March 4, 1969 A. NECTOUX 3,430,781

INSTALLATION COMPRISING A CRADLE FOR SUPPLYING INGOTS TO A ROLLING MILL

Filed Nov. 28, 1966 Sheet 1 of 3

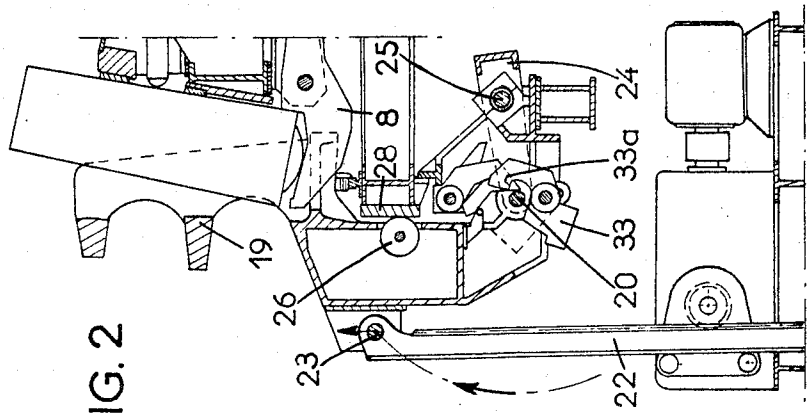

FIG. 2

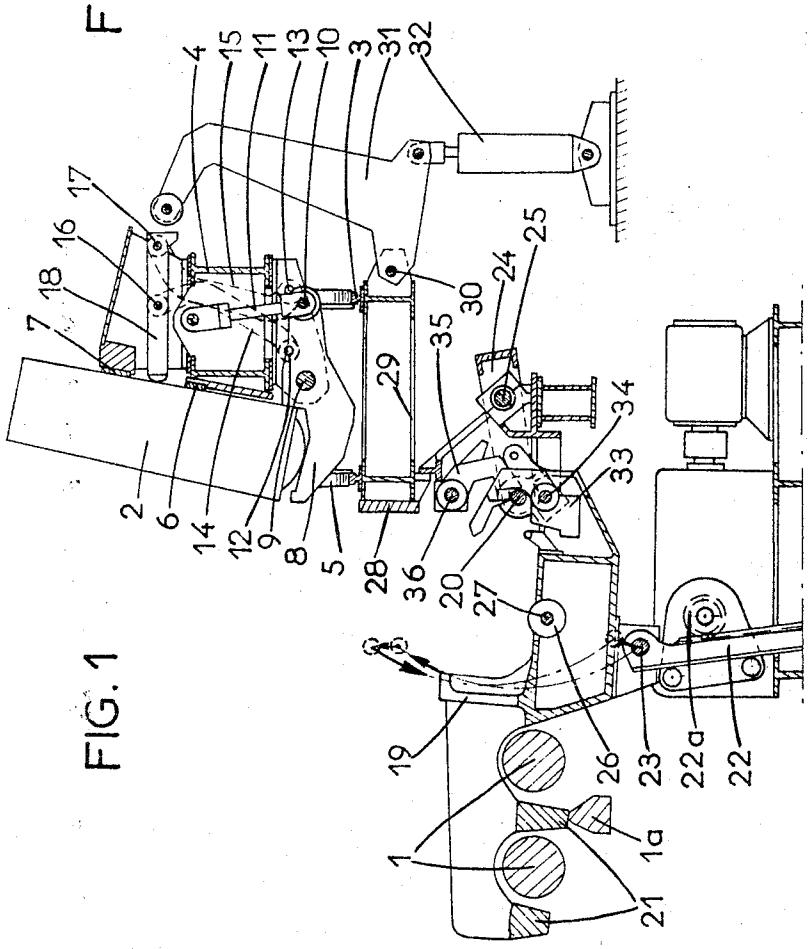

FIG. 1

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FIG. 4

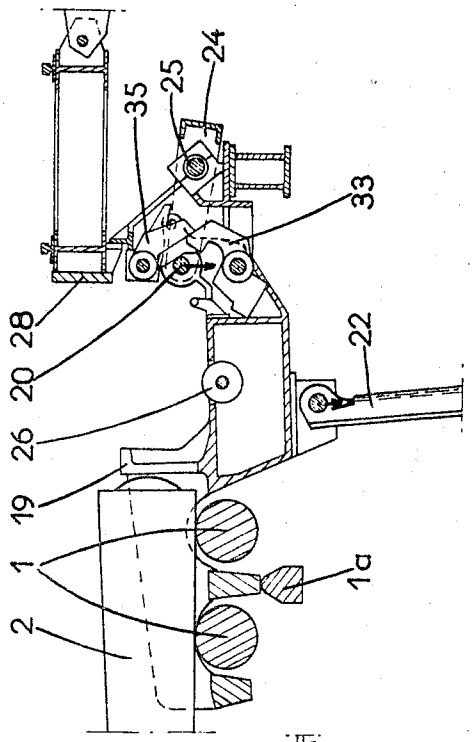

FIG. 3

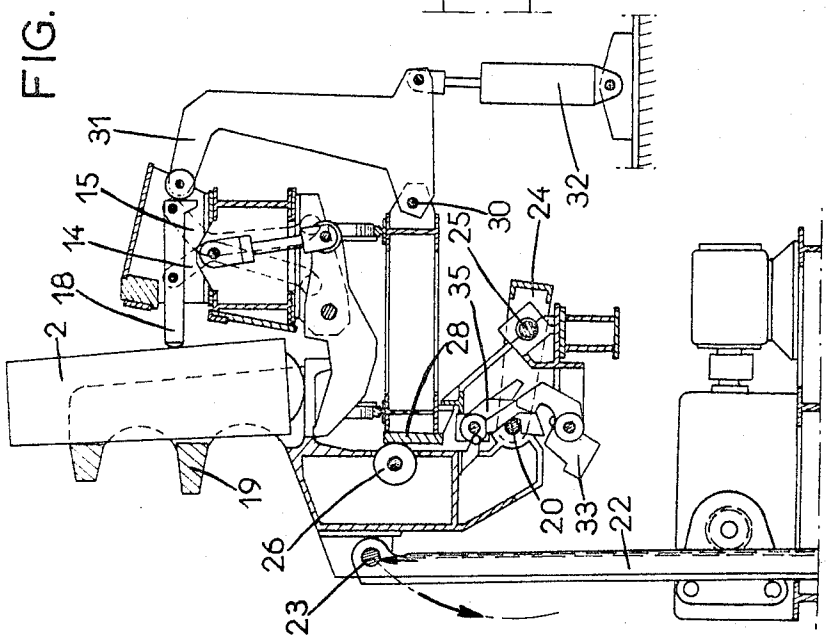

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FIG. 5

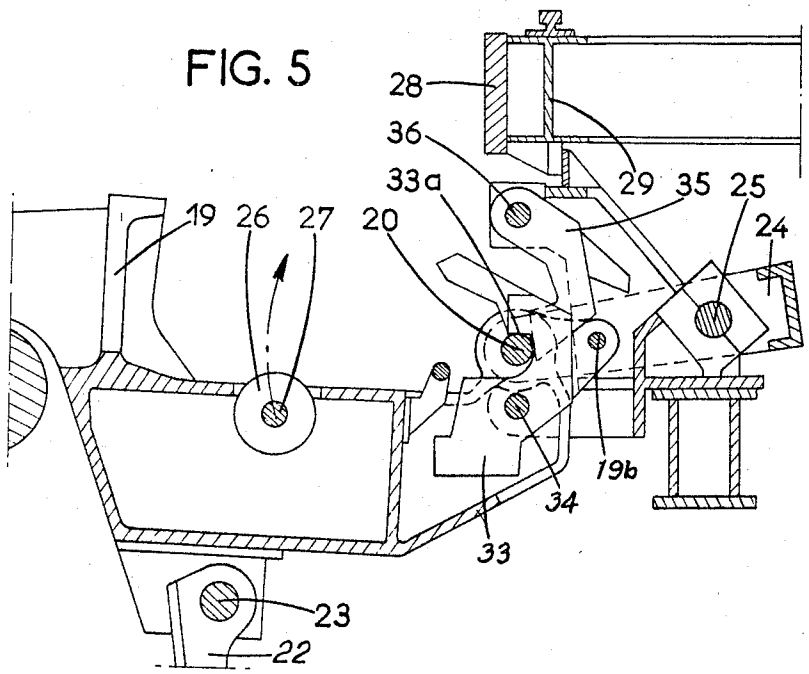


FIG. 6

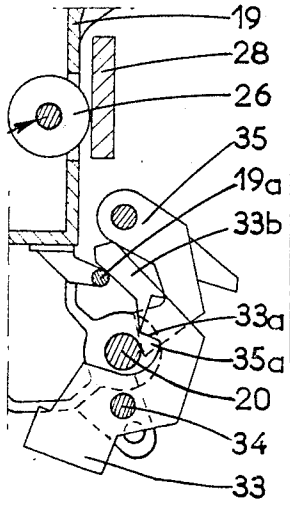


FIG. 7

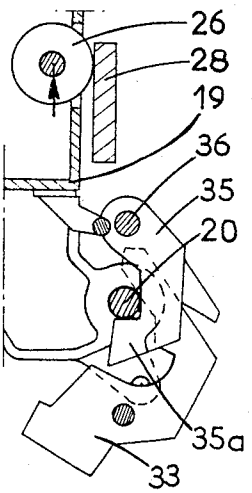
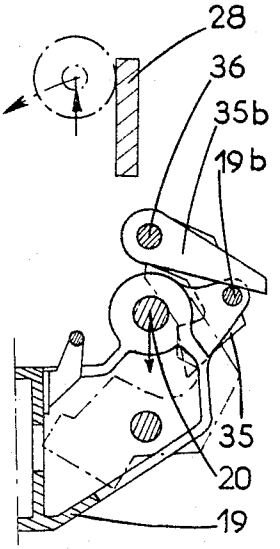


FIG. 8



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3,430,781

INSTALLATION COMPRISING A CRADLE FOR SUPPLYING INGOTS TO A ROLLING MILL

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U.S. Cl. 214—1 7 Claims
Int. Cl. B65g 67/24; B21b 39/20

ABSTRACT OF THE DISCLOSURE

