(No Model.) 4 Sheets—Sheet 1.

H. AIKEN.

MILL APPLIANCE.

No. 449,724. Patented Apr. 7, 1891.

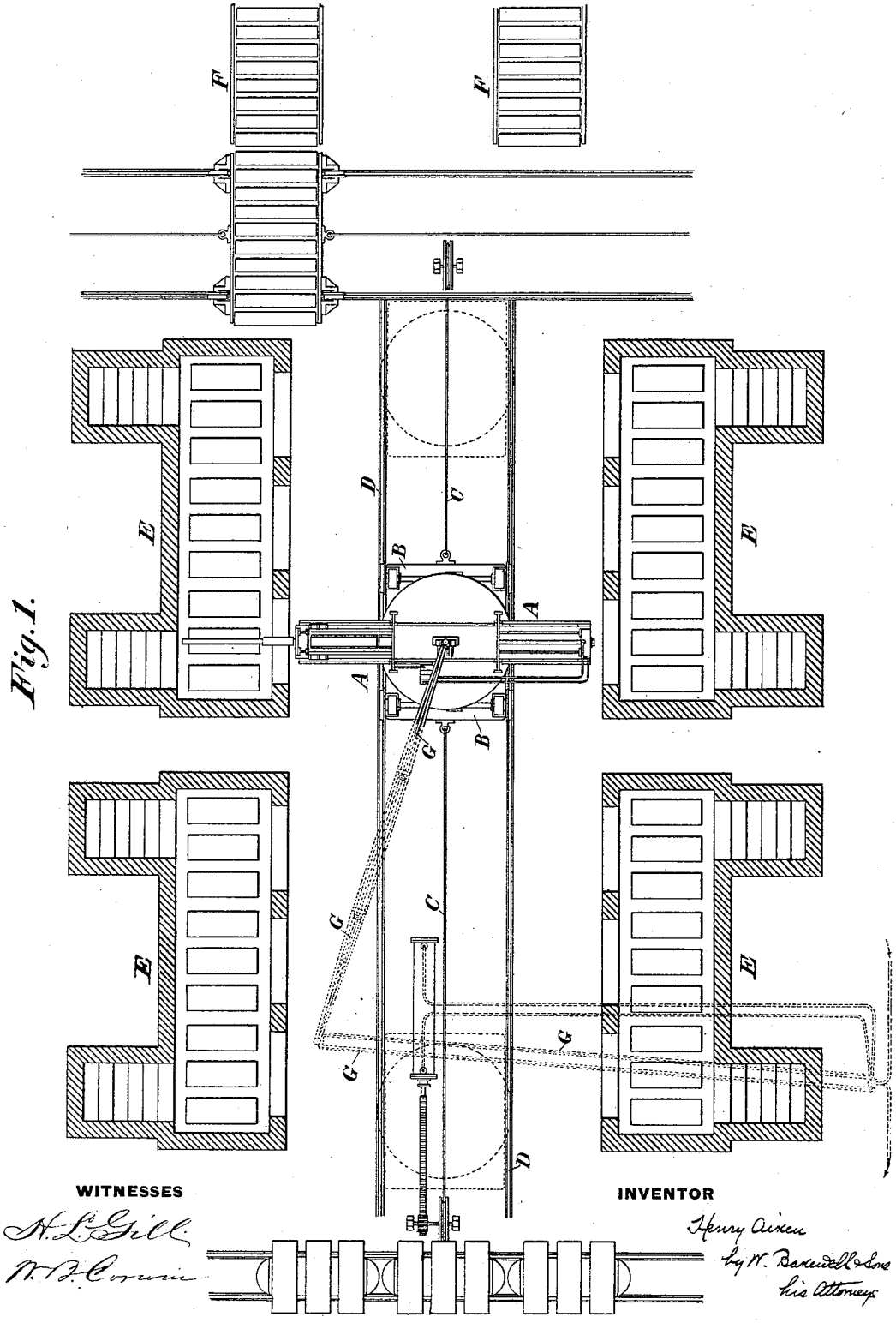


Fig. 1.

