(No Model.) 3 Sheets—Sheet 1.

J. A. POTTER.

ROLLING MILL.

No. 549,818. Patented Nov. 12, 1895.

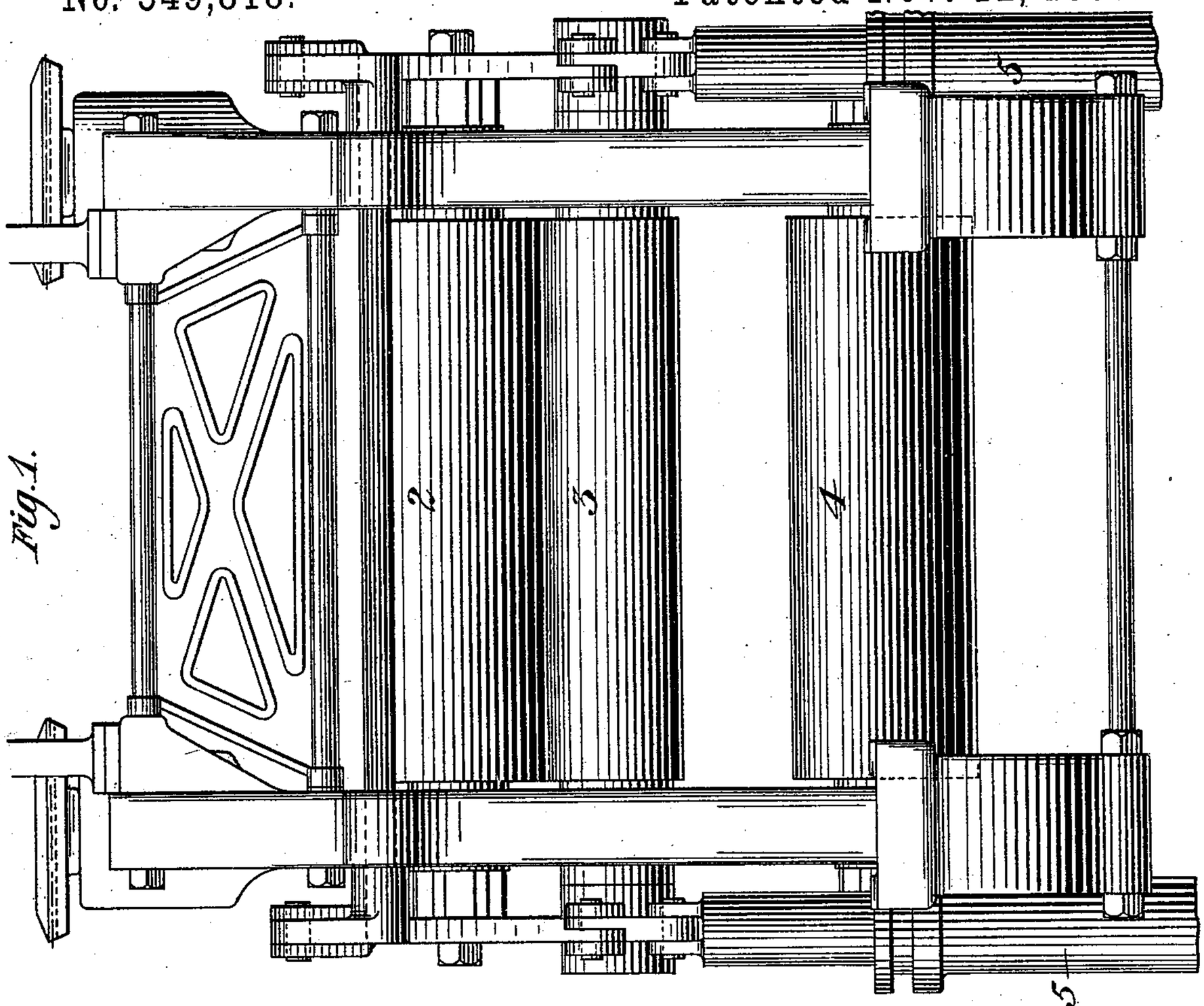

Fig. 1.

