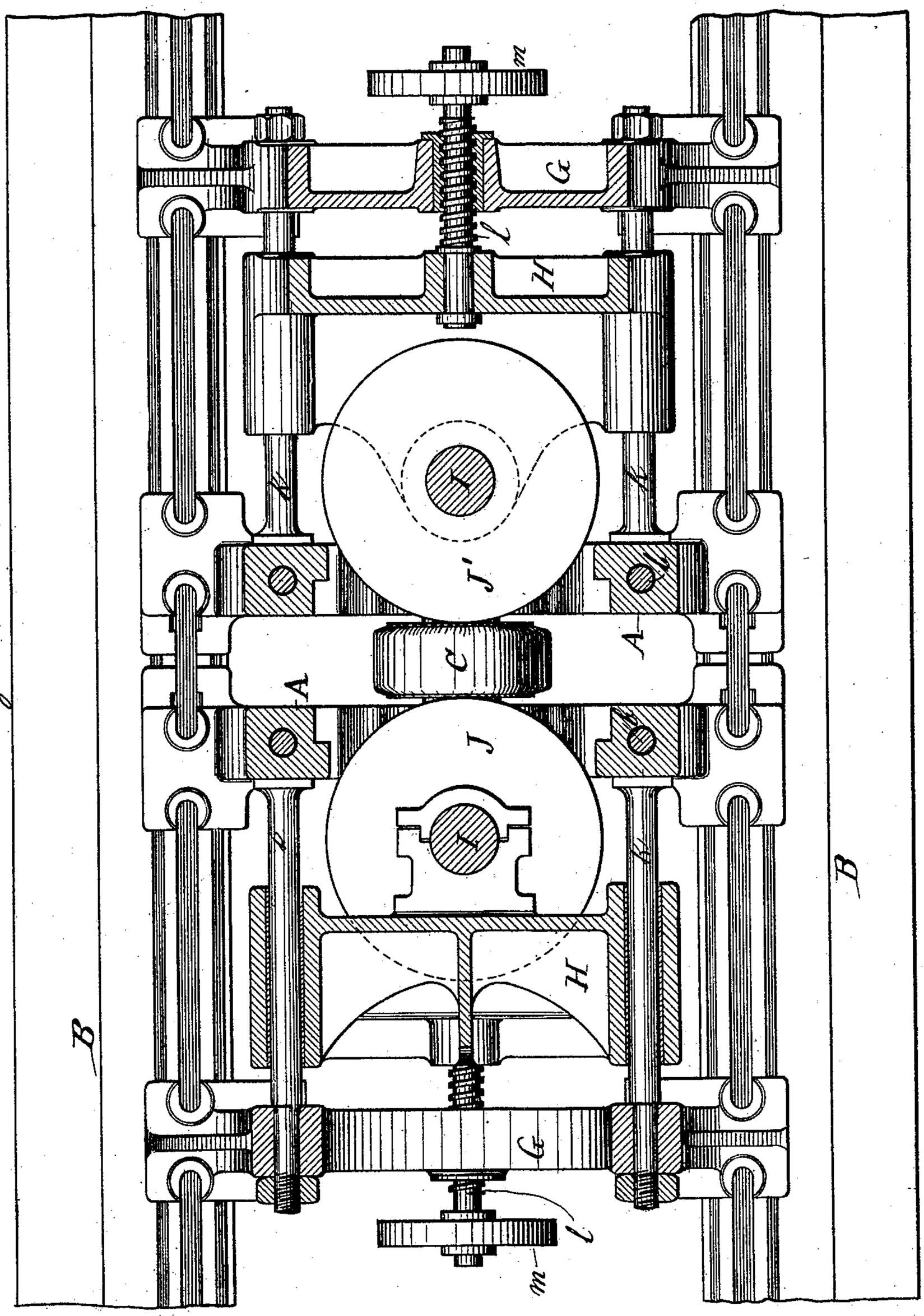
Fig. 2.



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(No Model.) 3 Sheets—Sheet 3.

