C. L. TAYLOR.

THREE HIGH ROLL MILL.

APPLICATION FILED AUG. 20, 1907.

1,004,500.

Patented Sept. 26, 1911.

4 SHEETS—SHEET 1.

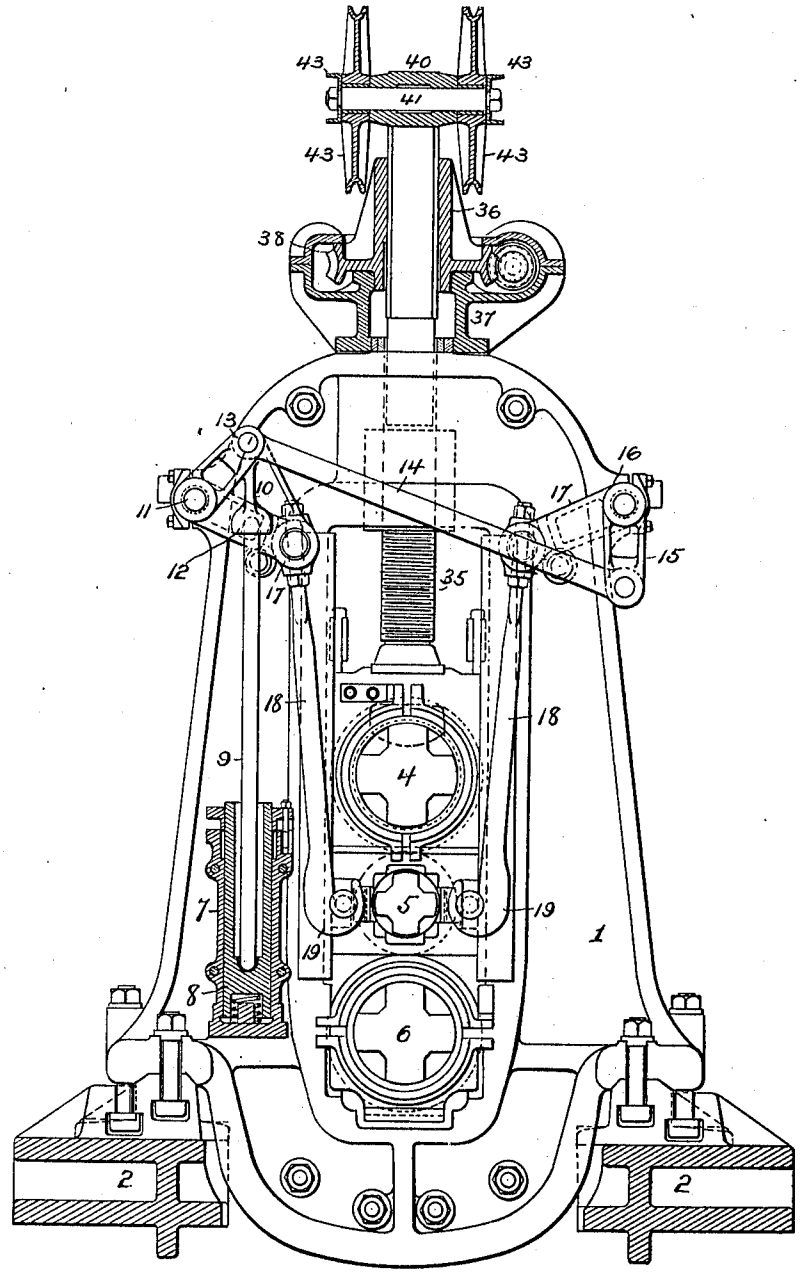


FIG. 1.

WITNESSES

E. Nottingham

G. F. Downing.

INVENTOR

C. L. Taylor

By F. G. Seymour

Attorney

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

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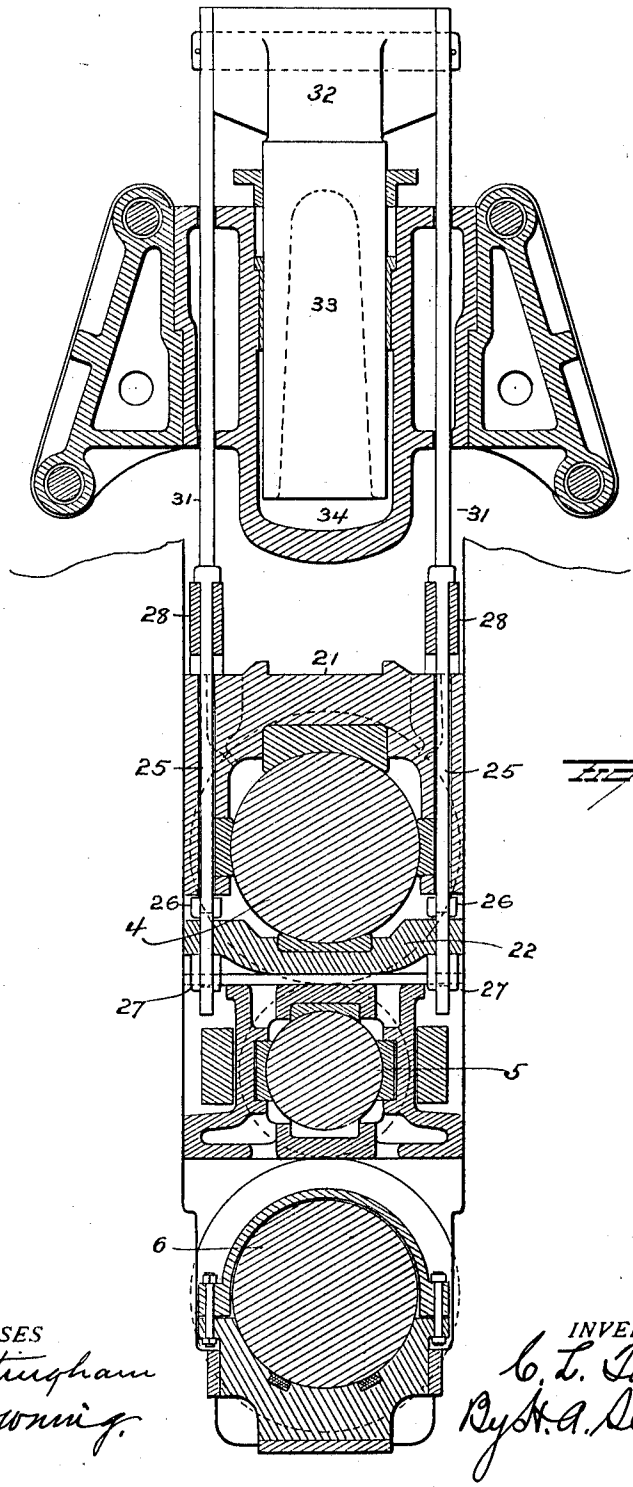


