

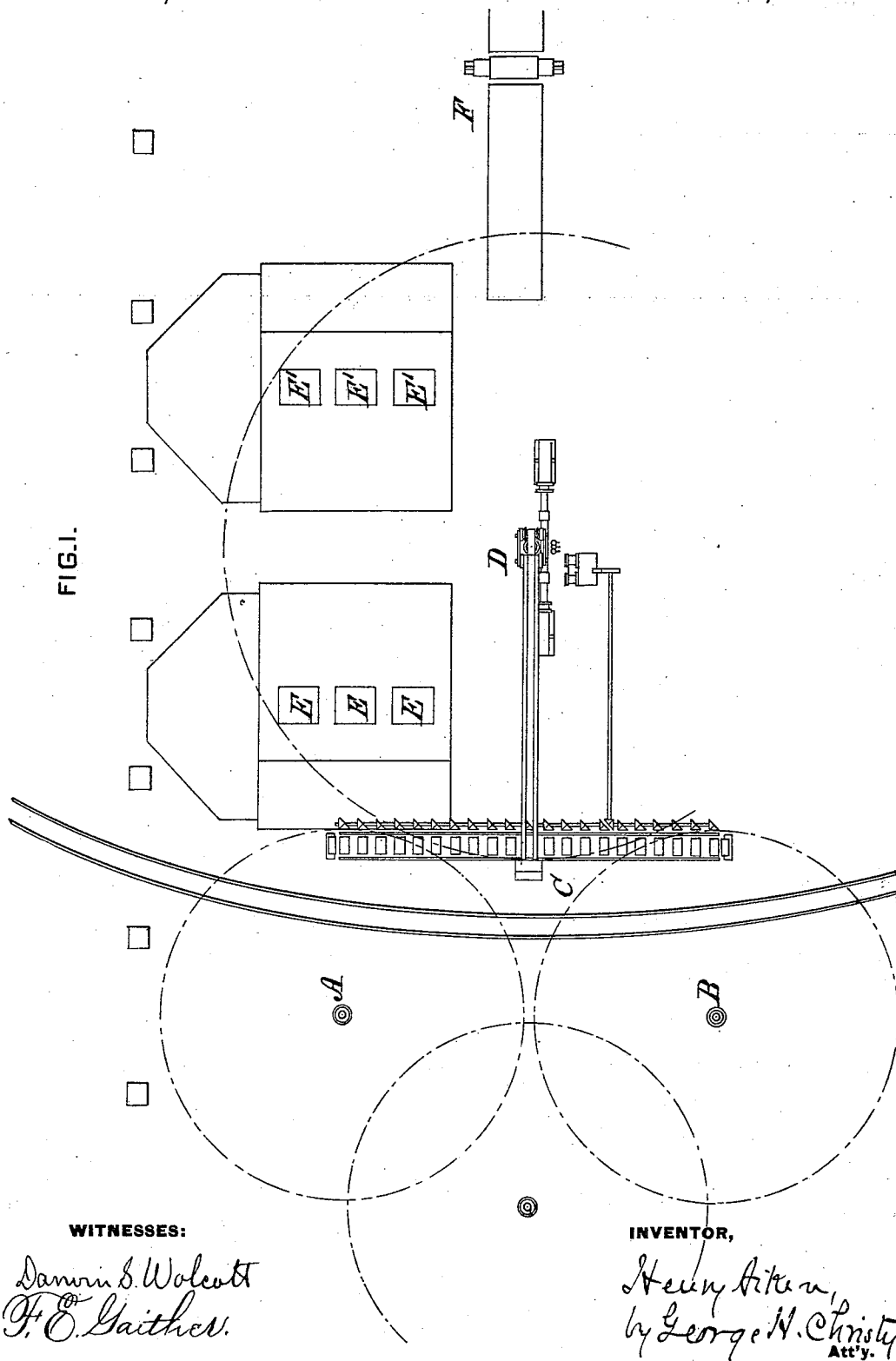
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H. AIKEN.
CRANE.

No. 471,307.

Patented Mar. 22, 1892.



