

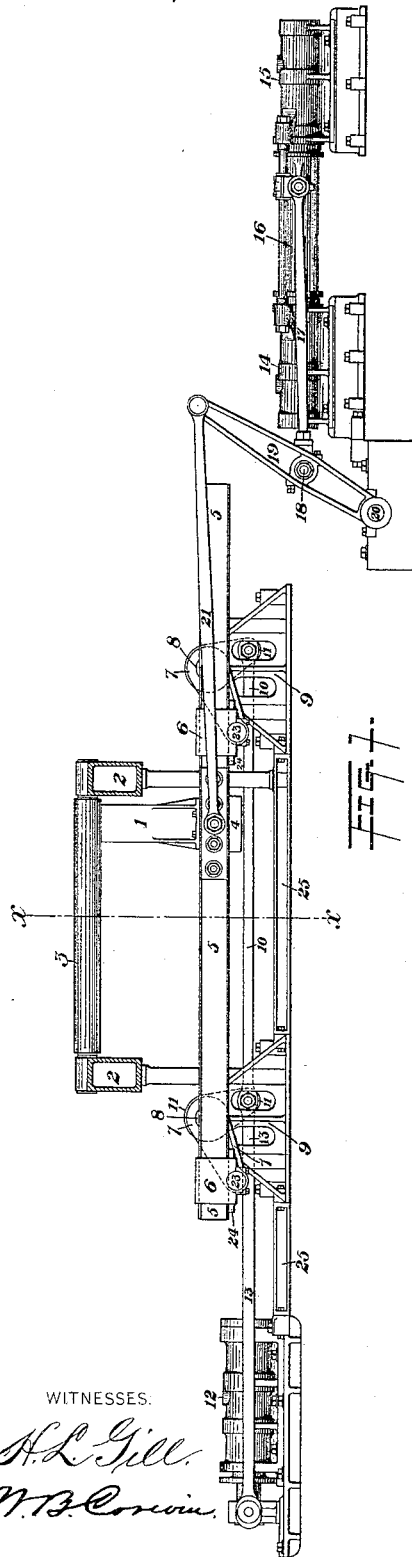
(No Model.)

2 Sheets—Sheet 1.

J. KENNEDY.  
INGOT MANIPULATOR.

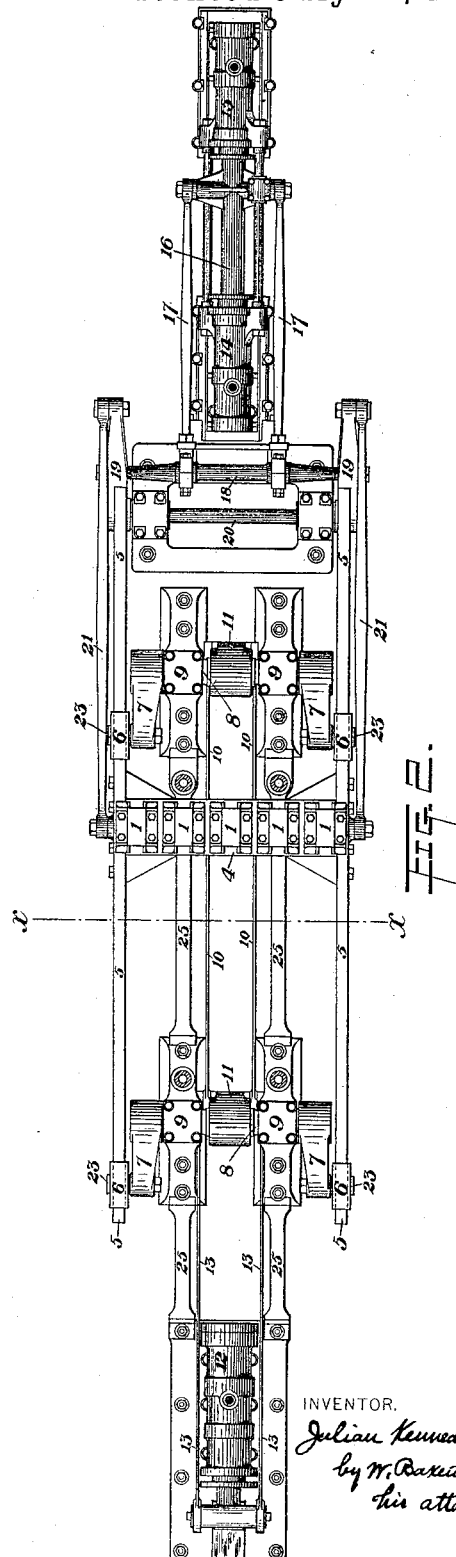
No. 386,324.