Ingots are transported from an ingot truck to the roller table of a rolling mill by a rocking cradle. The rocking cradle is mounted for two-directional rocking movements about a horizontal axis from a bottom position to a top position. The movement of the cradle to a vertical position brings it beneath the ingot on the ingot truck. The cradle is then moved to its lower position for depositing the ingot on the roller table. The pivot is locked and released in its upper and lower positions.

This invention relates to an installation comprising a cradle for supplying ingots to a rolling mill, the said installation being intended for mounting at a fixed position along the rolling-mill roller table axis in order to cause the ingots transported on ingot trucks to be deposited onto the roller table.

The installation enables simplified ingot trucks to be used, which require no depositing elements such as transfer rollers or a cradle, and hence with no driving elements.

According to the invention, the installation comprises a rocking cradle attached to an element for controlling two-directional rocking movements about a horizontal pivot axis, the latter pivot being movable between a bottom position and a top position, and a device for locking and releasing the pivot, said device being controlled by the cradle rocking movements, said device comprising a catch to retain the pivot in its bottom position during the lifting movement of the cradle into a vertical position which brings it beneath the ingot borne by an ingot truck, means for releasing the pivot at the end of said movement for an additional substantially vertical movement to engage the ingot, a catch for retaining the pivot in its top position which it reaches at the end of said movement, during the lowering of the cradle into its position for depositing the ingot, and means for releasing the pivot at the end of this movement, during an additional movement of the cradle into its horizontal inoperative position.

