3 Sheets—Sheet 1.

D. N. JONES.

Rolling-Mill.

No. 217,537. **Patented July 15, 1879.**

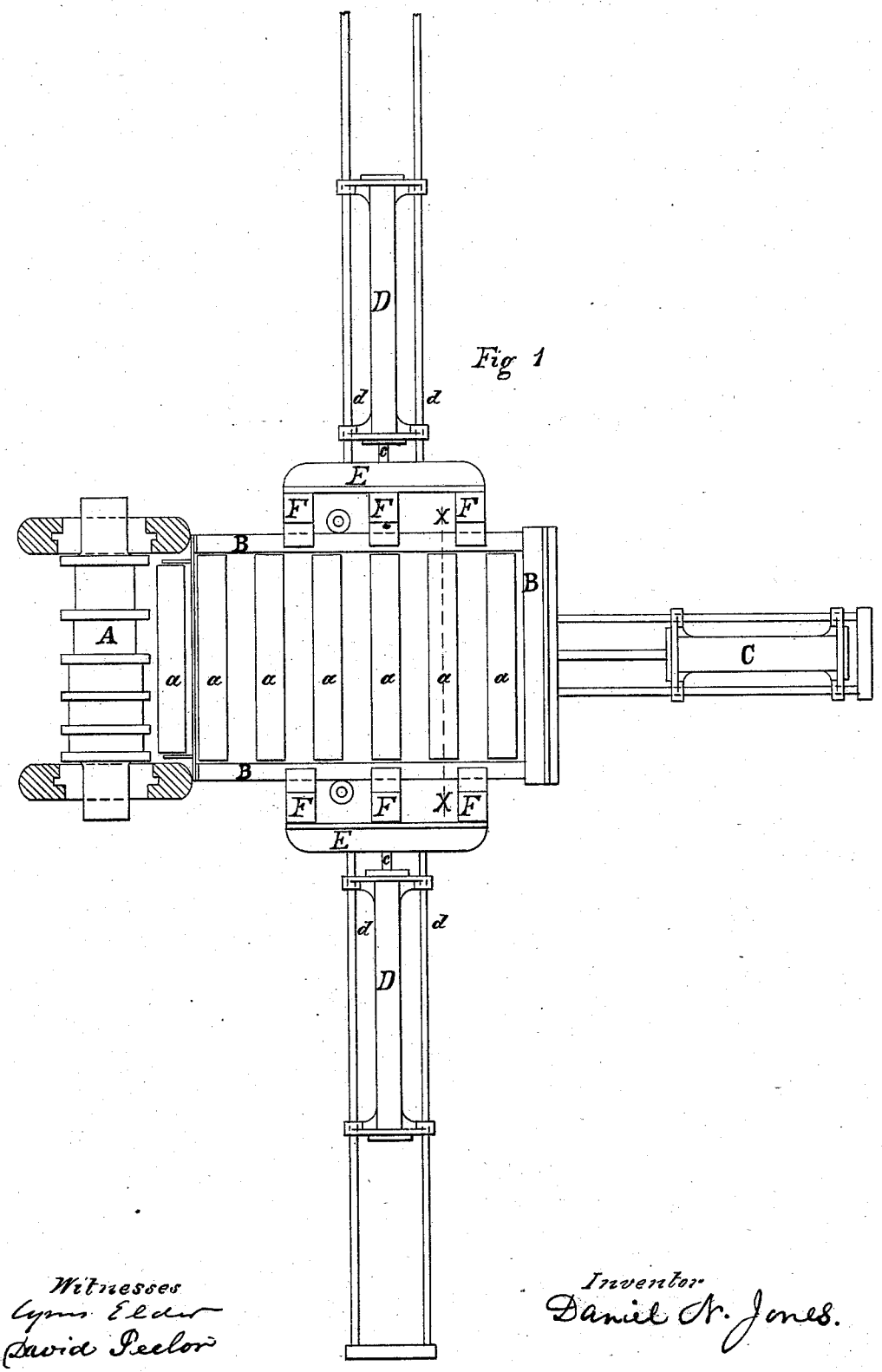


Fig 1

Witnesses
Lyman Elder
David Peelor

Inventor
Daniel N. Jones.

3 Sheets—Sheet 2.

D. N. JONES.
Rolling-Mill.

No. 217,537. Patented July 15, 1879.