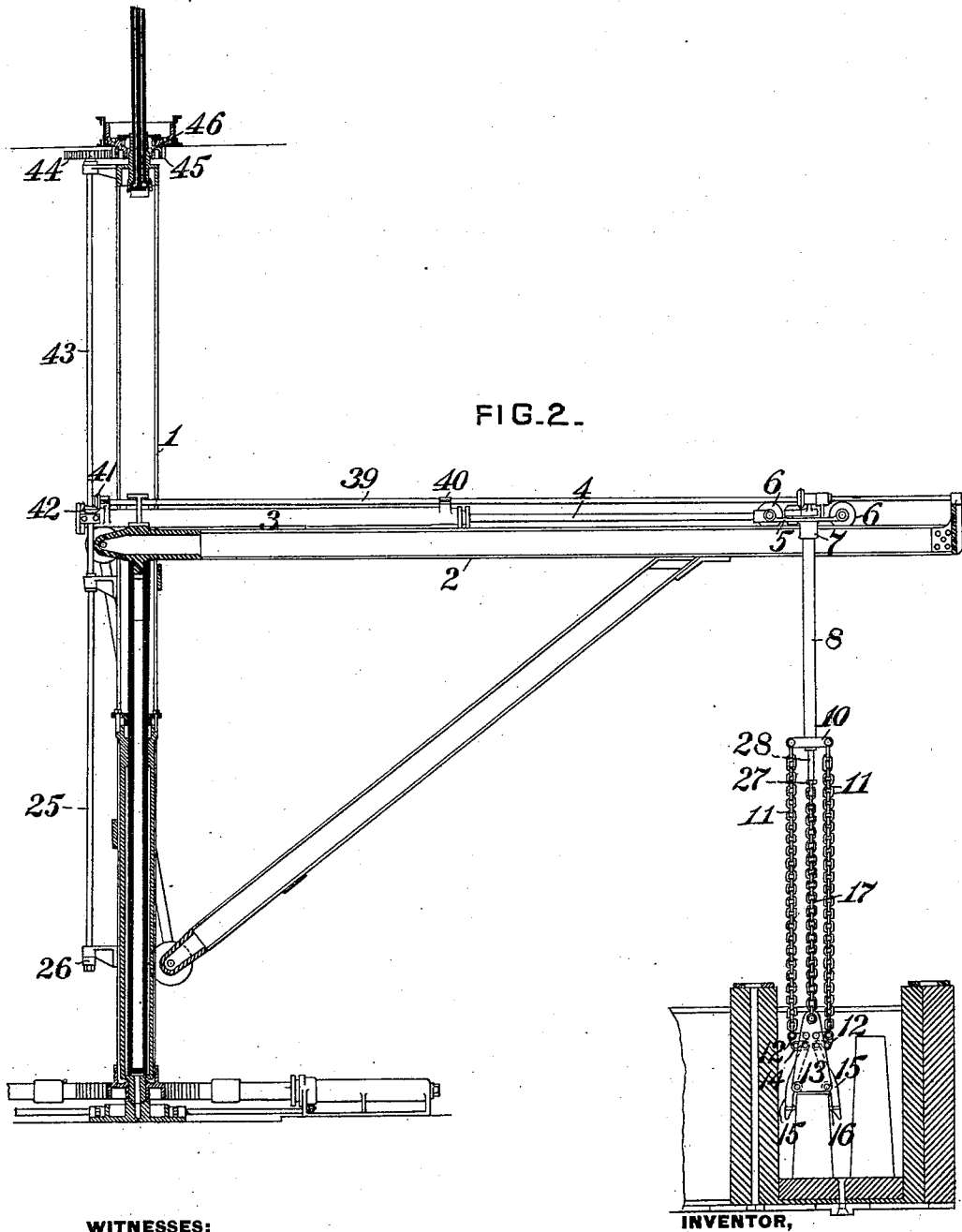
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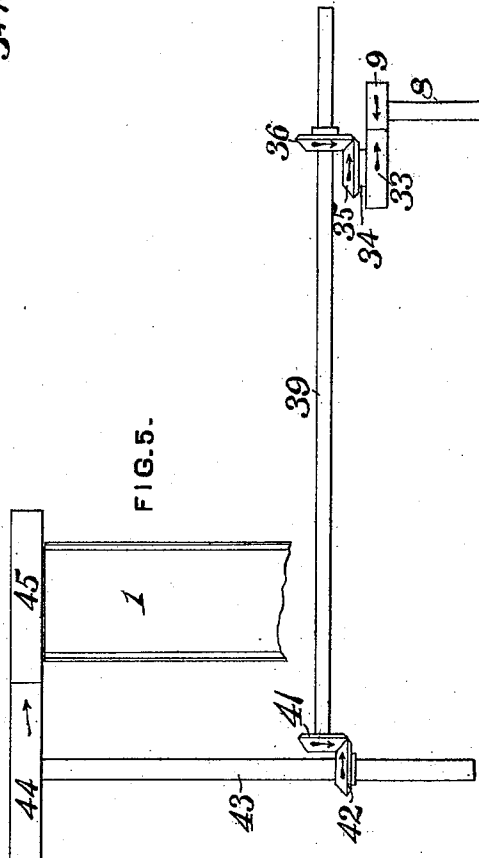
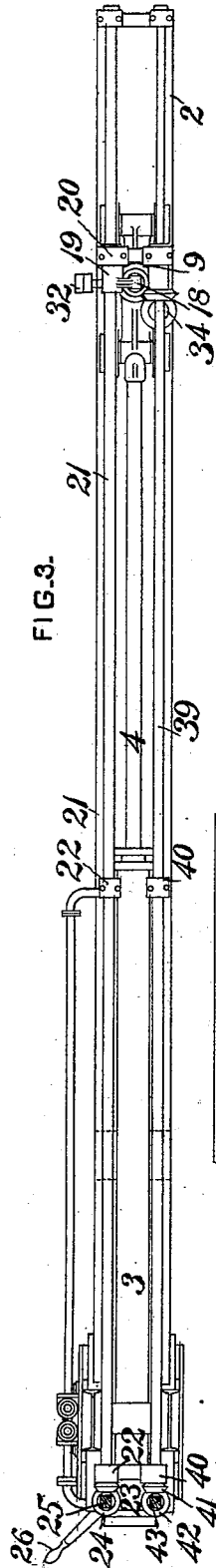