One specific embodiment of an installation according to the invention is illustrated in the accompanying drawing and described hereinafter by way of example.

In the drawing:

FIGURE 1 is a general view of the installation in section along a vertical plane passing through the axis of the roller-table, and showing the cradle in the inoperative position.

FIGURE 2 is a partial view showing the cradle at the end of its angular lifting movement.

FIGURE 3 is a partial view of the cradle at the end of its ingot-engagement movement.

FIGURE 4 is a partial view of the cradle at the end of its angular movement for depositing the ingot.

FIGURES 5, 6, 7 and 8 are respectively details of FIGURES 1, 2, 3 and 4 to an enlarged scale showing the corresponding positions for releasing the cradle pivot.

The installation illustrated in FIGURE 1 feeds a roller table 1 on which are deposited the ingots 2 transported by an ingot truck moving on a track 3 in a direction perpendicular to the direction of movement of the ingots on the roller table 1. The ingot truck may be of any type for the transportation of ingots loaded in an inclined position at varying degrees to the vertical.

The ingot truck illustrated comprises a chassis 4 mounted on wheels 5 and having fixed abutments 6 and 7 for an ingot 2, the head of which rests on a lug 8 pivoted at 9; the lug 8 is connected by a pivot 10 to a link 11 provided with resilient means (not shown) to damp the impacts on loading of an ingot. Levers 14 and 15 are pivotally connected to the chassis 4 at 12 and 13 and their top ends are pivotally connected to a ram 18 at 16 and 17.

The fixed installation comprises a rocking cradle 19 pivoted about a horizontal axis 20. The cradle comprises two ingot supporting members 21 adapted to be inserted between the rollers 1 of the roller table, one such member bearing on a fixed stop 1*a*. The cradle 19 is connected to a rack 22 which is pivoted at 23 and driven by a pinion 22*a*.

The pivot 20 is borne by a rocker 24 pivoted about a fixed pivot 25. The cradle 19 bears a roller 26 which is mounted on a pivot 27 and which, when the cradle is in the raised position, is adapted to engage a fixed plate 28 rigidly connected to a fixed frame 29. This frame also supports a pivot 30 about which rocks a lever 31 connected to a jack 32 and adapted to control the forward movements of the ram 18 mounted on the ingot truck.

The pivot 20 of the cradle 19 can occupy two positions as a result of the rocker 24 pivoting about its axis 25. A movable catch 33 pivoted about a fixed shaft 34 locks the pivot 20 in its bottom position (FIGURE 1) and a movable catch 35 pivoted about a fixed pivot 36 locks the pivot 20 in its top position (FIGURE 3). The function of the catches 33 and 35 will be explained in the following description of the operation of the installation with reference to FIGURES 5 to 8, which are drawn to an enlarged scale.

For the angular lifting movement of the cradle 19, the latter pivots about the pivot 20 which is then locked in its bottom position by a butt 33*a* of the catch 33 (FIGURE 5). This angular movement is limited by the roller 26 meeting the fixed plate 28 (FIGURES 2 and 6). A dog 19*a* which is provided on the cradle 19 and which has come into contact with an incline 33*b* of the catch 33 has at this moment pivoted the catch about its pivot 34 so as to free the butt 33*a* (FIGURE 6), and the cradle is engaged beneath the ingot 2 borne by the ingot truck (FIGURE 2).

The lifting action of the rack 22 continues and the cradle 19 is constrained to perform a vertical movement, tht roller 26 running on the fixed plate 28 and lifting the ingot 2 (FIGURE 3). At the end of the movement, a butt 35*a* of the catch 35 can engage beneath the pivot 20, which is thus locked in its top position (FIGURE 7). The catch 33 is retained in the release position by the pivot 20.

