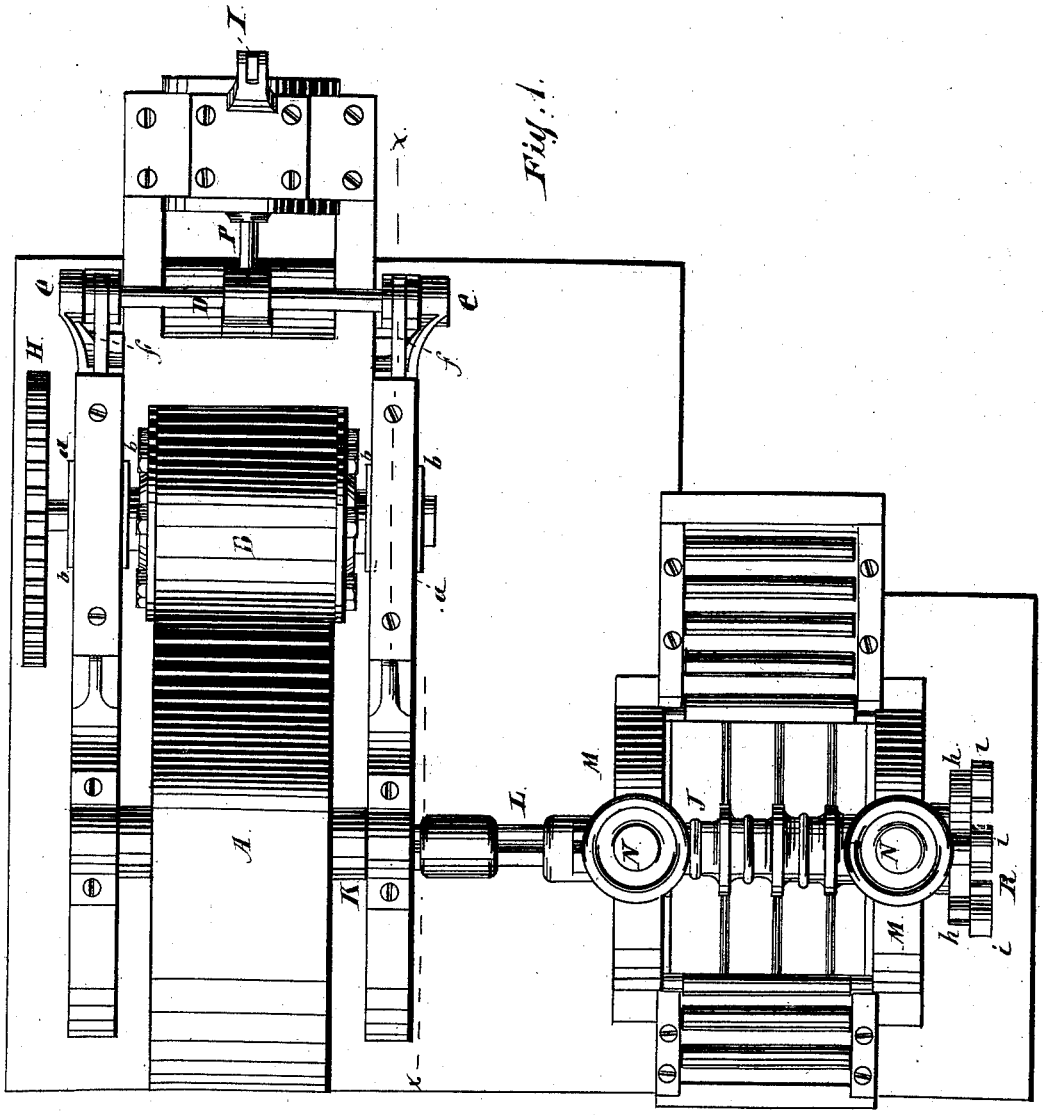
4 Sheets—Sheet 1.

# W. H. & J. WHYTE.
## Rolling-Mill.

No. 216,073. Patented June 3, 1879.