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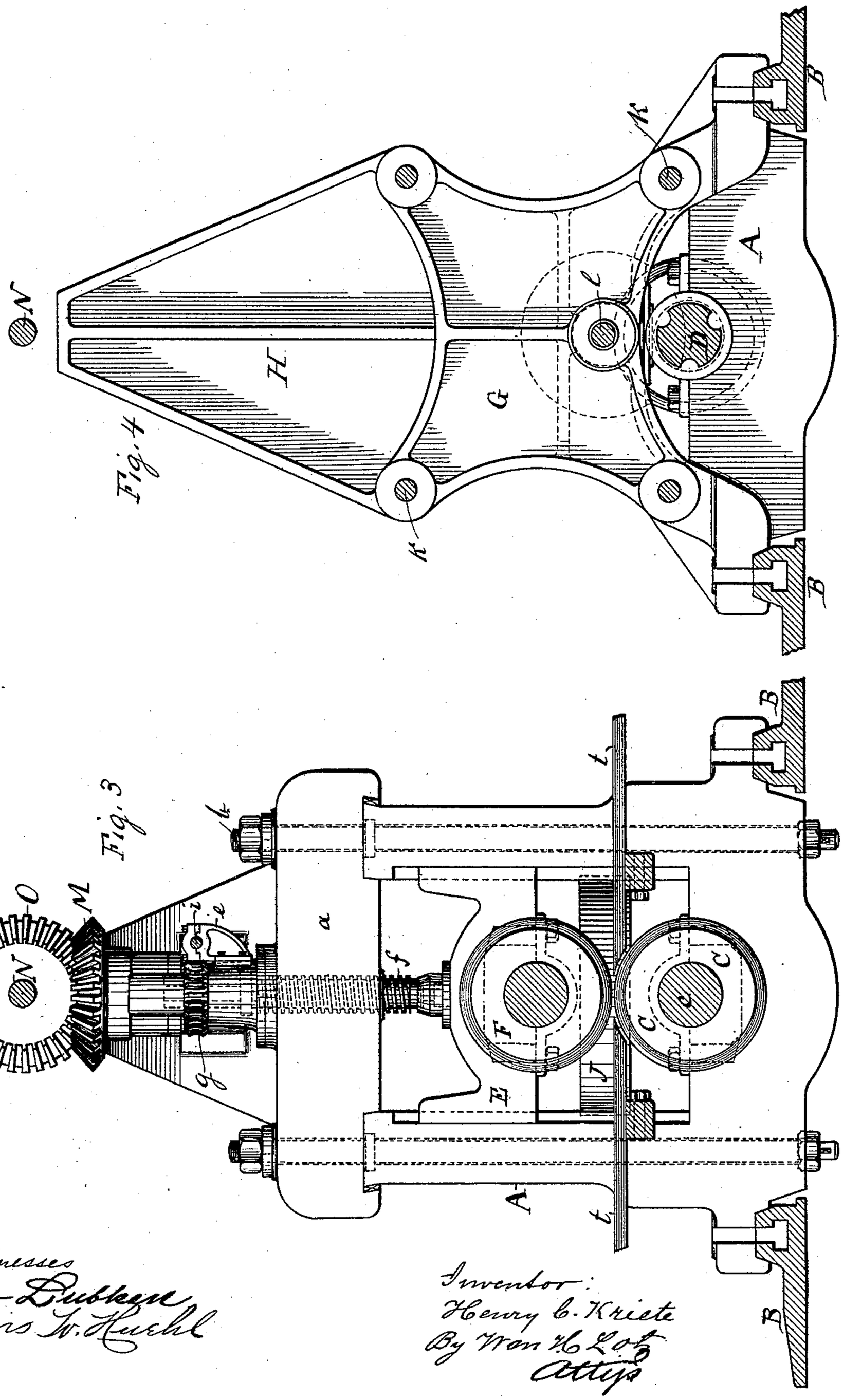

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UNITED STATES PATENT OFFICE.

HENRY C. KRIETE, OF CHICAGO, ILLINOIS.

ROLLING-MILL.

SPECIFICATION forming part of Letters Patent No. 420,498, dated February 4, 1890.

Application filed April 27, 1889. Serial No. 308,876. (No model.)

To all whom it may concern:

Be it known that I, HENRY C. KRIETE, a citizen of the United States of America, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Universal Rolling-Mills, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to machines for rolling structural beams and bars of iron or steel, and particularly **I**-beams, and it has for its object to provide such a machine in which the bar of iron is shaped between two vertical and two horizontal rolls, and in which three of the rolls are driven by power; and with this object in view my invention principally consists in the arrangement for driving the lower vertical roller and the two horizontal rollers, as more fully will be hereinafter described and specifically claimed.

In the accompanying drawings, Figure 1 represents a longitudinal vertical section of the machine; Fig. 2, a sectional plan on line 2 2 in Fig. 1; Fig. 3, a transverse vertical section on line 3 3 in Fig. 1; Fig. 4, an end view of one of the vertical roller-bearing frames, and Fig. 5 a plan of the adjusting-gear for the upper horizontal roll.

Corresponding letters in the several figures of the drawings designate like parts.

A A′ denote the two housings secured upon the **T**-grooved bed-plates B B′ by bolts to be rigid therewith. The bottom of each housing A A′ provides a saddle for a bearing for the trunnions *c* of the lower roller C, which trunnions by sleeve-couplings *d* are connected with the driving-shaft D. The side standards of each housing are connected on top by a cap *a*, rigidly secured by bolts *b* in the usual manner, and between these standards are vertically guided the cross-heads E, provided with bearings for journals of upper roller F. These cross-heads E are pivotally suspended each to a screw *f*, tapped through caps *a*, the upper portions of which screws *f* are grooved or fluted for engaging the hubs of worm-wheels *g*, both to be rotated simultaneously by worm-wheels *h* engaging therewith, and both being mounted upon a shaft *i*, journaled on bracket-bearings *e*, and having pulley *j*, whereby the upper roller F can be raised or lowered and held to its work, as indicated in dotted lines in Fig. 1 and in detail in Fig. 5. This adjusting mechanism, however, may be varied and other well-known devices may be applied for accomplishing the same object, and the upper roller F with the cross-heads E may be counterbalanced by weights, springs, or hydraulic pressure, so its raising and lowering can be carried out with more ease; but such devices being common and well known I have not found it necessary to show and describe the same. Standard-frames G, also rigidly secured upon bed-plates B, are connected one with each housing A by four brace-rods K, which at the same time serve as guide-rods for frames H to slide horizontally thereon. Each such frame H is horizontally adjustable by a screw *l*, tapped through the central boss of frame G and pivotally connected with frame H, and a wheel *m* is mounted upon its outer end by which to turn such screw either by hand or power.

