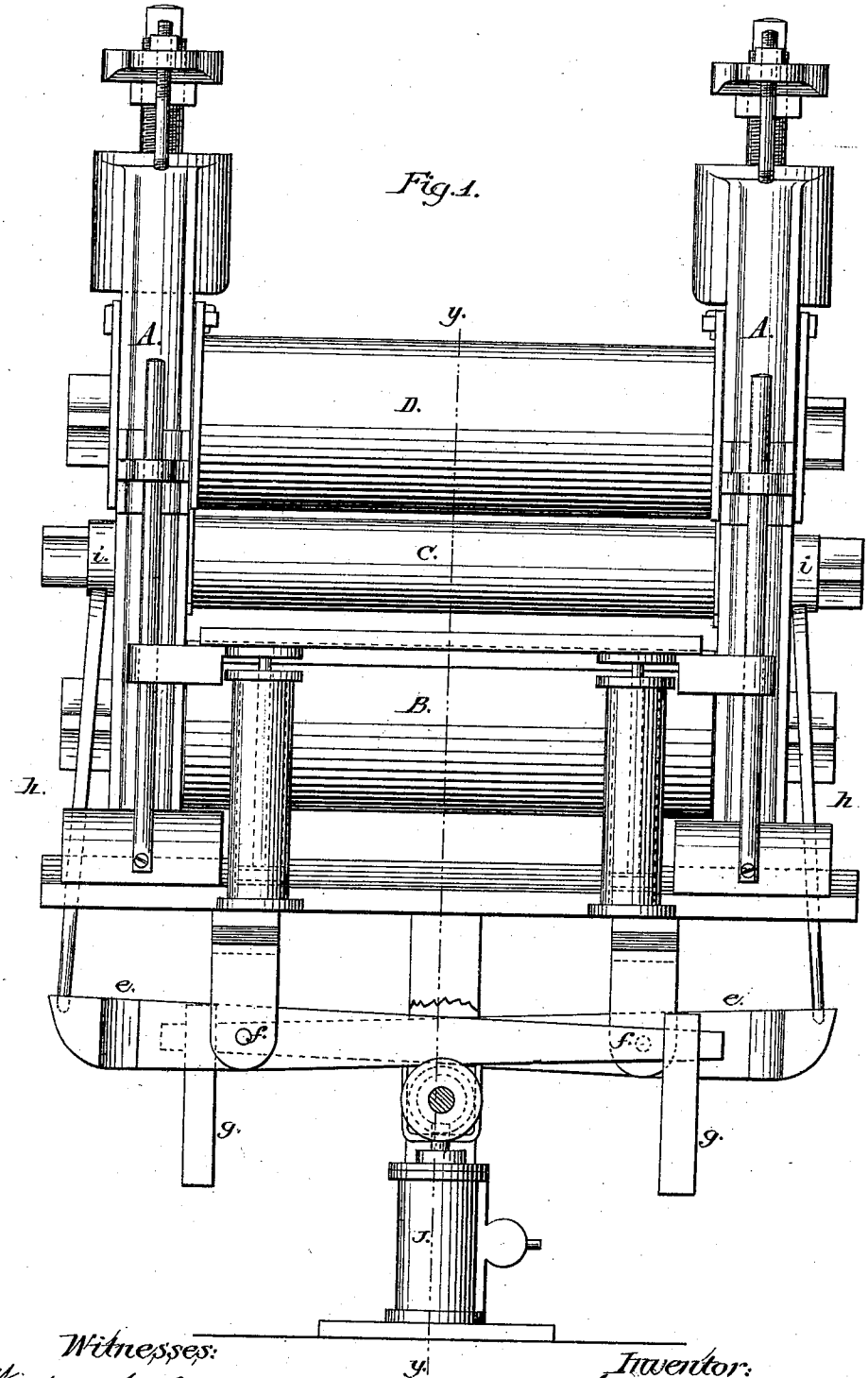
3 Sheets--Sheet 1.

J. I. WILLIAMS.

Three-High Rolling Mills.

No. 169,071. Patented Oct. 19, 1875.

Fig. 1.



Witnesses:
Wilton C. Dunn
M. Gardner.