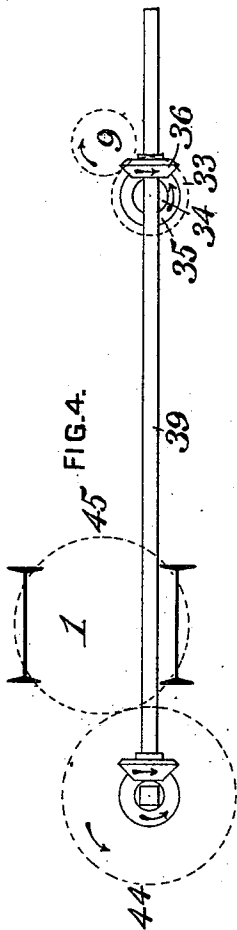
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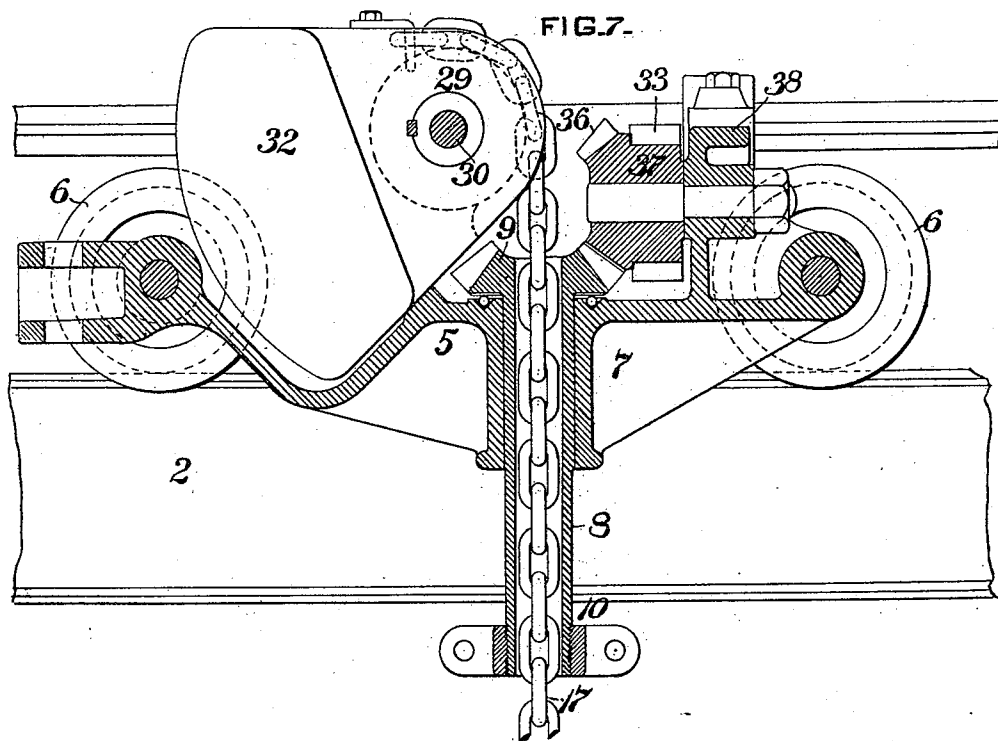
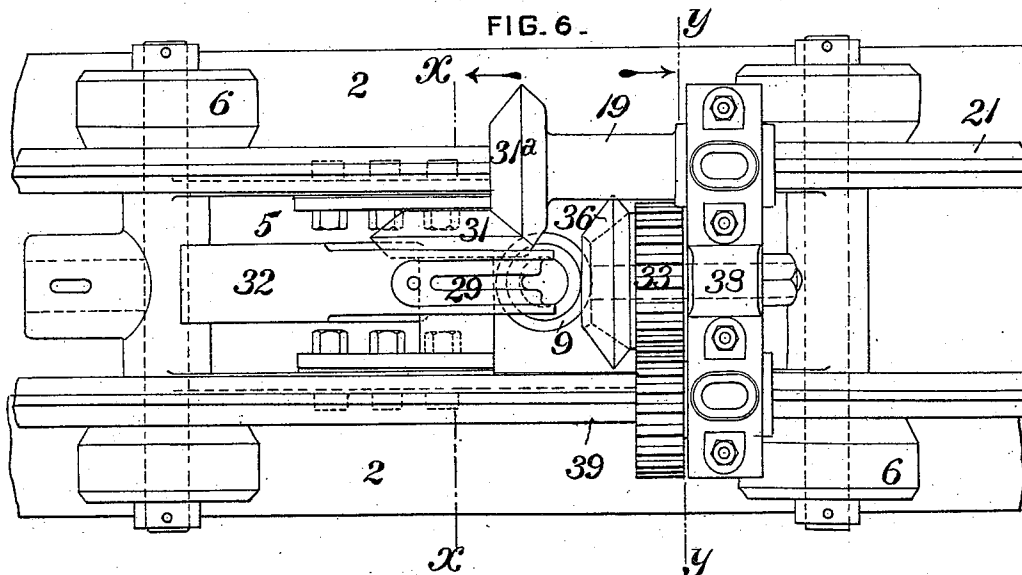