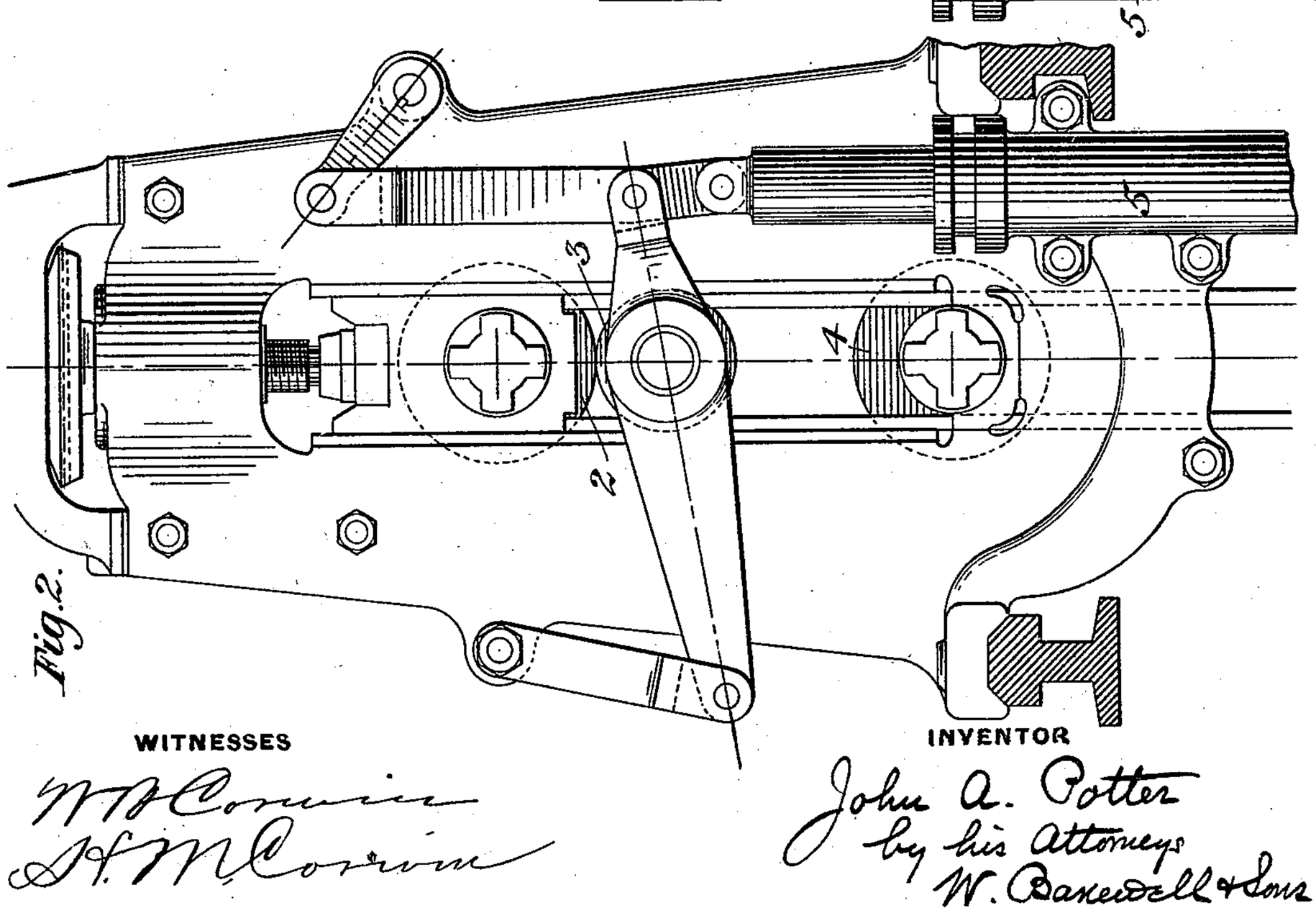

Fig. 2.