The ram 18 actuated by the jack 32 then pushes the ingot towards the cradle 19 until it bears on the latter (FIGURE 3). The action of the jack 32 is so controlled as to limit the thrust of the ram 18 to a given value and maintain this thrust during the start of the movement of the cradle 19 into the horizontal position for depositing the ingot, so as to avoid any release of the ingot at the start of this movement. A control of this kind can be provided with any known means, e.g., calibrated valves for controlling the pressure of the fluid used in the jack and directly subject to the movements of the cradle, and by stops for the end of the movement and reversal of the direction of operation of the jack.

For its angular movement into its horizontal position for depositing the ingot, the cradle 19 rotates about the pivot 20 which is locked in the top position by the catch 35. At the end of the angular movement limited by the stop 1*a* the ingot is deposited on the roller table 1, and a dog 19*b*

borne by the cradle **19** acts on a lug **35***b* connected to the catch **35**, which is then returned to the position for releasing the pivot **20** (FIGURE 8). The cradle **19** is then returned by the rack **22** to the initial bottom position shown in FIGURES 1 and 5, in which it abuts the stop **1***a* and in which it is again locked by the catch **33**.

From the foregoing it will be apparent that actuation of the rack **22** causes the cradle to be brought beneath the ingot and then engage the same when said rack is moved in one direction, and causes the ingot to be deposited and the cradle to return to the initial position when the rack is actuated in the other direction, the said movements occurring successively and without any dead time.

Of course the above-described installation could be modified in respect of its details, or completed by appropriate accessory elements, without departing from the scope of the invention.

More particularly, the control rack could be replaced by a hydraulic jack, or else the installation could be adapted to ingot transportation devices other than ingot trucks.

What I claim is:

1. An installation comprising a cradle for supplying ingots to a rolling mill, the said installation being disposed between a movable ingot supply device and the rolling mill roller train, characterised in that it comprises a rocking cradle attached to an element for controlling two-directional rocking movements about a horizontal pivot, said pivot being movable between a bottom position and a top position, and a device for locking and releasing the pivot, said device being controlled by the cradle rocking movements, said device comprising a catch to retain the pivot in its bottom position during the lifting movement of the cradle into a vertical position which brings it beneath the ingot borne by an ingot truck, means for releasing the pivot at the end of said movement for an additional substantially vertical movement to engage the ingot, a catch for retaining the pivot in its top position which it reaches at the end of said vertical movement, during the movement of the cradle into its position for depositing the ingot, and means for releasing the pivot at the end of this movement, during an additional movement of the cradle into its horizontal inoperative position.

2. Installation according to claim **1**, characterised in that the cradle bears a roller which in the raised position abuts a fixed runway for guiding the cradle during the additional movement for engagement of the ingot.

3. Installation according to claim **1**, characterised in that the cradle bears an element which in the position for depositing the ingot bears against a fixed stop forming the cradle rocking pivot during the additional movement into the inoperative position.

4. Installation according to claim **1**, characterised in that the cradle control element consists of a movable rack attached to the cradle between the base for supporting the ingots and the movable pivot.

5. Installation according to claim **1**, characterised in that the movable pivot for the cradle is supported by an arm pivoting about a fixed horizontal axis, and co-operates with the cradle lift stop roller to hold the cradle in a substantially vertical position during the additional movement for engagement of the ingot.

6. Installation according to claim **1**, characterised in that the catches for retaining the movable pivot in its top and bottom positions and each pivoted about a fixed horizontal axis are continuously urged in the locking direction and are each provided with a release incline co-operating with an element rigidly connected to the cradle and coming into operation at the end of the corresponding angular movement thereof.

7. Installation according to claim **1**, characterised in that it comprises a jack for horizontal movement of a ram borne by each of the ingot trucks and adapted to apply the ingot against the cradle at the start of the angular movement for lowering the cradle.

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U.S. Cl. X.R.

72—250; 214—44