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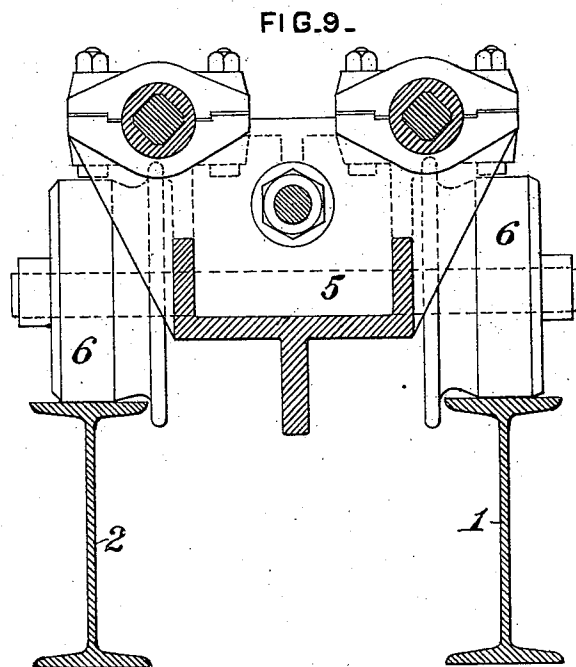
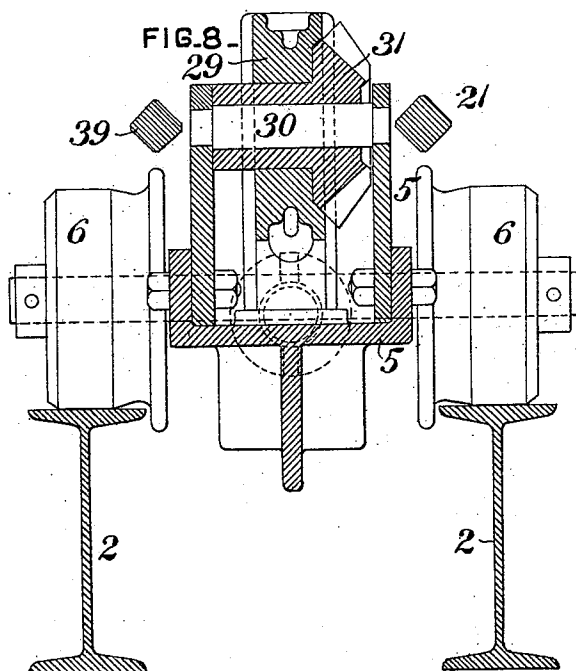
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UNITED STATES PATENT OFFICE.