WITNESSES

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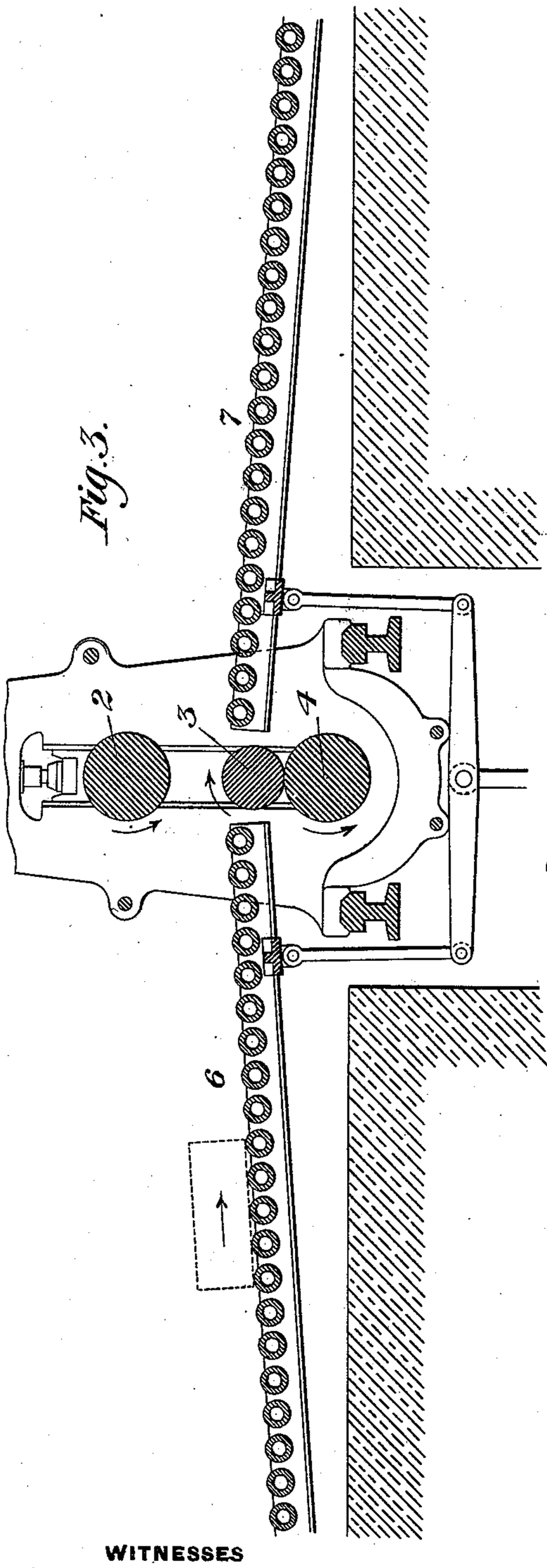