Inventor:
John I. Williams
By J. L. Johnston
his attorney

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

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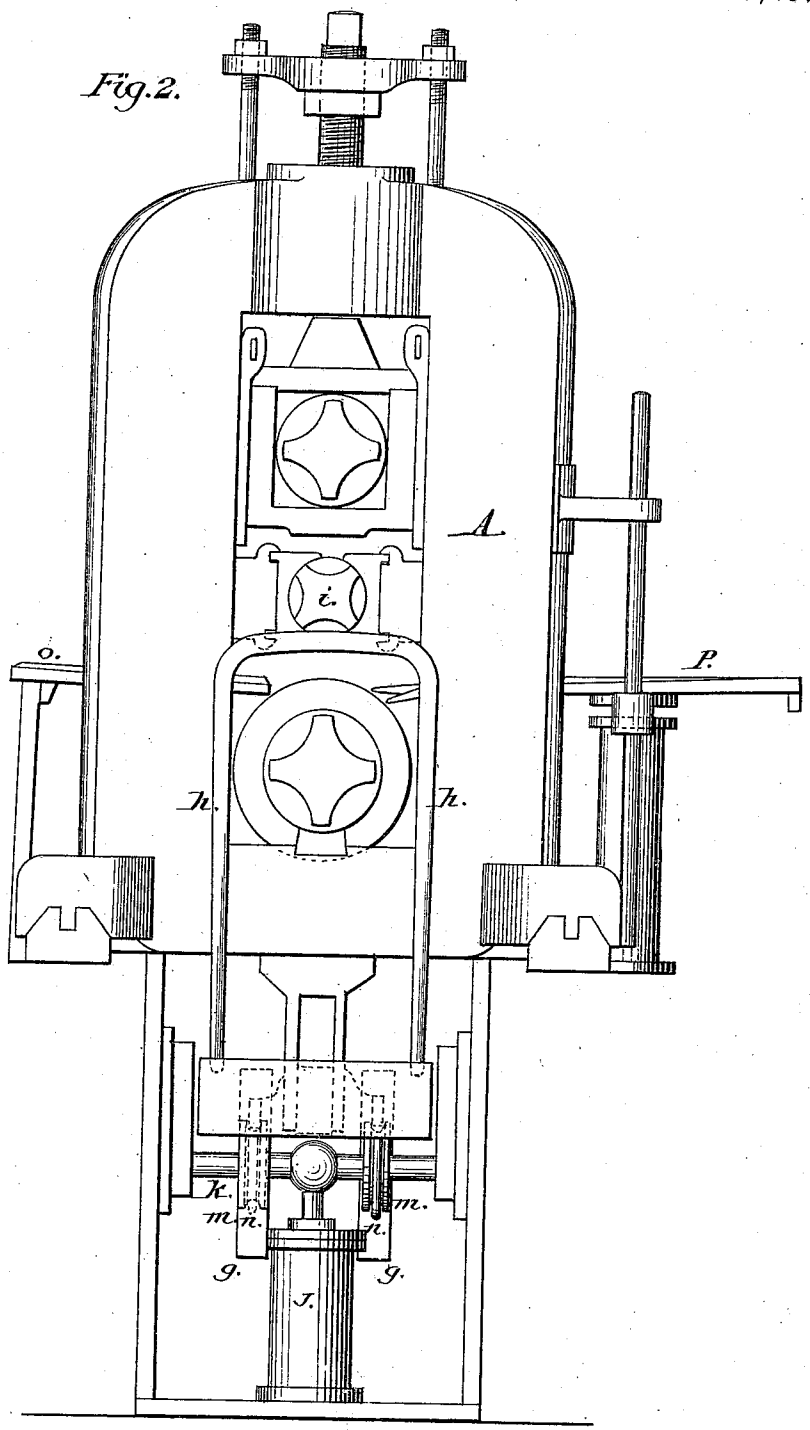
J. I. WILLIAMS.

Three-High Rolling Mills.

No. 169,071. Patented Oct. 19, 1875.

Fig. 2.