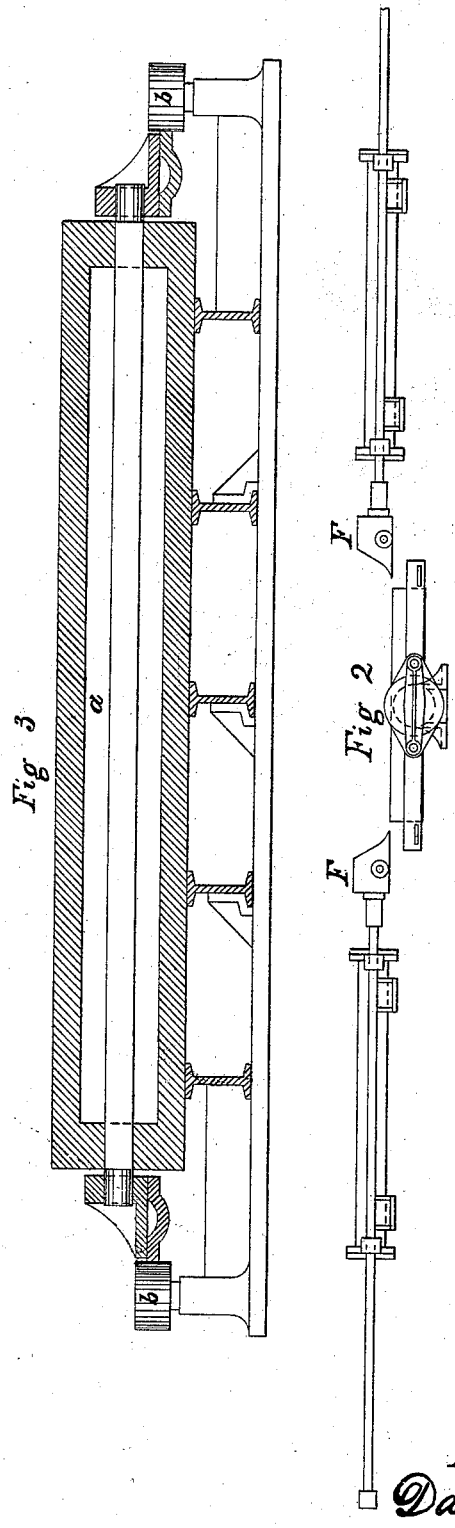


Fig 3

Fig 2

Witnesses;
Lynn Elder
David Peelor

Inventor;
Daniel N. Jones

3 Sheets—Sheet 3.

D. N. JONES.

Rolling-Mill.

No. 217,537. Patented July 15, 1879.