WITNESSES

H. L. Gill

W. B. Cousin

INVENTOR

Henry Aiken

by W. Bakewell & Sons

his Attorneys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 4 Sheets—Sheet 2.

H. AIKEN.

MILL APPLIANCE.

No. 449,724. Patented Apr. 7, 1891.

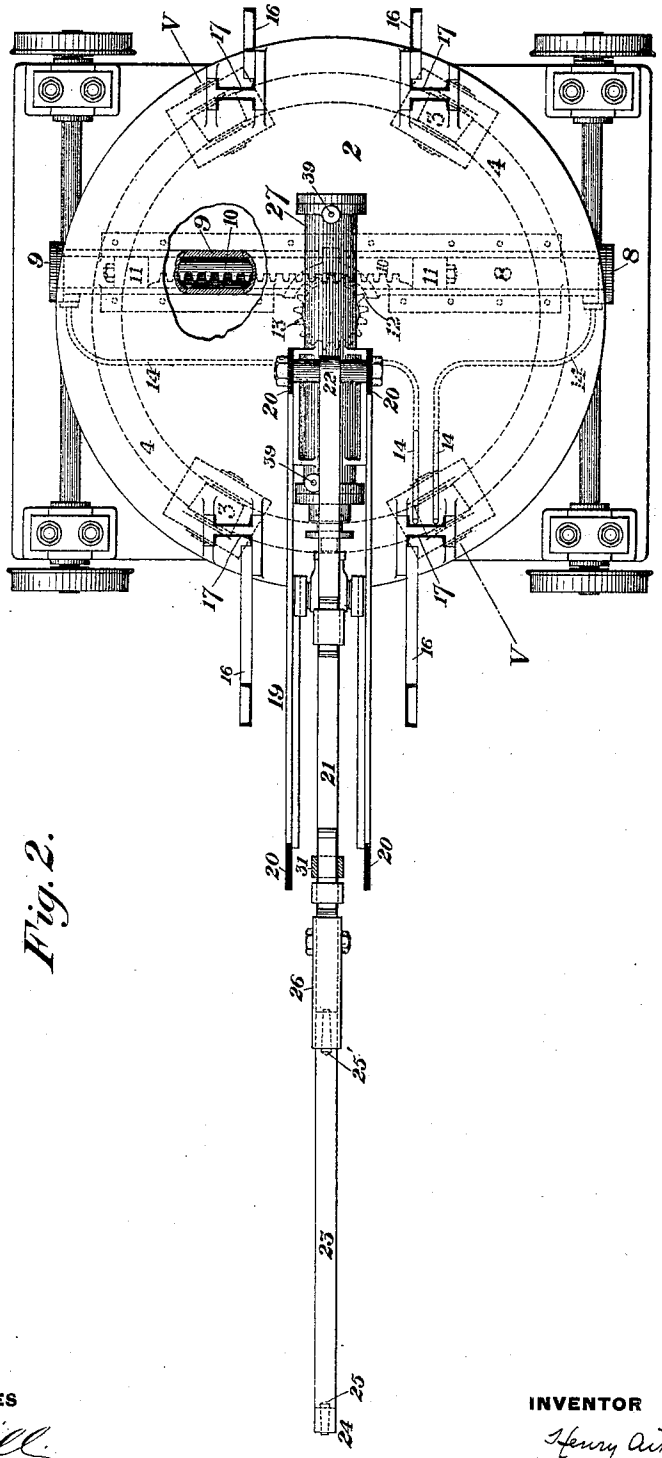


Fig. 2.

WITNESSES

H. L. Gill

W. B. Connin

INVENTOR

Henry Aiken

by W. Baxendell & Sons

his Attorneys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.)

4 Sheets—Sheet 3.

H. AIKEN.

MILL APPLIANCE.

No. 449,724. Patented Apr. 7, 1891.