Witnesses:

Wilton C. Conn

M. Gardner.

Inventor:

John I. Williams

By F. J. Johnston, his attorney

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

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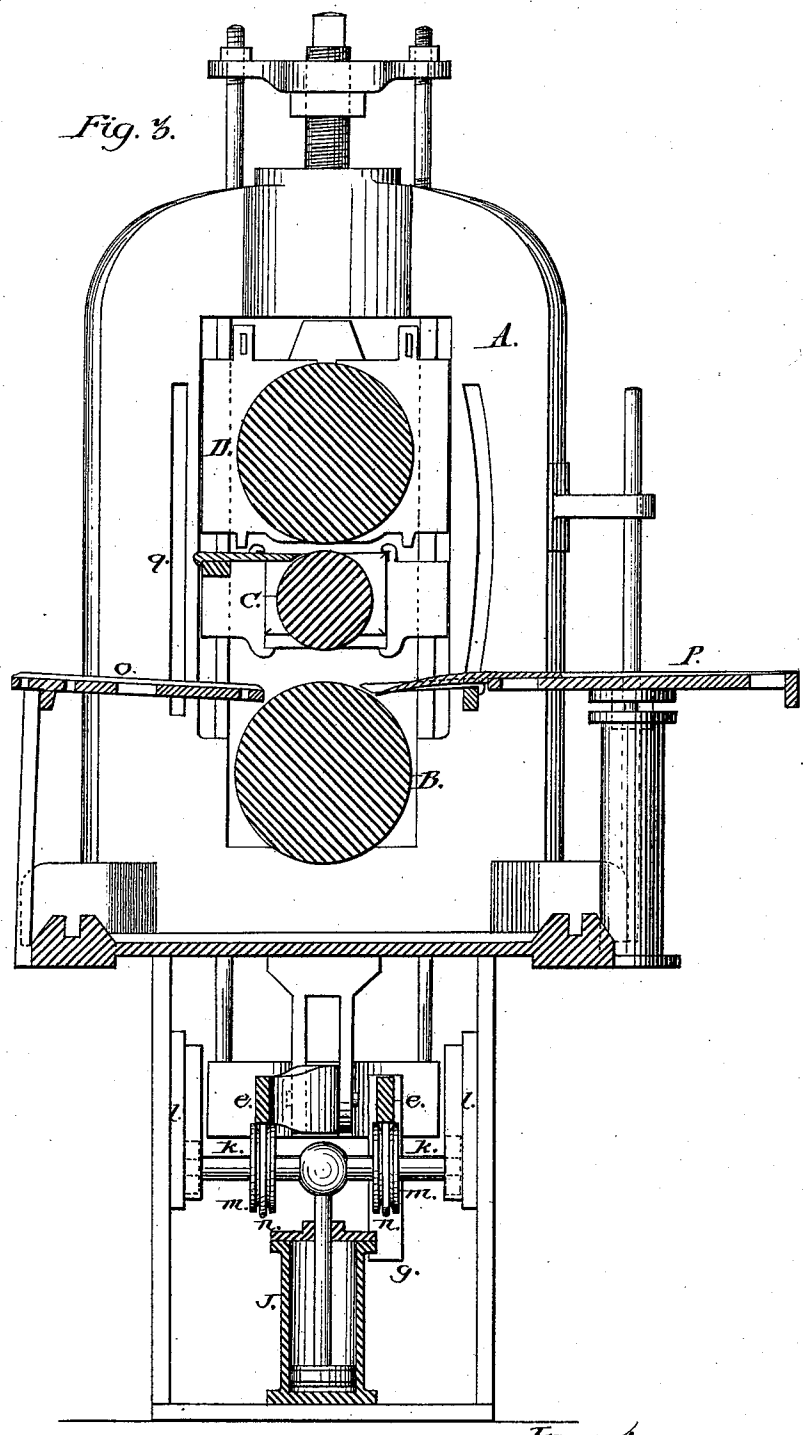
J. I. WILLIAMS.

Three-High Rolling Mills.

No. 169,074. Patented Oct. 19, 1875.

Fig. 3.



Witnesses:
Wilton C. Conn
M. Gardner.

Inventor:
John I. Williams
By J. J. Johnston,
his attorney

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOHN I. WILLIAMS, OF MILLVALE, PENNSYLVANIA.

IMPROVEMENT IN THREE-HIGH ROLLING-MILLS.