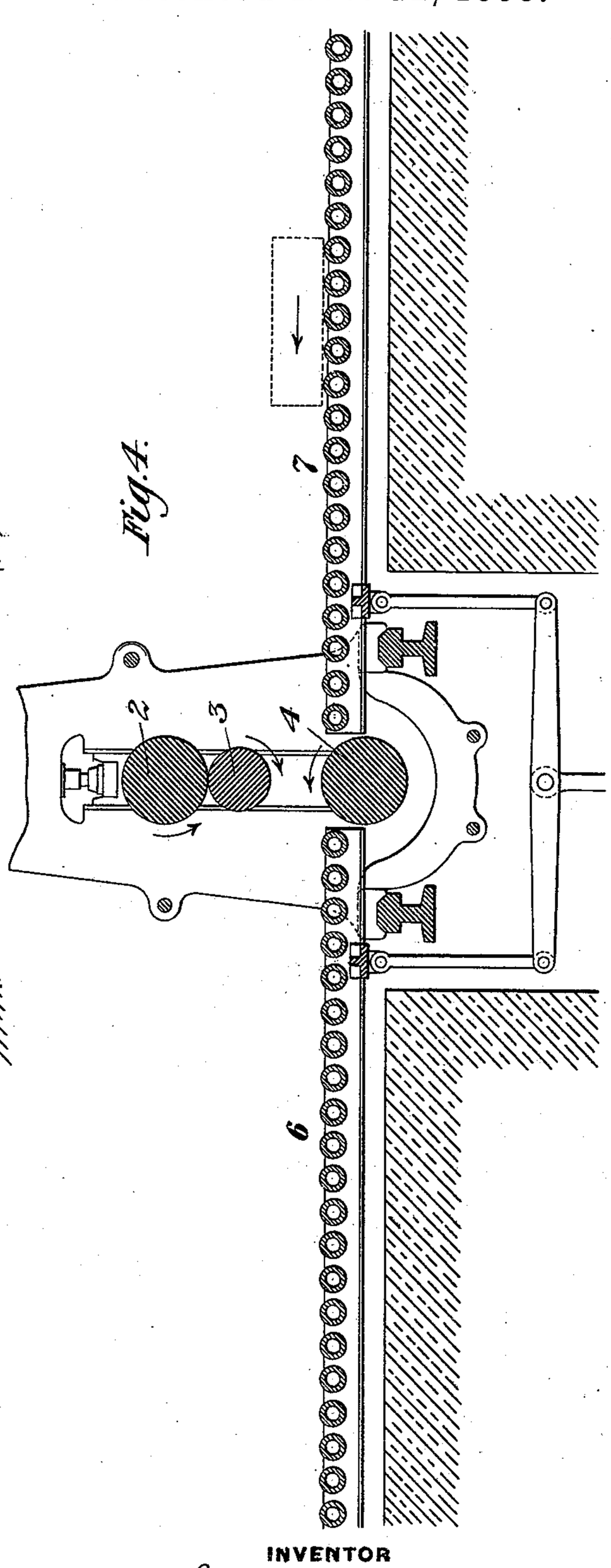

WITNESSES

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(No Model.) 3 Sheets—Sheet 3.

J. A. POTTER.

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Fig. 5.