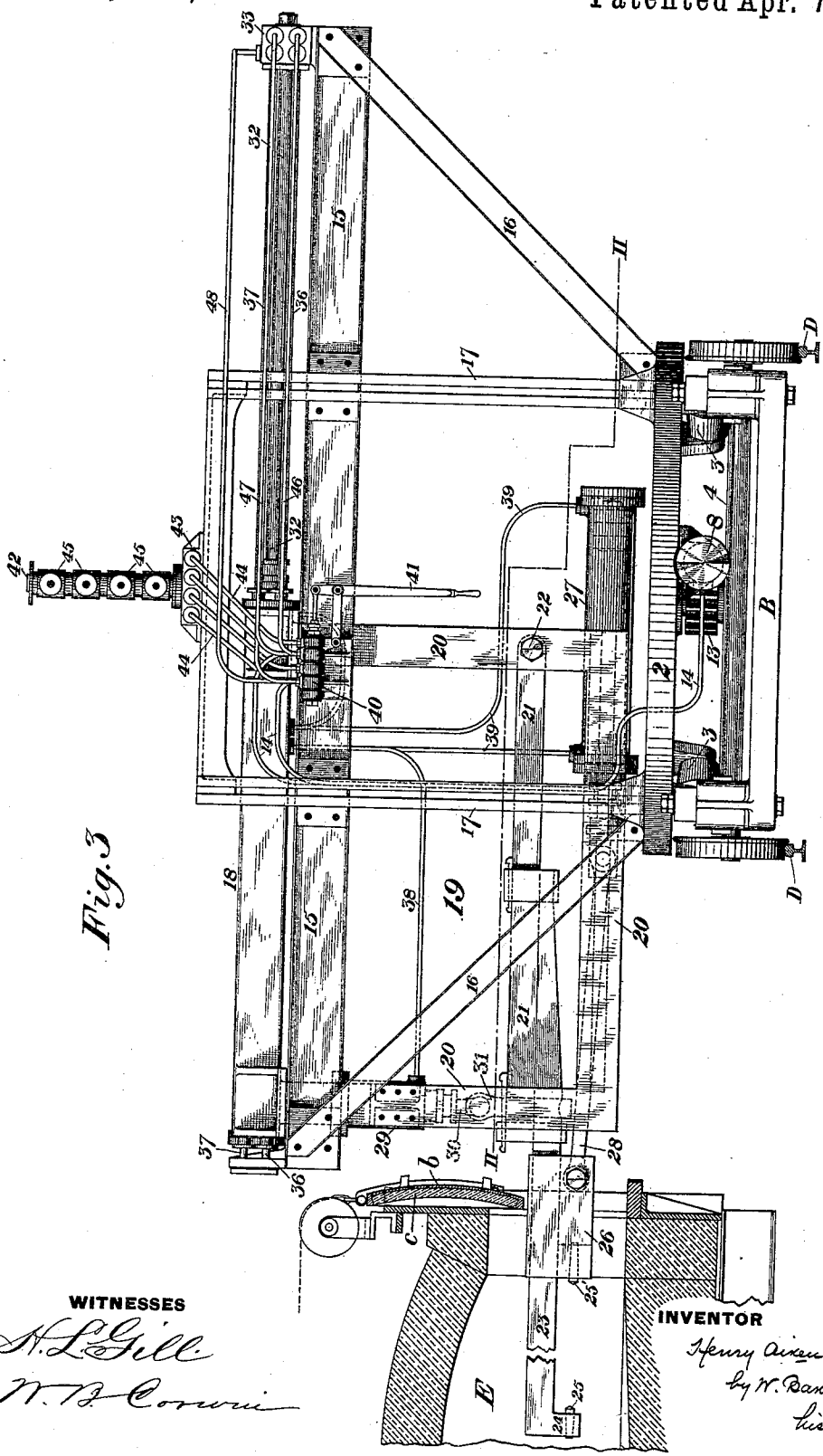


Fig. 3

WITNESSES

H. L. Gill

N. B. Conwell

INVENTOR

Henry Aiken

by W. Baxewell & Sons

his Attorneys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.)