Patented July 17, 1888.



WITNESSES:

*H. L. Gill.*  
*W. B. Conner.*



INVENTOR.

*Julian Kennedy.*  
*by W. Russell & Sons*  
*his attorneys.*

(No Model.)

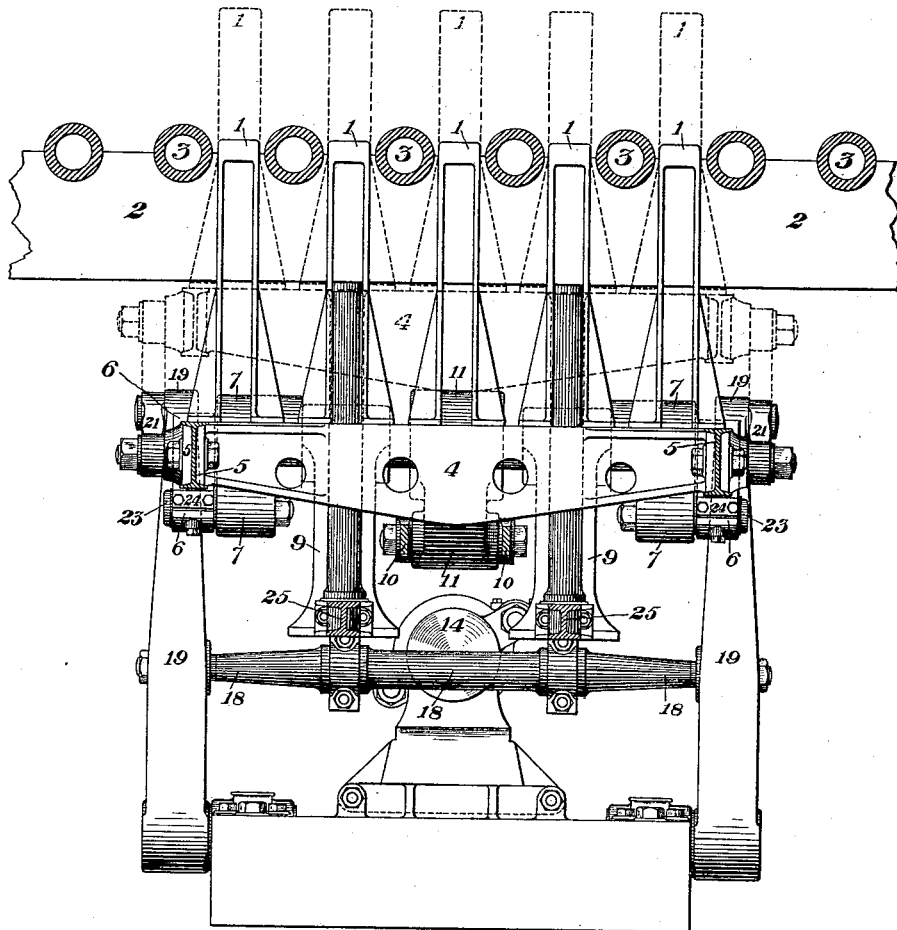
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FIG. 3.