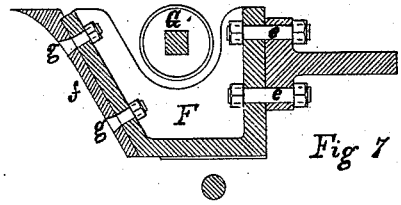


Fig 7

Fig 8

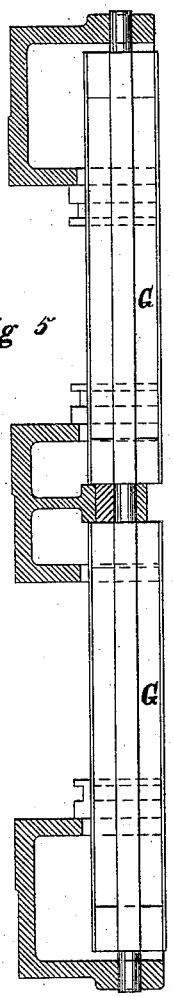


Fig 5

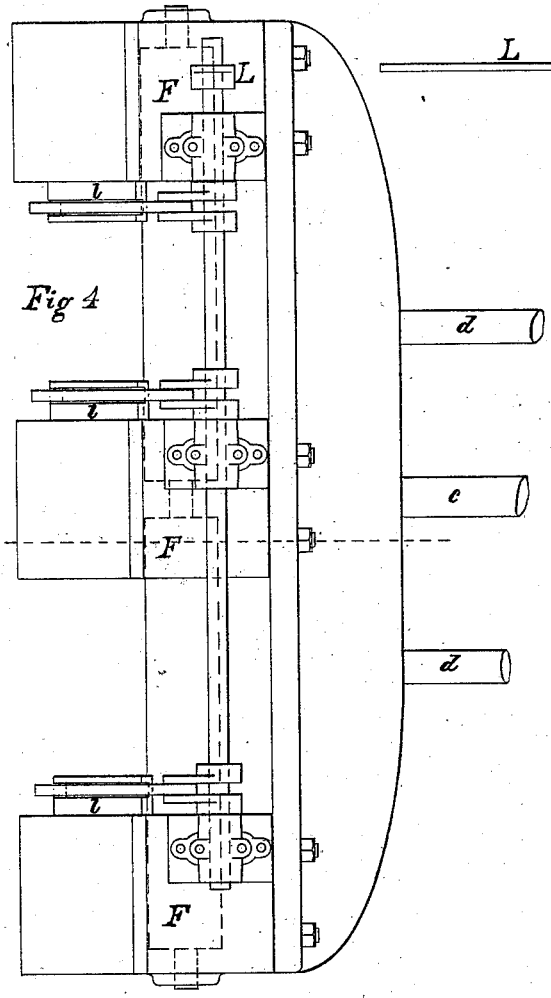
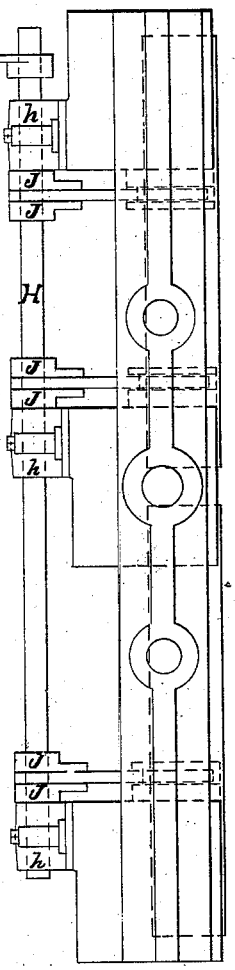


Fig 4



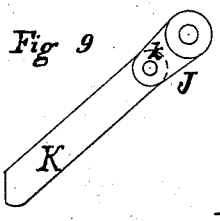


Fig 9

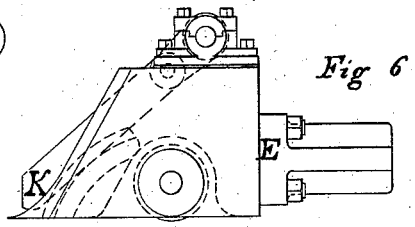


Fig 6

Witnesses;
Lyman Eeder
David Peelor

Inventor;
Daniel N. Jones.

UNITED STATES PATENT OFFICE.

DANIEL N. JONES, OF JOHNSTOWN, PENNSYLVANIA, ASSIGNOR TO HIMSELF AND CAMBRIA IRON COMPANY.

IMPROVEMENT IN ROLLING-MILLS.

Specification forming part of Letters Patent No. **217,537**, dated July 15, 1879; application filed July 24, 1878.

To all whom it may concern:

Be it known that I, DANIEL N. JONES, of Johnstown, in the county of Cambria and State of Pennsylvania, have invented certain Improvements in Rolling-Mills, of which the following is a specification.

In the reduction by rolling of heavy ingots or large masses of metal, the piece is usually fed into and taken away from the rolls by means of tables containing rollers, which have been constructed in different ways. Feed-tables have been made permanent with rollers running from the impact of the piece alone or driven by power, and such tables have been made movable horizontally, and also to elevate and lower. The difficulty of shifting and turning the piece to be rolled, so that it will present itself to the different grooves, and also present its different sides to their operation, is always considerable, and it increases with the weight and elongation of the metal. The most approved shifting and turning appliances are those which operate underneath elevating-tables used in connection with three-high rolls. The objections to this kind of a mill are that great power is required for the elevation of the piece to be rolled, and there is an immense strain upon all parts of the machinery employed.

The object of my invention is to overcome these difficulties, which I accomplish by employing feed-tables resting on a solid foundation upon a level with the passes of a two-high reversible rolling-mill, and placing on each side of one or both of these tables a shifting and turning apparatus of novel design, which operates above the feed-rollers.