4 Sheets—Sheet 4.

H. AIKEN.

MILL APPLIANCE.

No. 449,724. Patented Apr. 7, 1891.

Fig. 4.

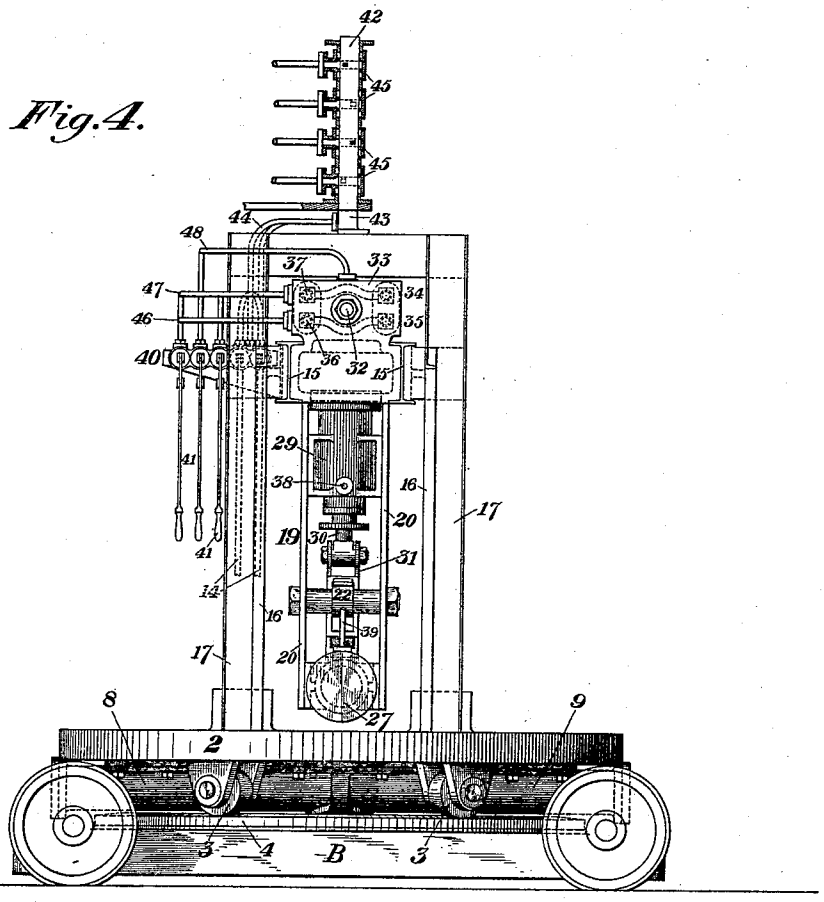
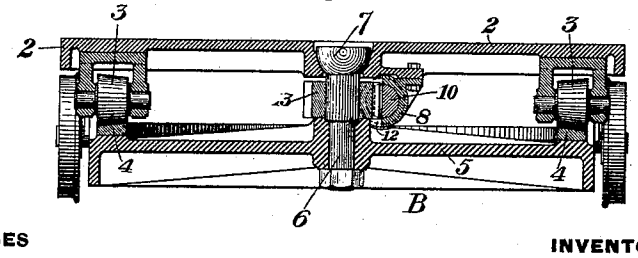


Fig. 5.



WITNESSES

H. L. Gill.

W. B. Connor.

INVENTOR

Henry Aiken

by W. Baxendell & Sons

his Attorneys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

HENRY AIKEN, OF PITTSBURG, PENNSYLVANIA.

MILL APPLIANCE.

SPECIFICATION forming part of Letters Patent No. 449,724, dated April 7, 1891.

Application filed September 1, 1890. Serial No. 363,652. (No model.)