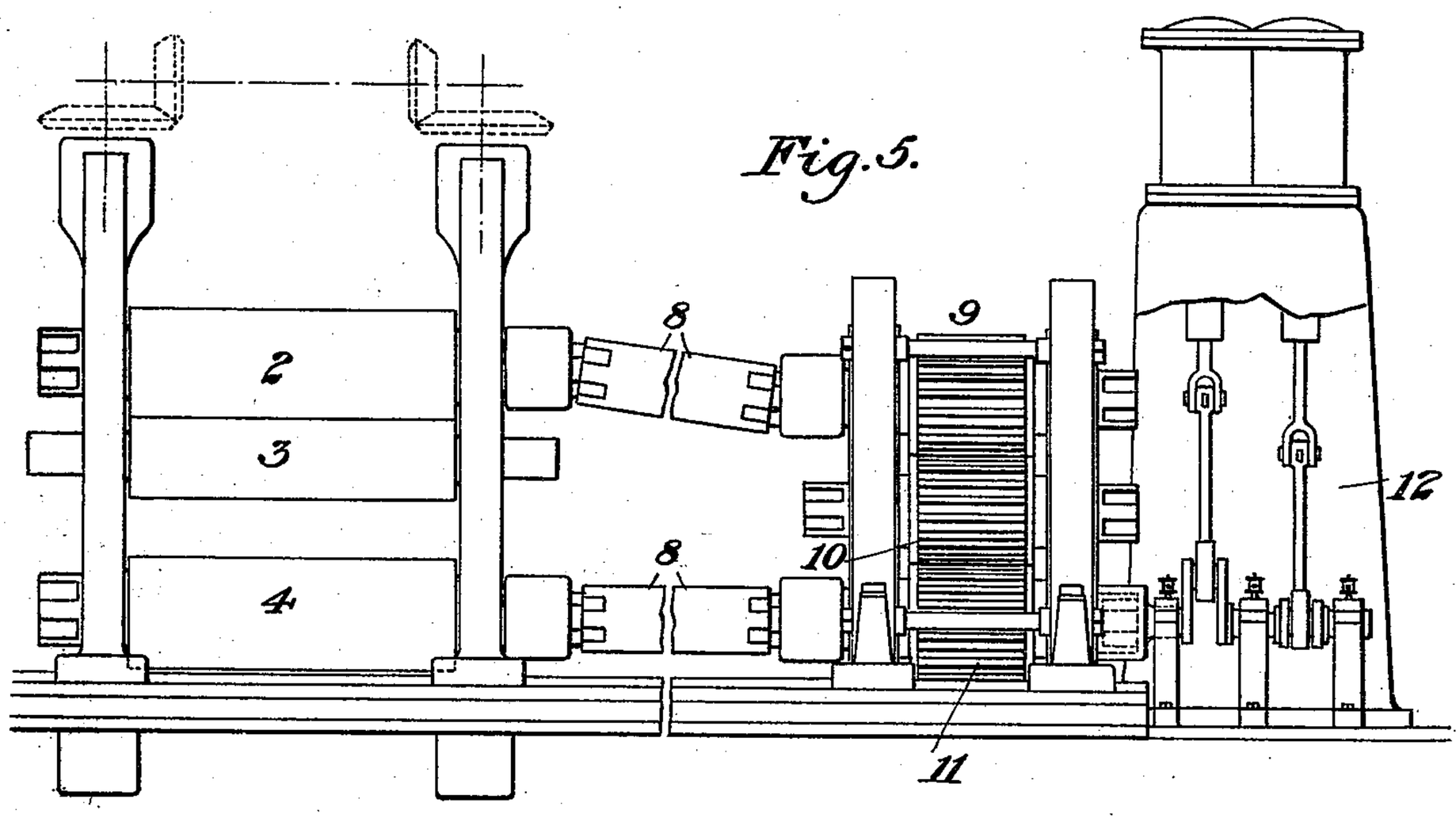
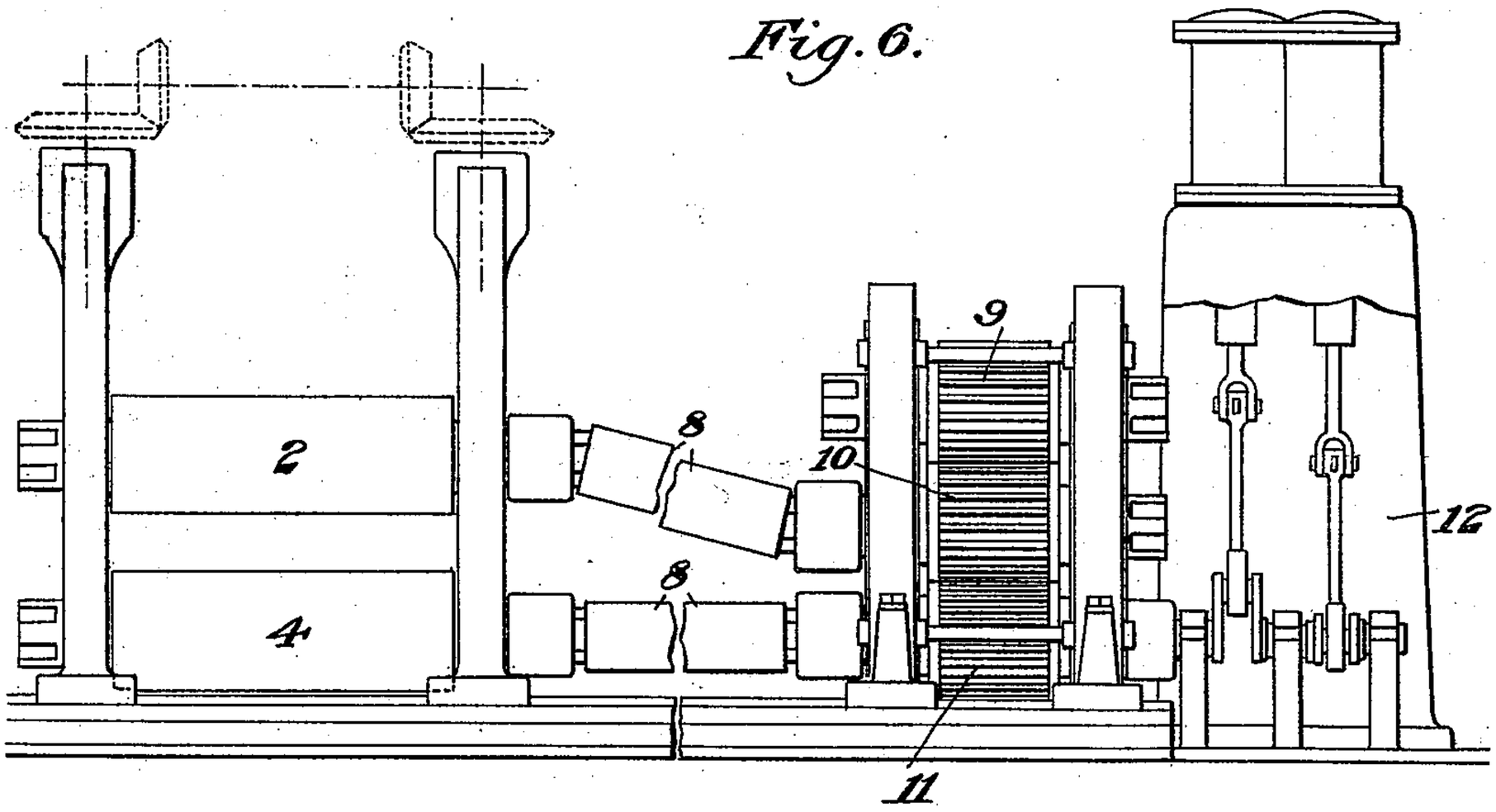