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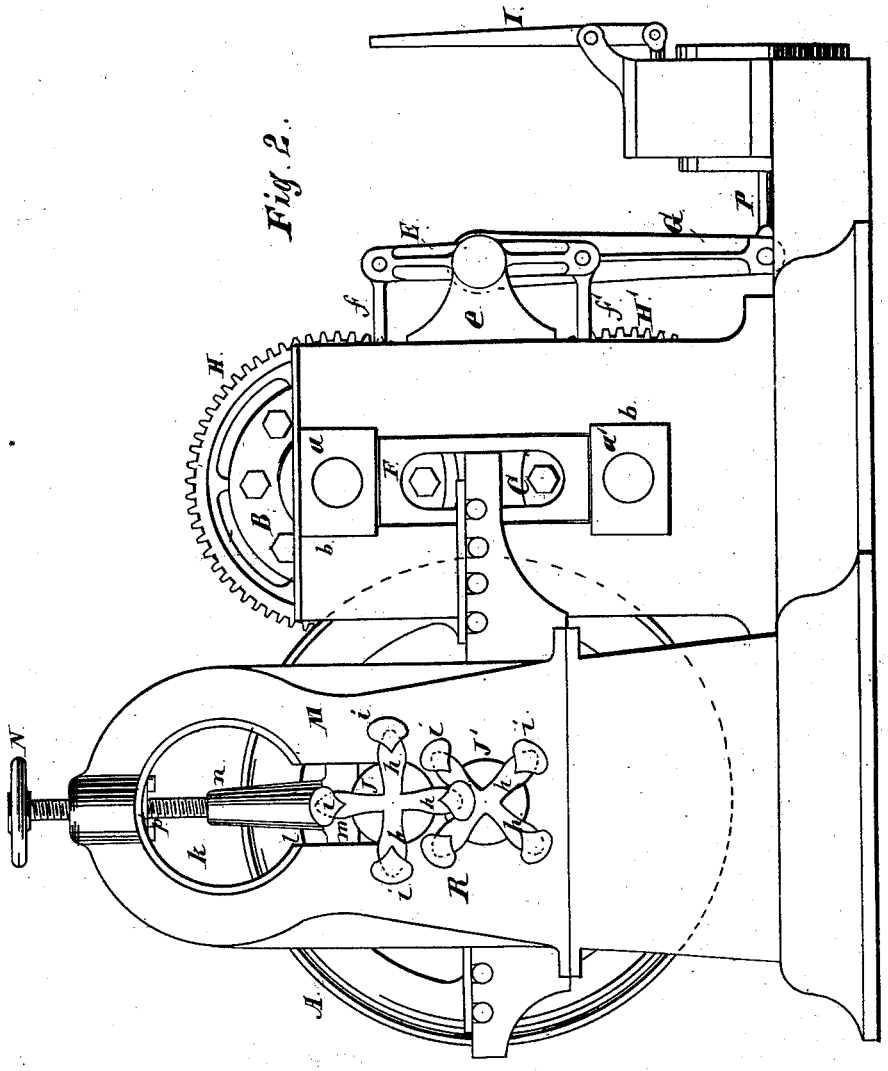
4 Sheets—Sheet 2.

# W. H. & J. WHYTE.
## Rolling-Mill.

**No. 216,073.** **Patented June 3, 1879.**

Fig. 2.