WITNESSES.

*H. L. Gill*  
*W. A. Corwin*

INVENTOR.

*Julian Kennedy*  
*by W. Russell & Sons*  
*his Attorneys*

# UNITED STATES PATENT OFFICE.

JULIAN KENNEDY, OF PITTSBURG, PENNSYLVANIA.

## INGOT-MANIPULATOR.

SPECIFICATION forming part of Letters Patent No. 386,324, dated July 17, 1888.

Application filed May 2, 1888. Serial No. 272,549. (No model.)

*To all whom it may concern:*

Be it known that I, JULIAN KENNEDY, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Ingot-Manipulators; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to an improvement in ingot-manipulators for use in shifting ingots laterally on the feed-tables of rolling-mills; and it consists in certain novel constructions and arrangements of the parts whereby the manipulator is simplified in construction and its efficiency is increased.

In the accompanying drawings, Figure 1 is a side elevation of the manipulator and its operative mechanism, showing the feed-table in vertical cross-section. Fig. 2 is a plan view thereof without the feed-table. Fig. 3 is a vertical section on the line *xx* of Fig. 1, showing the feed-table in longitudinal section and the manipulator-frame in cross-section.

Like symbols of reference indicate like parts in each.

In the drawings, 2 represents the frame of the feed-table of a rolling-mill, which feed-table is of the usual construction, being provided with a series of driven feed-rollers, 3, arranged on lines parallel with the rolls.

The ingot-manipulator consists of a number of upright bars, 1, the upper ends of which are arranged between the rolls of the feed-table, while the lower ends, being flanged, are bolted to a cross supporting bar or box, 4, the ends of which are bolted to two parallel side bars, 5, which together constitute the frame or carriage of the manipulator. For purposes of strength and convenience in construction, I prefer to use I-beams to form these side bars and to make the bar 4 of a hollow casting, the shape of which in side view is shown in Fig. 3. The side bars, 5, fit within hollow boxes 6, within which they are mounted, so as to be movable longitudinally, and there are preferably four of these boxes, two for each of the side bars. The boxes are supported on the ends of crank-arms 7, being pivoted thereto by pins 23, which allow the boxes to adjust themselves to the position of the cranks and to remain always in horizontal positions. Inside the boxes beneath the I-beams are shoes 24, of

brass or other anti-friction metal, which serve as the slide-bearings on which the I-beams move, and which can be easily renewed when worn out. The crank-arms 7 project radially from crank-shafts 8, which are journaled in pedestals 9. These shafts are connected with each other by rods 10, which at their ends are pivotally attached to arms 11, projecting from the shafts and quartering with the crank-arms 7. The crank-shafts are rotated by means of a hydraulic cylinder, 12, the piston of which is connected by rods 13 to the crank-arms 11 of the shaft nearest the cylinder. It is obvious that when the parts are thus constructed the longitudinal motion of the piston of the hydraulic cylinder will turn the crank-shafts and will correspondingly actuate the crank-arms 7, so as to move the boxes 6 and their contained side bars, 5, up or down accordingly as the hydraulic piston is moved in one direction or the other. This motion of the side bars, 5, imparts to the uprights 1, forming the ingot-manipulators, the necessary vertical motion between the rollers of the feed-table.

The horizontal motion of the manipulators between the feed-rollers and parallel therewith is imparted by means of the following mechanism:

14 and 15 are hydraulic cylinders, which are provided with a plunger, 16, common to both, and having a cross-head, which is joined by connecting-rods 17 with a spool or cross-bar, 18, which connects two levers, 19. These levers are keyed at their lower ends to a common shaft, 20, which connects them and causes them to act together and preserves the parallelism of the sides of the frame of the manipulators during their operation. At their upper ends the levers are pivotally connected by rods 21 with the side bars, 5, of the ingot-manipulator frame. The mechanical details of the arrangement and connection of these parts are clearly shown in the drawings. As the plunger 16 is moved longitudinally in either one direction or the other, it will rock the levers 19 on their pivots, and thereby, through the connecting-rods 21, will move the side bars, 5, longitudinally within the hollow guide-boxes, and by reason of the loose or pivotal connection of the connecting-rods with the lever and with the side bars this longitudinal motion of

the latter will be effected, no matter to what elevation the side bars be lifted by the action of the hydraulic cylinder 12. In order to brace the apparatus and to resist the pull of the hydraulic cylinder 12, I interpose struts or distance-pieces 25 between the base of the hydraulic cylinder and the adjacent pedestal 9 and between the two pedestals 9, and bolt them at the ends to these parts.

From the foregoing description the operation of the manipulator will be easily understood. The vertical motions of the uprights to raise them above or to carry them below the level of the feed-table are caused by the hydraulic cylinder 12, and their side motions are caused by the other hydraulic cylinders, 14 and 15. By these motions the ingot may be tipped on the table or shifted thereon from one side to the other in the usual way. It will be noticed that in the operation of the manipulator the whole frame, composed of the side bars, 5, and the cross-bar 4, supporting the uprights 1, moves in accordance with the action of the hydraulic cylinders. I believe that I am the first to thus mount the manipulator-arms on a frame, the frame and the arms being movable together both vertically and horizontally by means of power-engines which are stationary, in the sense that they are not mounted on and do not move with the frame. Heretofore in manipulators of this class a stationary engine has been used to move the frame carrying the manipulator-arms horizontally, and a second engine mounted on the frame and movable therewith has been used to move the arms vertically. I use the words "horizontally" and "vertically," not in a mathematical sense, but simply to designate the rising and falling motions and the lateral motions of the manipulator.

The advantages of my improvement will be apparent to those skilled in the art, the apparatus being less cumbersome, more easily constructed, and otherwise more efficient than others heretofore known or used. It is susceptible of many modifications without involving a departure from the principles of the invention. For example, the mechanical connection of the hydraulic cylinders with the side bars, 5, may be varied by making the connection directly between these parts instead of through the levers which I have shown. Instead of the hydraulic cylinders, pneumatic cylinders,

or other suitable power-engines, may be substituted.

I claim—

1. An improvement in manipulators for rolling-mill feed-tables, which consists in a frame having the manipulator-arms mounted thereon, and stationary power-engines connected by intervening mechanism with the frame and operating to move it, together with the manipulator-arms, vertically and horizontally, substantially as and for the purposes described.

2. An improvement in manipulators for rolling-mill feed-tables, which consists in the combination, with a frame having the manipulator-arms mounted thereon, of vertically-movable boxes or supports by which the frame is supported and on which it is movable horizontally, and power-engines by which the boxes or supports are moved vertically and the frame is moved horizontally thereon, substantially as and for the purpose described.

3. An improvement in manipulators for rolling-mill feed-tables, which consists in the combination of a frame carrying manipulator-arms, and cranks which support the frame and which impart to it its vertical motions, said frame being horizontally movable on the cranks, and a power-engine which is connected with the frame and moves it horizontally, substantially as and for the purpose described.

4. In manipulators for rolling-mill feed-tables, the combination, with a horizontally-movable frame on which the manipulator-arms are carried, of a power-engine which moves said frame, and levers keyed to a common shaft and interposed in the connection between the engine and the frame, substantially as and for the purpose described.

5. In manipulators for rolling-mill feed-tables, the combination of a frame carrying manipulator-arms, cranks whereby the frame is moved vertically, and boxes or supports in which the frame is carried, said boxes or supports being pivotally connected with the cranks, substantially as and for the purpose described.

In testimony whereof I have hereunto set my hand this 19th day of April, A. D. 1888.

JULIAN KENNEDY.

Witnesses:

THOMAS W. BAKEWELL,  
W. B. CORWIN.