To all whom it may concern:

Be it known that I, HENRY AIKEN, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Mill Appliances, 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 plan view showing my improved charging apparatus in a mill-plant. Fig. 2 is a plan view on a larger scale of the charging apparatus alone. This figure is shown partly in horizontal section on the line II II of Fig. 1. Fig. 3 is a side elevation of the charging apparatus. Fig. 4 is a rear end view thereof. Fig. 5 is a vertical section of the truck on the line V V of Fig. 2.

Like symbols of reference indicate like parts in each.

In Fig. 1, A represents the metal charging and conveying apparatus, mounted on a truck B, which is provided with a cable C or similar device, by which it can be moved on a track D. The apparatus is rotary on its truck and has a projecting jib having suitable grippers adapted to be projected into a furnace to deposit or remove a metal piece.

E E are lines of heating-furnaces at the sides of the track, and F F are feed-tables of rolling-mills.

The charging device may be moved along its track opposite to any of the furnaces, its jib projected into the furnace-door to insert or remove a metal piece, and it may be moved on its track to the proper feed-table and rotated so as to carry the piece above the table for the purpose of depositing it thereon. The water for operating the various parts of the charging device by hydraulic power may be delivered and discharged by horizontal pipes G, having a pivotal connection at both ends and jointed at a middle point, as shown in Fig. 1, so that the water-connection shall be maintained in every position of the apparatus on its track.

The charging-openings of the heating-furnaces are provided with upright doors constructed as shown in Fig. 3—*i. e.*, with a four-sided metal frame *b*, which is outwardly bowed transversely or vertically or in both of said directions, and a refractory brick lining *c*, built in said frame. Heretofore such furnace-doors have been made of flat shape and when first exposed to the heat of the furnace the consequent greater expansion of the bricks at the inner edges than at the remote outer edges has caused the brick lining to bow itself inwardly, thus rendering the bricks liable to drop from the frame. With my improved door this cannot occur, because the initial heat, acting on the inner edges of the brick, merely causes the lining to straighten out into a flat position. The advantages in this regard will be appreciated by those skilled in the art.

I shall now proceed to describe, particularly, the construction and operation of the charging apparatus, referring to the figures on sheets 2, 3, and 4 of the drawings. The rotatory platform 2, by which the apparatus is supported on the truck B, is provided with wheels or rollers 3, set on a circular track 4, which is supported by a rigid base portion 5 of the truck-frame. (See Fig. 5.) At the center of the platform is a vertical bolt or pivot 6, fixed to the truck and preferably made with a spherical or partly-spherical head 7, fitting in a corresponding socket at the platform, so that it shall not only serve as the king-bolt or pivot for the platform, but shall permit to the latter without binding some relative lateral movement which may be occasioned by the inaccuracies of the track D, &c. The wheels 3 are preferably conical in shape and the circular track correspondingly beveled, so that they may rotate naturally in the arc of the track. The mechanism for rotating the platform is shown most clearly in Figs. 2, 3, and 5.

8 9 are two single-acting hydraulic cylinders, which are fixed to the platform 2, and are set with their open ends abutting each other and secured together, although so far as the essential features of my invention are concerned it is not necessary that they should so abut.

10 is a double plunger or bar, which is set longitudinally within the cylinders and has at its ends heads 11, which are suitably packed and are adapted to serve as pistons to the respective cylinders. One side of the bar is made on a circular arc in cross-sectional outline, so as to fit snugly against the walls of