HENRY AIKEN, OF PITTSBURG, PENNSYLVANIA.

CRANE.

SPECIFICATION forming part of Letters Patent No. 471,307, dated March 22, 1892.

Application filed July 13, 1891. Serial No. 399,336. (No model.)

To all whom it may concern:

Be it known that I, HENRY AIKEN, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Cranes, of which improvements the following is a specification.

The invention described herein relates to certain improvements in cranes for moving ingots to and from the soaking-pits.

In order to facilitate the operations of a rolling-mill, it is desirable to so arrange the several apparatus or devices thereof that the ingots may be placed thereon or charged therein in a certain predetermined position. As ingot-cranes have heretofore been constructed it has been necessary to turn or rotate the ingot on its longitudinal axis by means of tongs, &c., as it is being shifted from place to place by the crane, in order to present it properly to the several devices or apparatus, as the grippers thereof will maintain the same relative position to the mast, but constantly change position with relation to external objects as the jib is swung around. As, for example, if the jib is swung around through an arc of one hundred and eighty degrees after an ingot has been grasped by the grippers the ingot will have been rotated on its axis through an arc of one hundred and eighty degrees also; or, in other words, the ingot or other article held by the grippers will be turned on its axis through an arc corresponding, approximately, to that through which the jib is swung. Hence, as heretofore stated, it has been necessary to adjust the grippers either to properly grasp a previously-placed ingot or in shifting the ingot from place to place.

The object of the present invention is to provide for holding the gripping devices in the same position relative to objects external of the crane during the swinging of the jib; and the invention has also for its object certain improvements in the gripping mechanism and its operating devices.

In general terms the invention consists in the construction and combination substantially as hereinafter described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a plan

view of a portion of a metallurgical plant, showing the relative arrangement of the several parts thereof included within the operative scope of my improved crane. Fig. 2 is a view in side elevation of the crane, the grippers in engagement with an ingot in the soaking-pit. Fig. 3 is a top plan view of the crane. Figs. 4 and 5 are diagrammatic views showing the operation of the mechanism for rotating the gripper. Figs. 6 and 7 are plan and sectional elevations of the trolley and the parts connected therewith; and Figs. 8 and 9 are transverse sections of the trolley, the planes of section being indicated by the lines *xx* and *yy* of Fig. 6.

The crane, as regards the mast 1 and jib 2 and the manner of supporting the former in the building and the mounting the latter on the mast and the operative mechanism of both, is constructed in the usual or any suitable manner. The crane may either be of that class or kind in which the mast rotates with the jib or of the kind having a non-rotatable mast and a jib swinging around the mast as a pivot, both kinds being old and well known. A fluid-pressure cylinder 3 is arranged on the jib near its inner end, and the piston-rod 4 of said cylinder is connected to the trolley consisting of the frame or body portion 5 and the wheels 6, the latter constructed to run along the I-beams forming the jib. In the body portion 5 of the trolley is formed a socket 7, through which passes a support 8 for the gripping mechanism. This support 8 is preferably made in the form of a tube or sleeve and is provided at its upper end with a head 9, projecting beyond the edges of the socket and preferably resting upon anti-friction balls arranged in a groove formed around the socket. The lower end of the tube or sleeve is provided with arms 10, from which depend chains 11, connected at their lower ends to one corner of triangular plates 12. These plates 12 are pivoted at their apices to the side plates 13 of the gripping mechanism, and the other corners of the plates 12 are connected by links 14 to upper ends of the gripping jaws or levers 15. These levers are pivoted to the side plates 13 and are provided at their lower ends with spurs 16 for engagement with the ingot or other article. It will be evident to the

