

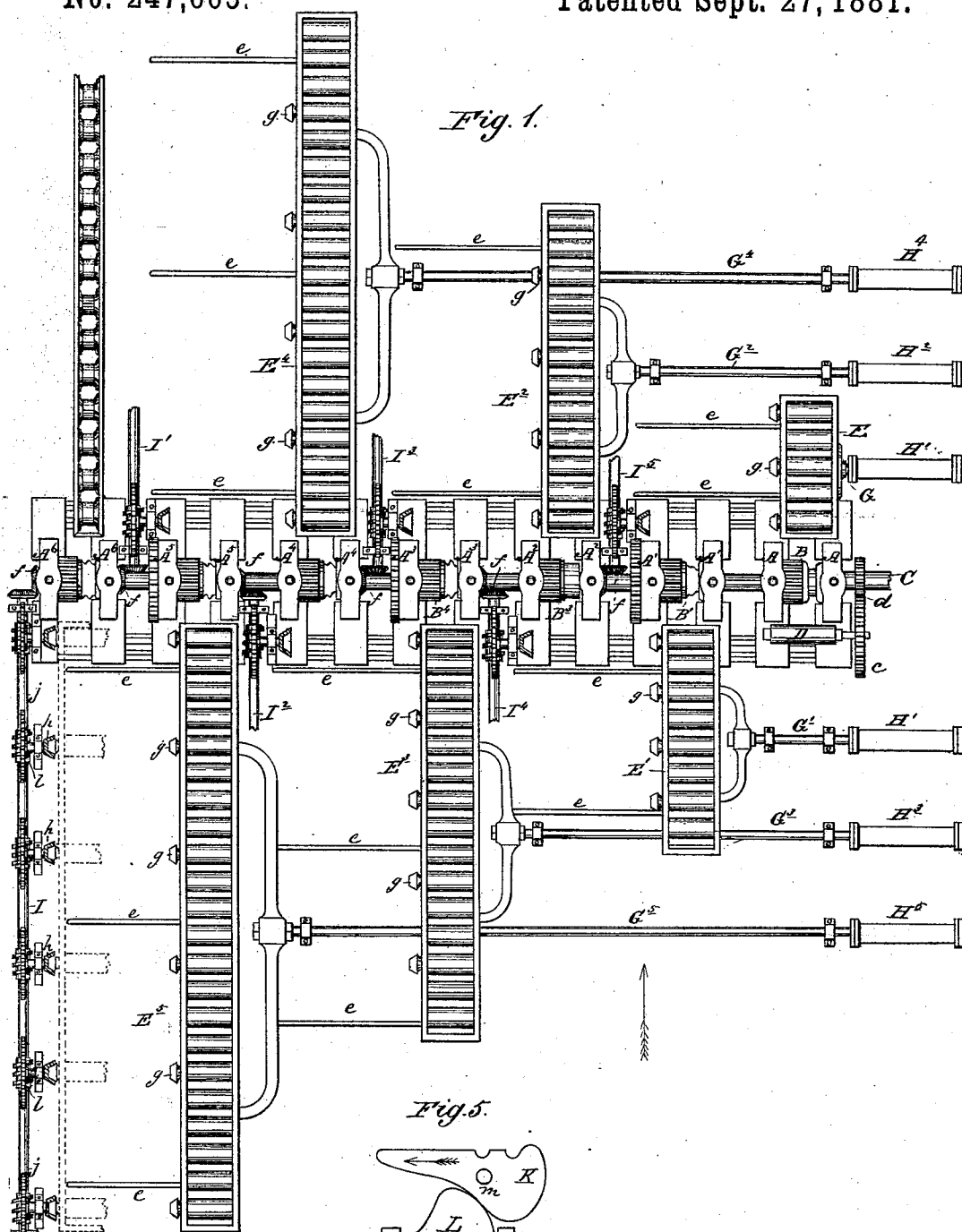
(No Model.)

2 Sheets—Sheet 1.

C. LEWIS.
ROLLING MILL.

No. 247,665.

Patented Sept. 27, 1881.



WITNESSES:

Edw. W. Byrne.
John C. Kemou

INVENTOR:

C Lewis
BY *[Signature]*
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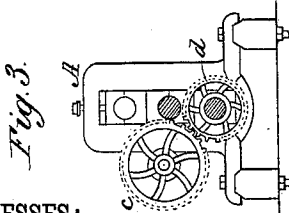
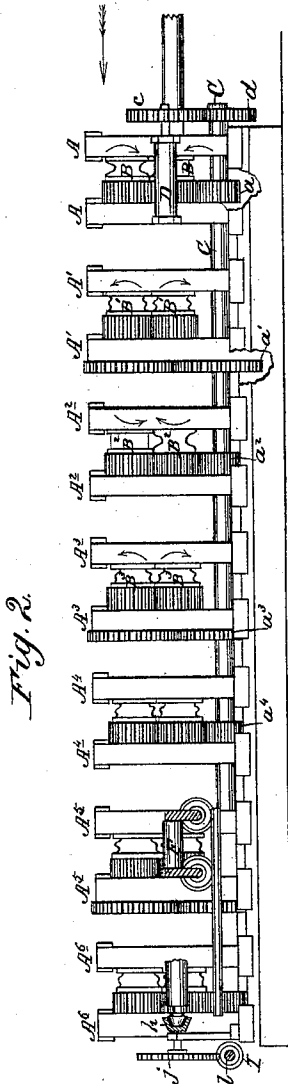
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2 Sheets—Sheet 2.