the cylinders, and the opposite side is formed with teeth constituting a rack, which is partly exposed by a lateral opening 12, formed at the middle of the conjoined cylinders. A pinion 13 is fixed to the bolt 6 opposite to the opening 12, so that its cogs shall mesh with the teeth of the toothed plunger-rack 10. Each of the cylinders 8 and 9 is provided with a pipe 14, through which water under pressure may be admitted to and exhausted from its outer end, so that by proper manipulation of the controlling-valves the rack-bar may be caused to move lengthwise in the cylinders. In such motion, as the teeth of the rack are in gear with the pinion 13, and the latter is fixed from rotation, there is produced a radial motion of the cylinders and rack-bars around the pinion with a resultant revolution around its axis of the platform to which the cylinders are fixed. In the action of this part of the apparatus the toothed plunger is backed and braced securely by the cylinders with which its rear side is in contact. The use of this toothed plunger is of great advantage. It constitutes a very strong compact device, it is cheap in construction, and materially shortens the required cylinder-stroke. It may be applied to use not only in connection with apparatus of the sort shown in the drawings, but in other mill mechanism—such as the adjusting-screws of rolls—for the purpose of rotating crane-masts, &c. I therefore desire to claim it, broadly, and do not intend to exclude a construction in which, instead of fixing the pinion and permitting the plunger to travel around it, the pinion shall be fixed to the rotatory platform and the cylinders fixed to the truck-frame.

On the platform 2 is a frame comprising horizontal beams 15, having upholding struts and uprights 16 and 17. The beams 15 constitute the jib or track from which the carriage for the gripping mechanism is suspended, so as to be capable of longitudinal motion. This carriage, the gripping mechanism, and their operative apparatus may be varied in many ways within the scope of my invention as stated in the claims; but I have illustrated in the drawings devices which in many respects are the same as described in a prior patent, No. 412,851, granted to Julian Kennedy and myself on October 15, 1889.

18 is the racking-cylinder, constructed as described in said patent and arranged with slides, so as to be capable of longitudinal motion on the jib 15, which motion is effected as hereinafter described. The carriage 19 is composed of rectangular iron frames 20, suspended from opposite sides of the racking-cylinder and fastened together by the various parts and structures which are placed between and supported by them.

21 is the gripper-carrying bar, which extends longitudinally of the carriage, to which it is pivoted at its rear end 22. The grippers may be of any suitable construction. I show, as in the said patent, grippers consisting of a horizontal bar 23, which projects from the bar 21 and at its extreme end has a downward lip or extension 24, with an inwardly-projecting spur 25. A slide 26 is set on the bar 23, and is movable toward the lip 24, so as to serve as the other member of the gripping mechanism. It may also have a spur 25′. The slide 26 is operated by a horizontal cylinder 27, mounted on the carriage, the piston of which is connected with the slide by a pitman 28. As above stated, the rear end of the bar 21 is pivoted to the carriage, and a vertical movement or oscillation on its pivot is imparted to it to enable it to pick up and deposit an ingot or other burden by means of a vertical cylinder 29, mounted between the side frames of the carriage, the piston-rod 30 of which cylinder is connected by a yoke 31 with said bar, said yoke reciprocating vertically, and thereby raising and lowering the outer or gripping end of the bar.

The racking-cylinder 18 is provided with a stationary plunger 32, supported horizontally on the jib by a rigid box or casting 33, which also supports the main supply and waste pipes of said cylinder, and the cylinder is moved longitudinally by the admission of water into the chambers at the outer ends of the head of said plunger.

Pipes 34, 35, 36, and 37, four in number, lead through longitudinal chambers in the wall of the cylinder, and, as described and shown in Patent No. 412,851, they have openings communicating with the respective chambers for the supply and exhaust of water. One of the chambers communicates with the cylinder at the rear end, while the other three are provided with pipes 38 39, leading to the cylinders 27 and 29 for the supply of water thereto. Water is supplied to the front end of the cylinder 18 through the plunger 32, which is made hollow and is connected through the casting 33 with the valve 40 by means of a pipe 48.

40 is a hydraulic valve for controlling the water-supply to the various cylinders of the apparatus, which valve may be constructed in the manner described in said prior patent, so that by manipulation of the valve-levers 41 any of the cylinders may be operated. Water is delivered to the apparatus through an upright pipe 42, having four channels and communicating with passages in a casting 43, which is upheld by the frame of the apparatus, and pipes 44 lead from the respective chambers of this casting to the valve 40. Water is delivered to the passages of the pipe 42 by suitable collars 45, to which the water-supply pipes are connected in the manner described and claimed in a prior patent application, No. 336,789, filed by me on January 13, 1890. From the valve 40, pipes 46, 47, and 48 lead to the casting 33, the pipes 14 lead to the cylinders 8 and 9, and from the water-channels of the cylinder 18 the pipes 38 and 39 lead to the cylinders 29 and 27.