skilled mechanic that the weight of the gripping mechanism when supported by the chains 11 will cause the lower ends of the jaws or levers to move inwardly and engage any article placed between them, and that the added weight of such ingot or other article when the jib is raised will cause a firmer engagement of the spurs therewith. A disengagement of the spurs can be effected, the ingot or other article being placed on the ground or other support, by raising the side plates 13, thereby moving the upper ends of the jaws or levers in toward each other. To this end a chain or other device 17 is attached to the upper ends of the side plates 13, the opposite end of said chain being connected by a swivel-joint 27 to a rod 28 and preferably passing through the sleeve or tube 8 and connected to an arm 18, which is formed on or secured to a sleeve 19, mounted in a bearing 20 on the trolley, as shown in Fig. 3. This sleeve is internally shaped so as to rotate with the shaft 21, while free to slide along the same as the trolley is shifted along the jib. The inner portion of the shaft 21 is supported in suitable bearings 22 on the jib, and on its inner end is secured a bevel-pinion 23, intermeshing with a corresponding pinion 24 on the upper end of a shaft 25, mounted in suitable bearings on the mast 1 and provided at its lower end with a handle 26, whereby it may be rotated. By rotating the handle in the proper direction the arm 18 will be raised, thereby lifting the side plates of the gripping mechanism and releasing the spurs 16. The sleeve 19 is provided with a counter-weight 32, designed to balance, approximately, the weight of the gripping mechanism.

If desired, the rod 28 may be omitted and the chain 17 extended up and attached directly to the arm 18, in which case it is preferred to construct the arm 18 in the form of a drum, as shown in Figs. 6 and 7, and secure it on a short counter-shaft 30, mounted in suitable bearings on the trolley. This shaft has a bevel-pinion 31 keyed thereto and arranged to intermesh with a corresponding pinion 31^a, formed on the sleeve 19. In lieu of attaching the counter-weight 32 to the sleeve, it may be formed integral with the arm or drum 18, as shown in Figs. 6 and 7.

In operating a plant such as is indicated in Fig. 1 the ingots are placed by the cranes indicated at A and B upon the weighing train of rolls C and thence removed by the crane D to the soaking-pits E E' and thence to the feed-table of the rolling-mill F. As the gripping mechanism is usually connected to the jib, it is evident that when moving the ingot from the train C to the soaking-pit the ingot would be so turned on its axis that when it arrives at the pit E the sides of the ingot will be at an angle to the sides of the pit in which the ingots should be arranged in regular order. Hence it is necessary for the workman to turn the ingot into proper relation to the sides of the pit. This shifting of the in-

got while held in the grippers so turns the latter that when moved back to pick up another ingot the grippers must be turned in order to enable them to grasp the ingot. This constant turning and returning of the ingot and the grippers causes considerable delay in the operations of the plant and necessitates the employment of laborers for that purpose. In order to overcome this objectionable feature, the head 9 of the tube or sleeve 8 is constructed in the form of a pinion, as shown in Fig. 3, and is adapted to intermesh with a corresponding pinion 33 on a vertical shaft 34. A bevel-pinion 35 is secured to or formed integral with the pinion 33 and intermeshes with a corresponding pinion 36, formed on the sleeve 37, which is mounted in a suitable bearing 38 on the trolley. In lieu of the arrangement shown in Fig. 6, the head 9 may be made in the form of a bevel-pinion, in which case the shaft 34 will be arranged horizontally and the bevel-pinion 36 will engage the head 9, while the pinion 33 will intermesh with a corresponding pinion on the sleeve 37, as shown in Figs. 6 and 7. This sleeve is internally shaped so as to rotate with while free to slide along the shaft 39, which passes through said sleeve and is mounted in suitable bearings 40, arranged on the jib near its inner end. On the inner end of the shaft 39 is keyed a bevel-pinion 41, adapted to intermesh with a corresponding pinion 42 on the vertical shaft 43, which is mounted in suitable bearings on the mast. On the upper end of this vertical shaft is keyed a gear-wheel 44, which intermeshes with a stationary gear-wheel or circular rack 45, secured to the top steadiment 46 of the mast, as shown in Fig. 2. By reference to Figs. 4 and 5 it will be seen that the several parts of this connection, between the top steadiment and the tube or sleeve, is so arranged and proportioned that as the jib is swung around the tube or sleeve and the gripping mechanism connected thereto will be so rotated that the gripping mechanism and any article held thereby will maintain a constant position relative to the various parts of the plant wherein the crane is employed.