C. LEWIS.
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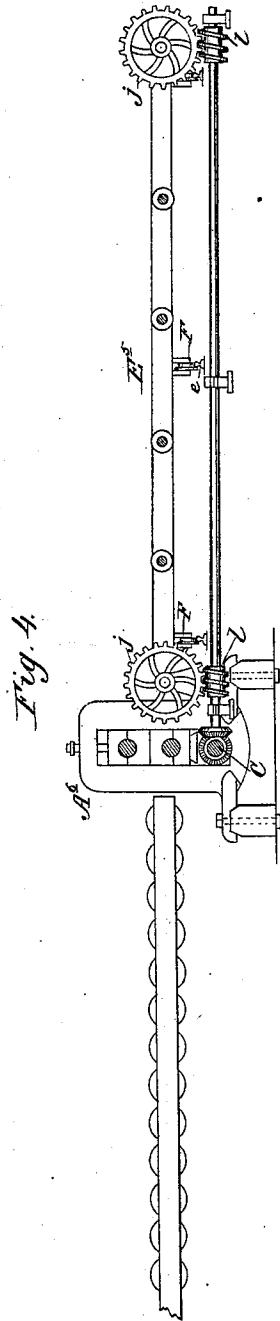
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UNITED STATES PATENT OFFICE.

CHRISTOPHER LEWIS, OF COLUMBUS, OHIO.

ROLLING-MILL.

SPECIFICATION forming part of Letters Patent No. 247,665, dated September 27, 1881.

Application filed January 12, 1881. (No model.)

To all whom it may concern:

Be it known that I, CHRISTOPHER LEWIS, of Columbus, in the county of Franklin and State of Ohio, have invented a new and Improved Continuous Rolling-Mill; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a plan view. Fig. 2 is a side elevation, looking in the direction of the arrow in Fig. 1. Fig. 3 is an end elevation, looking in the direction of the arrow in Fig. 2. Fig. 4 is an end elevation of the opposite end. Fig. 5 is a detail of a device for turning the rail.

My invention relates to an improvement in mills for rolling rails, girders, plates, &c., designed to permit more rapid working, and to reduce the manual labor ordinarily incident thereto.

My invention is an improvement in that class of rolling-mills in which several pairs of rolls have their alternate pairs arranged to be run in reversed direction to those next adjacent, and in which a laterally-adjustable carriage takes the rail and transfers it from one pair of rolls to the next, so that it is passed through one pair of rolls in one direction and is returned through the next pair of rolls in the reverse direction.

My invention contemplates the taking of a piece of steel from the furnace in the shape of a bloom and entering it between the first pair of rolls, whence it proceeds on through the machine without handling and comes out a perfect rail; and to this end my improvement consists in combining the series of rolls whose alternate pairs have a reversed movement with a set of carriages of constantly-increasing length, a set of tracks for carrying them from the line of one pair of rolls to the next, and a corresponding set of piston-rods and steam-cylinders grouped together at one side of the machine, which piston-rods connect with the carriages to shift them at the will of the engineer in charge.

The invention also consists in means for causing the ingot or unfinished rail to be fed forward to the rolls after the carriages bring them successively into line with the rolls; and also, further, in the means for turning over the article being rolled to suit the different positions

in which it may be required to be passed through the rolls.

In the drawings, A A, A' A', A² A², &c., represent the housings of several pairs of rolls, and B B, B' B', B² B² the rolls arranged in suitable bearings therein. Every other pair of these rolls has the same movement, as shown by the arrows, so that an ingot or rail fed in one direction through one pair can be returned through the next pair. For imparting this necessary movement a main drive-shaft, C, extends the full length of all the pairs of rolls, just beneath the same, and is provided with gear-wheels *a a' a² a³*, &c. Each roll is formed with a groove or pass at one end, and a pinion at the other, which passes of the two rolls of a pair form the contour which the rolls are designed to give, while the pinions mesh directly together.

The first pair of rolls are driven by the gear *a* on the main shaft meshing with the pinion of the lower roll, giving to this pair the motion indicated by the arrow, while a reverse motion is given to the next pair of rolls by the gear-wheel *a'* meshing with a gear-wheel, *b*, fixed on an extension of the shaft of the upper roll, outside the housing. The third pair of rolls and the succeeding alternate pairs have the same connection with the main shaft and the same motion as the first pair, while all the intermediate pairs have the same connection and same motion as the second pair.