In the accompanying drawings, Figure 1, Sheet 1, is a plan of a machine embodying my invention. Fig. 2, Sheet 2, is an end elevation of the same. Fig. 3, Sheet 2, is an enlarged cross-section of feed-table, showing rollers used as side guides for tables. Fig. 4, Sheet 3, is a plan showing head of shifting and turning apparatus. Fig. 5, Sheet 3, is a longitudinal section of shifting and turning apparatus, showing the rollers carrying the same, and also the guides for the turning-bars used in turning the piece. Fig. 6, Sheet 3, is an end elevation of shifting and turning apparatus, showing turning-bars with their guides and connections with cranks and shaft for operating the same, and also the cross-head of power-cylinder. Fig. 7, Sheet 3, is a cross-section of shifting and turning apparatus, showing the curved points or shoes of the same and the method of their attachment. Fig. 8, Sheet 3, is a rear elevation of the shifting and turning apparatus, showing its cylinder attachments, the shafts sustaining the turning-bars with their bearings, and the levers for operating the same. Fig. 9, Sheet 3, is a side view of the cranks affixed to the shafts, showing the turning-bars and the pin or pivot by which they are suspended to the cranks.

Referring to the above figures, A, Fig. 1, represents a pair of rolls in housings, constituting what is known as an "ordinary two-high reversible rolling-mill," constructed and operated in the usual way. B is a feed-table containing rollers *a a a a*, which deliver the piece into the rolls and receive it from the rolls, said table being operated by means of power-cylinder C and piston-rod and guide-rods attached to the feed-table in the ordinary way. These rollers rest and roll upon rails or metallic bars secured to cast-iron bed-plates bolted on solid masonry, as shown in Fig. 3. Owing to this method of construction the piece to be rolled will be advanced or withdrawn twice the distance traversed by the piston operating the table.

In the drawings I have shown a feed-table with its cylinder for operating it on one side of the mill-rolls only; but in the machine a precisely-similar apparatus must be placed in the same way on the other side of the mill-rolls. The power-cylinders should be placed sufficiently low and at such a distance from the tables as not to interfere with the rolling of long pieces. I prefer to fix them on the center-line of the tables and at a distance of about twenty-seven feet from the rolls, which will be most convenient for rolling a piece to the length of from thirty-three to thirty-five feet. At the sides of the feed-tables I have vertical guide-rollers *b b b b*, (shown in Fig. 3,)

which prevent lateral eccentricities of the tables and take the strain off the piston-rods. The feed-rollers are attached to the tables or frames by means of cap-bearings to facilitate their removal and renewal when necessary.

D D are power-cylinders placed on each side of the feed-table B, with pistons and guide-rods operating the shifting and turning apparatus, hereinafter described. The piston-rods *c c*, with guide-rods *d d d d*, are attached to the cross-heads E E, as shown in Fig. 1 and Fig. 4. In front of these cross-heads are fastened the peculiarly-shaped blocks F F by means of bolts *e e*. (Shown in Fig. 7.) The fronts of these blocks are given such shape as will serve the various purposes of shifting, turning, guiding, and lifting the piece to be rolled. I prefer to have these blocks present a curved wedge-shaped surface to the piece in such way that the points will enter below it and elevate or turn it, as may be desired. I prefer also, instead of using the face of the blocks for this service, to attach to their front the points or shoes *f f*, (shown in Fig. 7,) fastened to the blocks by the bolts *g g*, which points or shoes are made of iron or steel, and I give them such shape as may be desired, the curved wedge shape shown in the drawings being preferred.

In front of the cross-heads E E are the rollers G G, (shown in Fig. 5,) having suitable bearings on the inner faces of the blocks F F. These rollers rest upon and move transversely across the feed-rollers *a a a* in such way as to keep the blocks F F and shoes *f f* above and just clear of the feed-rollers.

On the blocks F F are bolted suitable bearings *h h*, (shown in Fig. 8,) for carrying the shafts H H, and at suitable points on these shafts I fasten the cranks J J, (shown in detail in Fig. 9,) suspended from which cranks by pins K K, on which pins they turn, are the turning-bars K K, (shown in Fig. 6,) which are so hung and adjusted that they may be dropped on one side of the feed-table, and engage the piece to be turned at its lower edge, opposing such resistance at its lower edge that the pressure of the curved shoes from the other side of the table will lift and turn the piece over.