Specification forming part of Letters Patent No. **169,071**, dated October 19, 1875; application filed November 19, 1874.

CASE B.

To all whom it may concern:

Be it known that I, JOHN I. WILLIAMS, of Millvale, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Apparatus or Mill for Rolling Iron; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings and to the letters of reference marked thereon.

My invention relates to an improvement in apparatus (known as three-high rolls) for rolling iron; and consists, first, in balancing the center or middle roll through the medium of weighted levers, and in elevating and depressing it by means of steam-power at the will of the operator.

To enable others skilled in the art with which it is most nearly connected to make and use my invention, I will proceed to describe its construction and operation.

In the accompanying drawings, which form part of my specification, Figure 1 is a front elevation of my improvement in apparatus or mill for rolling iron into the desired form, size, or thickness. Fig. 2 is an end elevation of the same. Fig. 3 is a vertical section of the same at line *y* of Fig. 1.

In the accompanying drawings, A represents the housings or frame-work for the rolls B C D and their bearings, all of which are of ordinary construction. Below the housings or frame-work A are two levers, *e*, which are pivoted at *f*, and are each furnished with a weight, *g*. On the outer end of each of the levers *e* is placed a forked arm, *h*, the upper end of which is placed under the neck or axis *i* of the center roll C. By this arrangement of the levers *e*, weights *g*, and forked arms *h*, with relation to the center roll C, it can be balanced, and also held up against the under side of the upper roll D, if desired. Below the pivoted levers *e* is placed a steam-cylinder, J, and to the end of its piston-rod, and at right angle to it is secured a bar, *k*, the ends of which move in slides or guides *l*. On the bar *k* are grooved pulleys *m*, in the grooves of which rests the lower edge of the levers *e*, which are yoked to the grooved pulleys *m* by means of the yokes *n*, the curve of which is placed in the groove of the pulleys *m*, and their ends secured to the levers *e*. By this arrangement of the steam-cylinder J, piston-rod bar *k*, grooved pulley *m*, and yokes *n*, the operator can, by means of a lever, move the slide or other valve connected with the steam-cylinder J, and admit steam into the cylinder, and thereby cause the piston to move upward or downward at will, causing the outer ends of the levers *e* to rise with the descent of the piston and lower with its ascent, whereby the center roll can be elevated or be depressed at his will by the simple movements of the lever connected to the valve, which admits steam into the cylinder J. *o* represents a fixed fore-plate for the lower roll B, and *p* a fore-plate, which is susceptible of being raised or lowered by steam-power in the manner and by the means described in my application for a patent for improvement in "steam-lift for fore-plate of plate and other rolls," bearing even date with this application, and marked Case A. To the movable bearing of the center roll C is secured the fore-plate *q* or rest and guides, which is elevated and depressed with the elevation and depression of the roll C.

The operation of my improvement is as follows: The heated "pile" is delivered upon the fore-plate *o*, and fed to the rolls B and C. Passing between them it is delivered on the fore-plate *p*, which is elevated to a plane with the upper surface of the center roll C when depressed, and is then passed between it and the upper roll D onto the fore-plate *q* or rest and guides, and from it down upon the fore-plate *o*, from which it is again fed between the rolls B and C, and delivered upon the fore-plate *p*, which has been lowered for its reception, and thus the heated pile is passed between the lower roll B and center roll C and the upper roll D and center roll C until it is reduced to the desired form, size, or thickness. The upper roll D is gradually lowered through the medium of the adjusting screws *r* at each "pass" of the iron between the rolls. The center roll C is elevated when the iron is passed between it and the lower roll B, and is low-

ered when the iron is passed between it and the upper roll D. The advantages of the improvement hereinbefore described will be apparent to those skilled in the art of rolling iron without fnrther description.

What I claim as of my invention is—

1. The rolls C, balanced through the medium of weights and levers, and elevated and depressed through the agency of steam, substantially as herein described.

2. The combination of the middle roll C, with the fore-plate or rest attached to its bearings, guide *q*, and steam-cylinder J, substantially as herein described.

JOHN I. WILLIAMS.

Witnesses:
A. C. JOHNSTON,
JAMES J. JOHNSTON.