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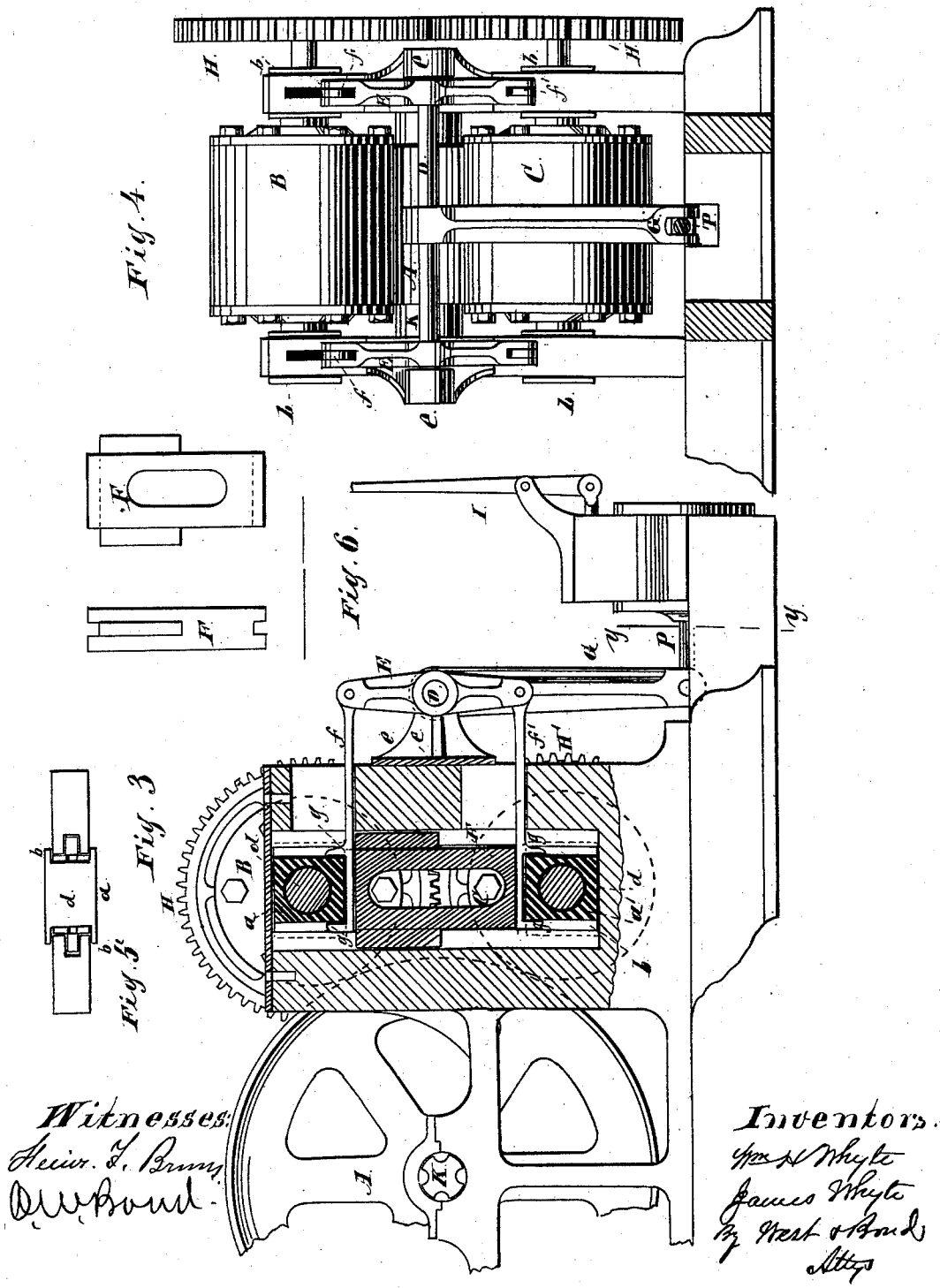
Attys.

# W. H. & J. WHYTE.
## Rolling-Mill.

No. 216,073. Patented June 3, 1879

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4 Sheets—Sheet 4.

# W. H. & J. WHYTE.
## Rolling-Mill.

No. 216,073. Patented June 3, 1879.

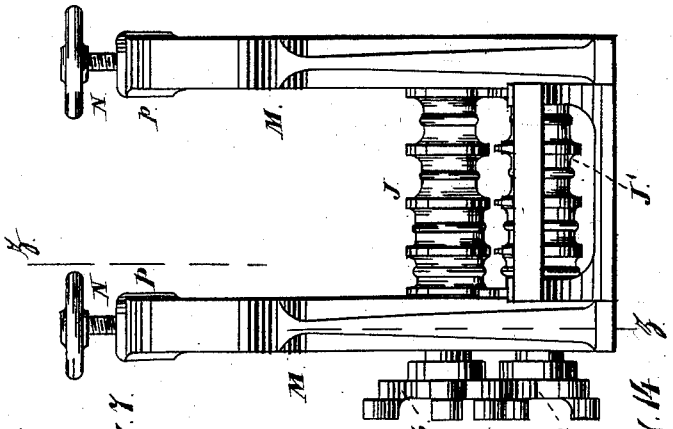


Fig. 7.

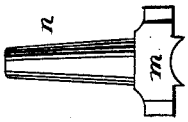


Fig. 11.


Fig. 12.

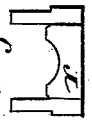


Fig. 13.


Fig. 14.


Fig. 15.