It will be understood that when the jib is vertically movable along the mast the pinions 24 and 42 are so arranged on the shafts 25 and 43 as to be movable along the shafts and to rotate therewith.

In places where it is not necessary to move the loads toward and from the mast the trolley may be dispensed with, the parts described as arranged on the trolley being placed directly on the jib.

While the trolley having a swiveling connection with the gripping mechanism and an independent connection for controlling the opening and closing of the latter is shown as applied to a crane, such construction is capable of use for many other purposes, and, if desired, the chain or rod controlling the opening and closing of the gripping mechanism

may be arranged outside of the main connection of the latter with the trolley.

I am aware that a fluid-pressure cylinder has been employed for releasing a gripping mechanism, fluid-pressure being conducted from a valve mechanism to the cylinder by pipes arranged along the jib of the crane, and the valve mechanism being operated by a shaft along the mast of the crane. Therefore such construction is disclaimed as of the invention herein; but I am not aware that mechanical devices—such as shafts, ropes, or chains, &c.—arranged along the mast and jib and connected to the gripping mechanism have ever been employed for that purpose.

I claim herein as my invention—

1. In a crane, the combination of gripping mechanism, a laterally-movable support therefor, and means for rotating the gripping mechanism, automatically operated on the lateral movement of the support, substantially as set forth.

2. In a crane, the combination of a swinging jib, gripping mechanism dependent therefrom, and means operated by the jib in its movements to rotate the gripping mechanism, substantially as set forth.

3. In a crane, the combination of a jib, a trolley movable along the jib, gripping mechanism dependent from the trolley, and means operated by the jib in its movements to rotate the gripping mechanism, substantially as set forth.

4. In a crane, the combination of a mast, a jib, a trolley movable along the jib, gripping mechanism dependent from the trolley, means operated by the jib in its movements to rotate the gripping mechanism, and means for controlling the gripping mechanism, operative from the foot of the mast, substantially as set forth.

5. In a crane, the combination of a mast, a jib, a trolley movable along the jib, gripping mechanism having a rotatable connection with the trolley, and gearing interposed between said connection and a non-rotatable portion of the crane for rotating said connection when the jib is moved horizontally, substantially as set forth.

6. In a crane, the combination of a mast, a swinging jib, gripping mechanism having a rotatable connection with the jib, a non-rotating gear-wheel or rack-bar, and gearing in-

terposed between said rack and the connection for the gripping mechanism, substantially as set forth.

7. In a crane, the combination of a mast, a jib, gripping mechanism from the jib, and mechanical devices arranged along the mast and jib and connected to the gripping mechanism for releasing the same, substantially as set forth.

8. In a crane, the combination of a mast, a jib, a trolley movable along the jib, gripping mechanism dependent from the trolley, an arm on the trolley, connected with the gripping mechanism for releasing the same, and connections from said arm to a point near the foot of the mast for operating the same, substantially as set forth.

9. In a crane, the combination of a mast, a swinging jib, a trolley movable along the jib, a rotatable sleeve dependent from the trolley, gripping mechanism connected to the sleeve, a non-rotating gear-wheel or rack-bar, connections between the rack-bar and sleeve, a releasing-arm mounted on the trolley and connected to the gripping mechanism, and connections from the arm to a point near the foot of the mast, substantially as set forth.

10. In combination with a movable trolley, a gripping mechanism having a rotatable connection to the trolley, and an independent connection from the trolley to the gripping mechanism for controlling the opening and closing of the latter, substantially as set forth.

11. In combination with a movable trolley, a gripping mechanism having a tubular rotatable connection with the trolley, and a rod or chain passing through the tubular connection for controlling the opening and closing of the gripping mechanism, substantially as set forth.

12. In combination with a movable trolley, a gripping mechanism dependent therefrom, a counter-weight for the gripping mechanism, arranged on the trolley and connected to the gripping mechanism, whereby the opening and closing of the latter are facilitated, substantially as set forth.

In testimony whereof I have hereunto set my hand.

HENRY AIKEN.

Witnesses:

R. H. WHITTLESEY,
DARWIN S. WOLCOTT.