On its inward face each frame H is provided with three journal-boxes *n*, *o*, and *p* for an upright shaft I, having mounted a roller J or J′, the face of which rollers J J′ are about in line horizontally with the meeting faces of rollers C and F, for upsetting the flanged edges of the beam L to the proper breadth while the thickness of web and width of flanges are gradually reduced to proper size.

Upon the upper extremities of shafts I are mounted bevel-gears M, and upon a shaft N, journaled in bearings *q*, secured upon the top of frames H, are feathered bevel-wheels O, which, meshing with wheels M, are laterally held in proper gear by plates *r* bolted to frames H, and engaging grooves *s* turned into the hubs of wheels O. The worms *h*, as well as the gear-wheels M, being feathered upon their respective shafts, the moving apart or closer together of housings A or frames H will not interfere with these driving-gears.

To the driving-shafts D and N are to be imparted a proportional speed for the circumferential speed of rollers C and J J′ to be the same, while the roller F will be rotated by frictional contact with the bar L passed through between these rollers.

To be on a line with the top face of lower

roller C are provided guide-tables *t* to both sides of such roller, which guide-tables are secured by proper supports between the housings A in the usual manner.

It will be readily seen the housings A and standard-frames G being rigidly secured upon bed-plates B and rigidly connected by brace-rods K, upon which the frames H carrying the rollers J J′ will slide horizontally, while the roller F can be adjusted vertically. The bar of iron to be reduced to the proper shape, when first introduced between the rollers, is to be broader and thicker than the finished bar, and therefore the roller F is elevated and the rollers J J′ are spread apart, when with the bar passing through it is reduced in its middle for forming the web and is upset at its edges for forming the flanges and for each passing through of the bar the roller F is gradually moved downward by turning pulley *j*, and the rollers J J′ are gradually moved toward the rollers C F by turning wheels *m* until the desired thickness and shape have been obtained, and for the purpose of providing a simultaneous gradual adjustment of rolls F J and J′ the pulleys or wheels *j* and *m* may be driven from a shaft intermittently and reversibly rotated from suitable power.

The rollers C and F are shaped on their rim correspondingly with the **I** shape the bar or beam is to have when completed, while the rollers J J′ only form the flat sides of the flanges, and therefore can be made true cylindrical. I do not intend to be restricted to the rolling of **I**-beams, however, since I can shape the rollers as well for rolling structural bars or beams of different shapes.

The advantage obtained from driving by power the rollers J and J′ to co-operate with the roller C, the roller F only receiving motion from frictional contact, is that the sometimes heavy bite required for the upsetting of the edges of the bar to form the flanges will prevent a tearing, drawing, or slipping of the bar, and that therefore the operation of reducing a bar to the desired shape by my device is more safe, and the product is more uniform than in machines in which the vertical rollers are rotated by frictional contact alone.

What I claim is—

1. In a machine for rolling structural beams of iron and steel, the combination of two horizontal rollers, one being driven by power and the other one being vertically adjustable and being rotated by frictional contact with the bar to be reduced, and two vertical rollers arranged for edgewise reducing, and also driven by power, substantially as set forth.

2. In a machine for rolling structural beams of iron and steel, the combination of two horizontal rollers, one being driven by power and the other one being vertically adjustable and being rotated by frictional contact with the bar to be reduced, and two vertical rollers arranged for edgewise reducing and for lateral adjustment, and being also driven by power, substantially as set forth.

3. In a machine for rolling structural beams of iron and steel, the combination of two horizontal rollers, one being driven by power and the other one being vertically adjustable and being rotated by frictional contact with the bar to be reduced, said rollers being journaled in rigid housings connected by horizontal brace-rods with rigid standard-frames, two vertical rollers mounted upon shafts pivoted to frames guided on the brace-rods to be horizontally adjustable, and a horizontal shaft for driving the vertical rollers by gearing, substantially as set forth.

4. In a machine for rolling structural beams of iron and steel, the combination of two horizontal rollers, one being driven by power and the other one being vertically adjustable and being rotated by frictional contact with the bar to be reduced, said rollers being journaled in rigid housings connected by horizontal brace-rods with rigid standard-frames, two vertical rollers mounted upon shafts pivoted to frames guided on the brace-rods for horizontal adjustment by means of screws tapped through the rigid standard-frames, and a horizontal shaft for driving the vertical rollers by gearing, all substantially as set forth.

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

HENRY C. KRIETE.

Witnesses:
WILLIAM H. LOTZ,
OTTO LUBKERT.