On the feed side of the first pair of rolls is the feed-roller D, driven by a gear-wheel, *c*, which meshes with a gear-wheel, *d*, on the main shaft C, which roller D serves to feed the ingot into the first pair of rolls. Then alternating on opposite sides of the rolls are arranged the series of carriages B E' E² E³, &c., each succeeding carriage being made longer, to adapt it to the increased length given to the article being rolled by the successive passages between the different rolls. Each of these carriages is made laterally adjustable, so that after it receives an unfinished rail from one pair of rolls it may be moved sidewise into line with the next pair, to allow the said rail to be rolled on the return movement by the next pair of rolls. For this purpose the carriages are mounted upon trucks F, and rails *e* are provided for the same, which

rails are arranged parallel to the main shaft C. For moving these carriages on the rails I have connected them each to independent piston-rods G G' G², &c., which are provided
 5 with pistons resting in cylinders H H' H², &c., and which cylinders are suitably provided with valve-gear for admitting steam to either side to give the proper motion to the carriages. In the place of this steam-cylinder, however, I
 10 may employ drums with belts or any other well-known means for shifting the carriages.

To enable the carriages to receive the unfinished rails or other articles as they emerge from between the rolls, said carriages are formed
 15 of an inclosing-frame with transverse rollers, preferably grooved to correspond with the shape of the rail, so that the rail readily moves over and upon the carriage.

After the unfinished rail or other article is
 20 received upon one of the carriages, and is projected laterally into line with the next pair of rolls, some means are required to start the rail between the next pair of rolls. For this purpose I arrange at right angles to the main
 25 shaft C, and at the end of the forward movement of each carriage, a set of counter-shafts, I I' I², &c., which I gear to the main shaft by bevel-wheels, as at *f*. A portion of the number of the rollers forming the bed of the carriage also have their shafts extended and provided with friction-cones *g*.

Just above the counter-shafts I I', &c., and coinciding with the position of the friction-cones on the carriages, are arranged friction-cups *h*, carried by shafts, which shafts have at
 35 their other ends worm-wheels *j*, which engage with worms *l* on these counter-shafts, so that as soon as a carriage is shifted with its rail to a position where the rail is to be entered between a succeeding pair of rolls the friction-cones *g* of the carriage fit into the revolving
 40 cups *h*, and motion is imparted to the rollers of the carriage, which automatically start the rail into this next pair of rolls.

For turning the rail or girder over upon its side, as is sometimes necessary in the successive operations of rolling, I have provided a means, as shown in Fig. 5. This consists in a support, K, grooved to fit the rail and hung
 50 upon a bolt, *m*, held between two cross-bars on the carriage, so that the supporting-piece K will rest crosswise to the carriage.

L is a stationary abutment or cam, bolted down fixedly beneath the carriage in position
 55 to be struck by the bulge on the lower side of K as the carriage is shifted, so that when the carriage is shifted laterally the piece K is turned over by contact with L, and the rail or other object is also turned over. These de-

60 vices K may be arranged in sufficient numbers and at proper distances apart to co-operate with fixed abutment L, so as to efficiently accomplish the desired result.

The advantages of this construction of mill are apparent to any iron-worker in the great
 65 saving of time and manual labor, since all handling of the rails is avoided, and as soon as an ingot is passed through the first and second pairs of rolls another ingot may be started in the first pair, so that the mill can be at work
 70 on several pieces of metal at once, securing a great economy of time.

Having thus described my invention, what I claim as new is—

1. The combination, with a series of rolls
 75 the alternate pairs of which are geared for a reverse movement, of a set of tracks and laterally-adjustable carriages of different lengths, and a corresponding set of piston-rods and steam-cylinders or their equivalent, as described, grouped together upon one side of the machine for operating the carriages, substantially as and for the purpose described.

2. The combination, with a series of rolls
 85 the alternate pairs of which are geared for a reversed movement, of a set of laterally-adjustable carriages having feed-rollers and mechanism, substantially as described, to rotate said rollers contemporaneously with the adjustment of the carriages in line with the feed side of
 90 any pair of rolls, as set forth.

3. The combination, with a series of pairs of rolls whose alternate pairs revolve in opposite direction to the rest, of a set of laterally-adjustable carriages having rollers a portion of
 95 whose shafts are extended and provided with friction-cones and a corresponding set of counter-shafts arranged at right angles to and deriving motion from the main shaft, and provided with a set of friction-cups rotated by said counter-shaft, and adapted to receive the friction-cones and impart motion to the rollers of the carriages whenever the latter reach the limit of their lateral adjustment, substantially as set forth.

4. The combination, with a set of stationary
 105 abutments, L, of the laterally-adjustable carriages having tilting support K arranged transversely to the same, and provided on their under sides with a bulge or projection adapted
 110 to be struck by the said abutments when the carriage is shifted for the purpose of turning over the rail or girder, as set forth.

CHRISTOPHER LEWIS.

Witnesses:

W. A. HARRISON,
 F. F. HOFFMAN.