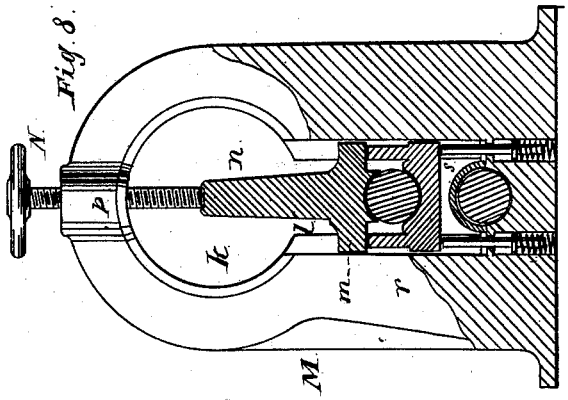


Fig. 8.

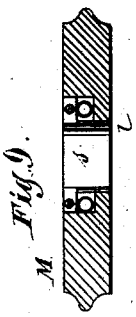


Fig. 9.

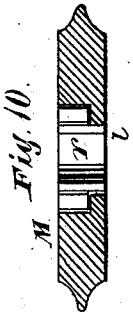


Fig. 10.

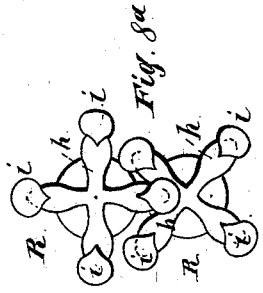


Fig. 8a.

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# UNITED STATES PATENT OFFICE.

WILLIAM H. WHYTE AND JAMES WHYTE, OF CHICAGO, ILLINOIS.

## IMPROVEMENT IN ROLLING-MILLS.

Specification forming part of Letters Patent No. **216,073**, dated June 3, 1879; application filed January 27, 1879.

*To all whom it may concern:*

Be it known that we, WILLIAM H. WHYTE and JAMES WHYTE, of Chicago, Cook county, State of Illinois, have invented new and useful Improvements in Rolling-Mills, of which the following is a full description, reference being had to the accompanying drawings, in which—

Figure 1 is a plan. Fig. 2 is an elevation; Fig. 3, a vertical section at *x x* of Fig. 1; Fig. 4, an elevation of the parts shown, taken at *y* of Fig. 3; Fig. 5, a top view of one of the bearings *a;* Fig. 6, details; Fig. 7, a front elevation of the rolls J J′ and housings. Fig. 8 is a detail, showing one of the housings, partly in section, at *z* of Fig. 7. Fig. 8ª is an elevation of the expansion-gear. Figs. 9 and 10 are details in section, showing the bearings for the rolls; Figs. 11 and 12, details of the rider and breaker. Figs. 13, 14, and 15 are details of the lower part of the bearing for the roll J.

Our invention consists in the construction of devices by means of which a reverse movement is given to the rolls, and which are applicable to any rolling-mill having two-high trains of rolls for blooming, roughing, or finishing. The reverse movement we obtain by means of friction-rolls and devices connected therewith.

In the drawings, A represents a driving-wheel having a broad rim. B C are two friction-rollers, one above and the other below the center of the driving-wheel A. They are supported in a suitable frame, and are so arranged that either one, but not both at the same time, can be brought into contact with the driving-wheel.

*a a′* are bearings, in which the shafts of the friction-rollers B C are located, and these bearings are so constructed and arranged that they can be moved a little toward and from the driving-wheel, for the purpose of bringing the friction-rollers alternately in contact with and away from the driving-wheel—first one, then the other. As shown, these bearings have flanges *b* at each end, one on each side, which hold them in place in the frame, while the central portion, *d*, is somewhat shorter than the distance between the two parts of the frame between which they are located.

D is a rock-shaft, supported in bearings *e*, connected with the frame. E E are arms keyed or otherwise secured to the rock-shaft, one at or near each end. *f f* are two arms or bars, the outer ends of which are, respectively, pivoted to the upper ends of the arms or bars E E. The inner ends of these bars are connected with the two upper bearings, which rest, as shown, on blocks F between the upper and lower bearings. In the upper end of each block is a groove for the arms or bars *f f*, which bars are provided with projections *g*, between which the bearings *a* are placed. *f′ f′* are two other arms or bars, the outer ends of which are pivoted to the lower ends of E E, and their inner ends are connected with the bearings *a′*, respectively. As shown, these arms *f f′* pass through slots in the front part of the frame to reach the bearings.