Fig. 6.



WITNESSES

INVENTOR.

John A. Potter
by Baldwin & Sons
his attys.

UNITED STATES PATENT OFFICE.

JOHN A. POTTER, OF MUNHALL, PENNSYLVANIA.

ROLLING-MILL.

SPECIFICATION forming part of Letters Patent No. 549,818, dated November 12, 1895.

Application filed January 26, 1893. Serial No. 459,784. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. POTTER, of Munhall, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Rolling-Mills, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a front elevation of the rolls of my improved mill. Fig. 2 is an end elevation of the same. Figs. 3 and 4 are vertical sectional views of the rolls and their feed-tables, Fig. 3 showing the tables when at the upper pass of the rolls and Fig. 4 showing them when at the lower pass. Fig. 5 is a front elevation of the mill with the rolls connected with the driving-pinions so as to enable the rolls to be used in the manner of the ordinary three-high mill. Fig. 6 is a similar view showing the rolls adapted to be used in the manner of a reversing-mill.

Like symbols of reference indicate like parts in each view.

The object of my invention is to provide a rolling-mill of great strength and compactness considered with relation to the nature of the work which the mill is adapted to perform.

To this end it consists in a rolling-mill having three working rolls—viz., an intermediate vertically-movable frictionally-driven roll and two outer power-driven working rolls in combination with a reversing-engine by which the driven rolls can be rotated in either direction, the intermediate roll being removable, so that the mill can be used interchangeably as a three-high mill or as a two-high mill, in combination with means for reversing the rotation of one of the outer rolls relatively to the other when the middle roll is removed. The advantage of this construction in increasing the range of work which the rolls can do is important.