The shafts H H, which thrust forward and withdraw the turning-bars K K as may be desired, are operated by means of the levers L L, (shown in Fig. 8,) the workman using his hands or a rod for the purpose, and they are held by any suitable stop from falling beyond a desired point.

When the levers L L are pushed inward toward the feed-table the turning-bars K K are withdrawn, so as not to prevent the piece from sliding on the curved face of the blocks or shoes.

When the levers are pulled outward they throw the turning-bars K K forward to engage the piece, instead of the curved faces of the blocks or shoes.

The guides *l l* (shown in Fig. 4) are attached to the inside of the blocks F F, and serve the purpose of keeping the turning-bars K K in place.

The power-cylinders D D, with their piston-rods, are so constructed and placed on each side of the feed-table B that the shifting and turning apparatus carried on the rollers G G directly oppose each other, and either of these shifters and turners may be thrust forward completely across the feed-table, and both may be drawn back entirely clear of the table.

I do not deem it necessary to use the shifting and turning apparatus upon both feed-tables of the train of rolls; but the apparatus may be arranged on both sides of the mill-rolls, if desired.

The operation of the above-described machinery is as follows: The piece to be rolled is placed upon the feed-rollers *a a a* in the table B on either side of the mill-rolls A. The table B is then thrust forward toward the mill-rolls A by means of the cylinder C, thus carrying the piece into the rolls, which, on passing through, is received on the other side of the mill-rolls by the corresponding feed-table B, and is carried by its rollers, and by withdrawing the table, by means of its cylinder, until it is clear of the rolls. The operation of the mill-rolls A is then reversed, and the piece is fed into the rolls by thrusting forward the feed-table on which it rests, as above described.

To shift or straighten the piece on the table, either or both of the cylinders D D may be used to give it a lateral thrust or pressure of the blocks or shoes in the direction required.

To turn the piece, the lever L, on the side toward which the turn is to be made, is pulled outward, which has the effect of dropping and throwing forward the turning-bars K K, attached to the cranks J J, the turning-bars on the other side being withdrawn. The apparatus is then advanced on both sides of the table to engage the piece, and it is rolled over on the turning-bars as often as may be desired.

For turning in the other direction the turning-bars used as above will be withdrawn, and those on the opposite side thrown forward, and the apparatus is then used as aforesaid.

By withdrawing the turning-bars on both sides of the table and using the curved faces of the blocks or shoes the piece may be lifted and held above the table, thus allowing the table to be shifted into a different position with respect to the piece to be rolled.

The above-described apparatus can be used in rolling-mills for rolling irregular shapes, such as channel and deck beams, angles, &c., wherein the grooves are turned in the rolls at an angle with the axis of the rolls, thus requiring the piece to be presented to the grooves in the rolls in a position corresponding to their angularity. In this case the turning-bars on one side of the piece may be presented, and the apparatus being advanced on both sides will take hold of and partially turn the piece, holding it loosely. The feed-table can then be

advanced, carrying the piece into the mill-rolls in a position corresponding to the angularity of the grooves in the same.

For the purpose of illustration, I have described and shown my improvements as applied to a two-high reversible rolling-mill; but I do not confine myself to such a mill.

While I have shown a shaft for the purpose of operating my turning-bars, I do not limit myself to this method, as these bars can be made to work with a hinge or cam, dispensing with the shaft.

I claim as my invention—

1. The shifting and turning apparatus described, consisting of cross-heads E E, blocks F F, shoes *f f*, rollers G G, shafts H H, cranks J J, turning-bars K K, with the levers L L and guides *l l*, constructed, arranged, and operated substantially as herein set forth.

2. The shifting apparatus described, consisting of the cross-heads E E, blocks F F, and rollers G G, constructed and operated substantially as herein set forth.

3. The blocks F F, provided with detachable shoes *f f*, in combination with the turning-bars K K, constructed and operated substantially as described, and for the purpose set forth.

4. The frame or feed-table B, provided with rollers *a a a*, and moving horizontally, as described, in combination with cross-heads E E, carrying blocks F F, and moving above and across the feed-rollers, substantially as described, and for the purpose set forth.

DANIEL N. JONES.

Witnesses:

CYRUS ELDER,

DAVID PEELOR.