The operation is as follows: The operator,

who rides upon the platform 2, is able to control the apparatus in whatever position it may be. The truck is moved along the track D into position opposite to the furnace from which an ingot or piece of metal is to be removed, and then by operation of the cylinder 18 the grippers may be inserted through the door-opening of the furnace, and by exhausting the water from the cylinder 29 the grippers may be caused to descend and to fit over the ingot to be lifted. Then by projecting the plunger of the cylinder 27 the slide 26 may be advanced to engage the metal piece in conjunction with the projection 24, and by elevating the plunger of the cylinder 29 the metal may be raised from the hearth of the furnace, and by reverse operation of the cylinder 18 the frame carrying the grippers and metal may be withdrawn. The truck may then be moved along its track to the rolling-mill feed-tables, and by operation of the cylinders 8 and 9 the platform 2 may be turned, so as to bring the metal piece above the table, on which it may be lowered by moving down the plunger of the cylinder 29 and opening the grippers. The operation of placing the metal piece in the furnace is the reverse of that just described, and the facility with which the platform of the apparatus may be turned enables it to be used in connection with a long range of furnaces on both sides of the track.

The advantages in respect of saving of labor and machinery in the operation of a mill will be appreciated by those skilled in the art.

Many modifications in the form and construction of the various parts of the apparatus will suggest themselves, and such I intend to cover by the following claims.

In the claims I use the word "rotatory" in connection with the platform, not as limiting the invention to a device in which the platform is capable of complete rotation, since in some cases it may not be necessary that it should have more than a partial rotation.

I claim as my invention—

1. In furnace-charging apparatus, the combination of a longitudinally-movable truck having a rotatory frame or platform, a metal-carrier, such as grippers, mounted thereon, mechanism for rotating the frame or platform, and mechanism adapted to operate the metal-carrier, substantially as and for the purposes described.

2. In furnace-charging apparatus, the combination of a longitudinally-movable truck having a rotatory frame or platform, a pinion, and a power-cylinder carried by the truck and having a toothed plunger in gear with the pinion for turning the platform, substantially as and for the purposes described.

3. In furnace-charging apparatus, the combination of a longitudinally-movable truck having a rotatory frame or platform, a pinion secured to the truck, and a cylinder and rack secured to the platform and in gear with the pinion for the purpose of turning the platform, substantially as and for the purposes described.

4. As a mill appliance, the double hydraulic-power cylinder having pistons therein, an intermediate toothed bar connecting the pistons, and fluid-supply pipes supplying motive fluid to actuate the pistons, substantially as and for the purposes described.

5. In furnace-charging apparatus, the combination of a truck having a rotatory frame or platform, a pinion, a double hydraulic cylinder having pistons therein, and a toothed bar connecting the pistons and in gear with the pinion, substantially as and for the purposes described.

6. As a mill appliance, the double hydraulic-power cylinder having pistons therein, a toothed bar connecting the pistons and bearing at the rear side against the cylinders, and fluid-supply pipes supplying motive fluid to actuate the pistons, substantially as and for the purposes described.

7. As a mill appliance, the double hydraulic-power cylinder having pistons therein, a toothed bar connecting the pistons, fluid-supply pipes supplying motive fluid to actuate the pistons, said cylinder having an opening at the middle to expose the toothed bar, and a pinion in gear therewith, substantially as and for the purposes described.

8. In a mill appliance, the combination of a traveling truck having a rotatory frame or platform, a hydraulic cylinder for rotating the latter, and a movable water-connection to said cylinder, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 27th day of August, A. D. 1890.

HENRY AIKEN.

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