In the drawings, Figs. 1 and 2, 2, 3, and 4 are the working rolls. The bearings of the intermediate roll 3 are connected with the piston of a cylinder 5, by operating which the roll can be lifted into frictional contact with the roll 2, as shown in Figs. 1 and 2, or lowered into frictional contact with the roll 4, as shown in Fig. 3. The working rolls 2 and 4 are positively driven by spindles from pinions shown in Fig. 5, while the intermediate roll 3 is frictionally driven by the roll with which it is in contact.

In Figs. 3 and 4 I show the mill in connection with feed-tables, in Fig. 3 the intermediate roll 3 being lowered into contact with the roll 4, leaving the upper pass between the rolls 2 and 3 open through which the metal piece is passed in the direction of the arrow. When the piece has passed from the table 6 to the table 7, the tables are lowered, the intermediate roll is raised into contact with the roll 2, as shown in Fig. 4, and the metal is then passed back through the lower pass of the rolls. Between successive passes the reduction of the metal is provided for by forcing down the roll 2 by means of the adjusting mechanism.

The engine by which the rolls are driven is a reversing-engine. Heretofore in passing metal between three-high rolls, in case the metal should stick because of the stalling of the engine, the rapid heating of the rolls in one spot, occasioned by the presence of the hot metal in the interval before the piece can be drawn out, is very apt to break one of the rolls. In fact it nearly always occasions its breaking. This danger I avoid by using a reversing-engine, for if the metal should stick I can at once withdraw it by reversing the mill. Furthermore, by a reversing-engine I dispense with the necessity of using a fly-wheel, which, by the sudden shocks it often gives to the mill, is the occasion of frequent strain or breaking. With a fly-wheel engine also in first starting the mill the ordinary efficiency of the mill is not attained until the inertia of the very heavy fly-wheel is overcome and the engine brought up to its normal speed. This consumes considerable time, and in order to prevent frequent loss of time during the working of the mill the engine is kept constantly in operation even during intervals of manipulating the piece, &c., when no work is being done by the rolls. This involves waste of power and wear of machinery which I avoid by my improvement, for by using a three-high mill with a reversing-engine I can start the engine so rapidly that in intervals when the metal is not in the mill the mill machinery can be stopped. In large mills the fly-wheel has been sometimes of one

hundred tons, and the saving occasioned by dispensing with this useless weight of metal and avoiding the constant danger of strain and breaking from the enormous power stored in it will be appreciated.

In Figs. 5 and 6 I illustrate a three-high mill having a removable middle roll and means for reversing the motion of one of the other rolls. In Fig. 5 I show the mill with the intermediate roll in place, the spindles 8 being connected with the rolls 2 and 4 on one end and with the upper and lower of the pinions 9, 10, and 11 at the other end, these pinions being driven by an engine 12 of the reversing type. In Fig. 6 I show the mill with the intermediate roll removed, and in this case the spindle of one of the working rolls is connected with the middle pinion 10, thus causing the two rolls to rotate in opposite directions, whereas when working as a three-high mill it is necessary that they should rotate in the same direction. The facility which this removability of the intermediate rolls affords for changing the mill from a three-high mill to a two-high mill and adapting it to work in reducing heavy or light plates, as desired, is of great advantage, and I claim this, broadly, as applied to three-high mills.

Modifications in the form and construction of the parts within the scope of the claims may be made by the skilled mechanic. For example, instead of plain-faced rolls grooved rolls may be used.

I claim—

1. A three-high mill, having a removable middle roll, power-driven outer rolls, driving pinions and spindles connecting them with the rolls, one of said spindles being adapted to be shifted from one pinion to another pinion which revolves in reverse direction; substantially as described.

2. A three-high mill having three working rolls affording an upper and lower pass for the metal, the middle roll being removable, a reversing engine by which the rolls are driven, mechanism by which rotary motion is transmitted from the engine to the outer rolls, and means whereby the direction of motion of one of the outer rolls may be reversed relatively to the other when the middle roll is removed; substantially as described.

In testimony whereof I have hereunto set my hand.

JOHN A. POTTER.

Witnesses:
W. B. CORWIN,
THOMAS W. BAKEWELL.