G is a lever, permanently secured to the rock-shaft D.

P represents the piston-rod of a steam or water cylinder, which piston-rod is connected by a pivot to the lower end of the lever G, for the purpose of operating the rock-shaft and parts connected therewith. H H′ are spur-wheels upon the shafts of the friction-rollers B C.

The shaft of C may be connected with the shaft of the driving-engine by means of a coupling, in the usual manner, and B can be driven by means of the spur-wheels.

I is a hand-lever, through which and suitable connections the lever G might be operated. We have shown this simply for illustration.

We have shown two blooming-rollers, J J′. The lower one is connected with the shaft K of the driving-wheel A by means of a coupling, L, as usual. These rollers are in bearings located in a strong frame. The upper roll, J, is driven by our improved expansion-gear R, which consists of arms *h*, standing at right angles to each other, to the outer faces of which arms and at the ends thereof are permanently secured secondary arms *i*. In practice, *h* and *i* are cast together. The expansion-gears are to be suitably secured upon the outer ends of the rollers J J′, and are so arranged relatively to each other that the arms *h* of one of the pieces engage with those of the other, like the cogs of two wheels, and the parts *i*

upon one of the gears engage with like parts on the other. The form of these gears will be best understood from the drawings.

M is the housing, in which the journal-boxes of the rollers J J′ are located. The upper portion is carried up some distance above the main part, and in circular form, as shown, forming with the base or main part a continuous piece. In the upper portion is an opening, *k*, large enough to permit the rolls and one of the expansion-gears to pass through the same. There is a slot, *l*, in the main part of the housing, in which the journal-boxes of the rolls are placed.

*m* is the rider or upper part of one of the boxes for the upper roll, J. *n* is a breaker, the lower end of which rests on *m*. N is a screw, which passes through a fixed nut, *p*, in the top of the housing. The lower end of the screw can come in contact with the breaker. The rider can be removed, permitting the easy removal of the rolls. The journal-bearings of the rolls can be held in the housing in any suitable manner.

As shown, the rider *m* and breaker *n* are made together; but in practice these two parts should be separate from each other.

In use the friction-roller B or C can be brought into contact with or withdrawn from the face of the driving-wheel A by means of the sliding journal-boxes *a a′*, bars or rods *f f′*, arms E, rock-shaft D, and lever G, the lever G being operated by the piston of a steam or water engine, or in any other suitable manner. When B is in contact with A the driving-wheel will rotate in one direction, and in the opposite direction when C is in contact with it, the motion being reversed by direct action, and in a simple and efficient manner, and, of course, at the same time reversing the movement of the rolls J J′. Any required amount of pressure can be applied to the friction-rollers.

The expansion-gear described is strong and effective, and permits the adjustment of the rolls J J′ at a considerable distance from each other without affecting their efficiency, the gear having great strength. During a portion of each revolution the roll J is driven by the action of the arms *h* of the lower part of the gear upon the arms of the other gear, and a portion of the time by the action of the parts *i* on each other.

When the rolls J J′ are in place they can be firmly held wherever located by means of the screws, and the rolls can be removed without changing or moving the housing, or any part thereof, by first raising the screws, and then removing the riders *m*. The opening *k* in the housing must be large enough to permit the rolls to be passed through them with the expansion-gear, as ordinarily the rolls must be removed at an angle, passing out between the housings, for the reason that there will not usually be room to remove them directly through the housing at either end.

The rolls can be adjusted relatively to each other in any suitable manner. Hydraulic pressure can be used in place of the screws N, the cylinders being located in the upper part of the housing.

We have described the wheel A as a driving-wheel, because the rolls J J′ are driven by this wheel, which is driven as described.

As shown, the friction-rollers B C are located at one side of the wheel A, one above and the other below the center; but we do not limit ourselves to this location. They might be above or beneath this wheel A; or one could be above and the other below, but on opposite sides, or in other convenient location, so as to be alternately brought into contact with A. When above or below they could be connected by a link or cross-head, and be operated by a piston-rod, and the rock-shaft and arms would not be required.

What we claim as new, and desire to secure by Letters Patent, is as follows:

The friction-rollers B C, supported in movable bearings *a a′*, bars or rods *f f′*, arms E, and shaft D, in combination with the wheel A, the rollers being arranged on opposite sides of the center of the wheel, substantially as and for the purposes set forth.

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