FIG. 2.

WITNESSES

E. L. Nottingham

G. F. Downing.

INVENTOR

C. L. Taylor

By H. A. Seymour

Attorney

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

C. L. TAYLOR.

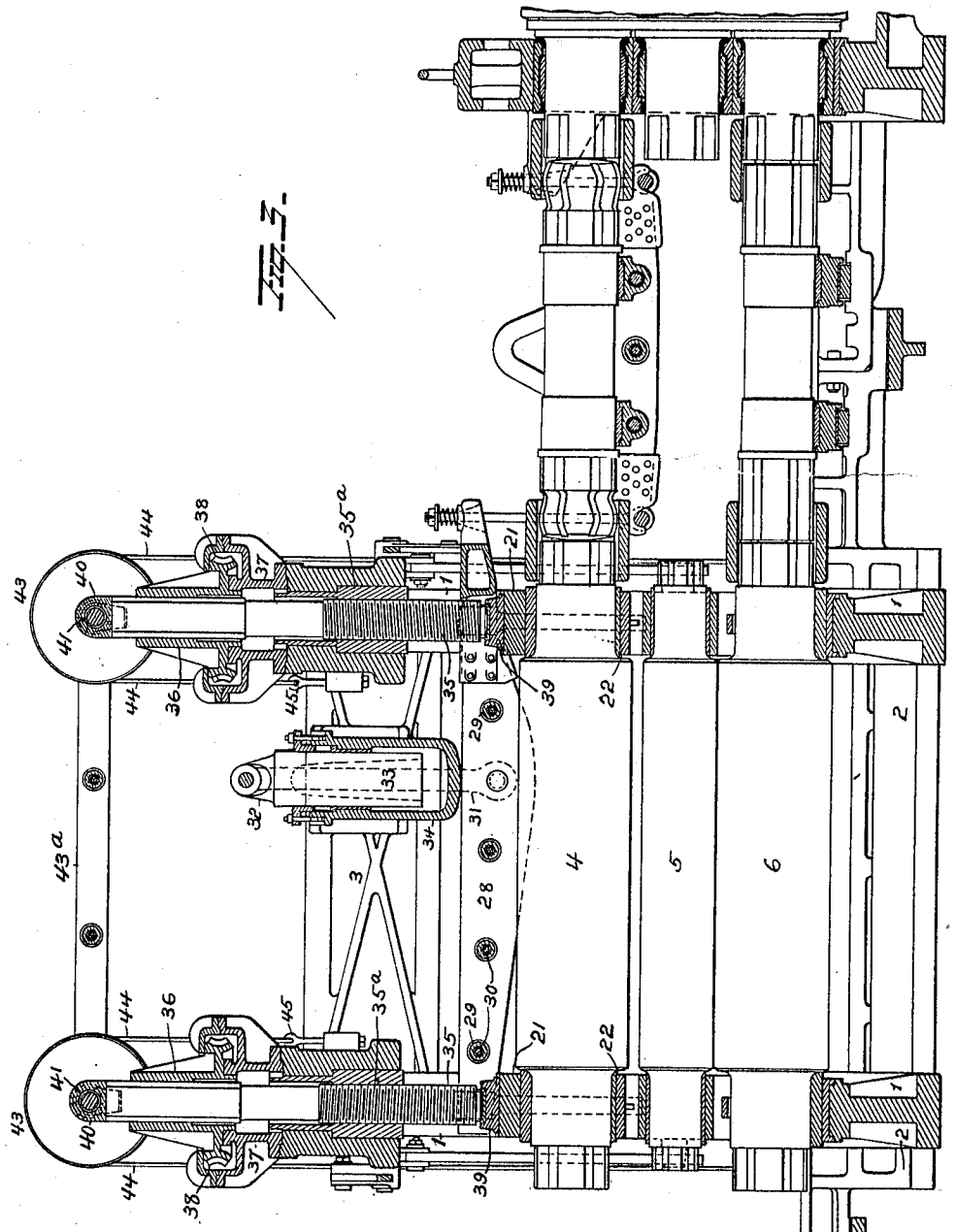
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WITNESSES

E. L. Nottingham

A. F. Downing.

INVENTOR

C. L. Taylor

By H. A. Seymour

Attorney

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

C. L. TAYLOR.

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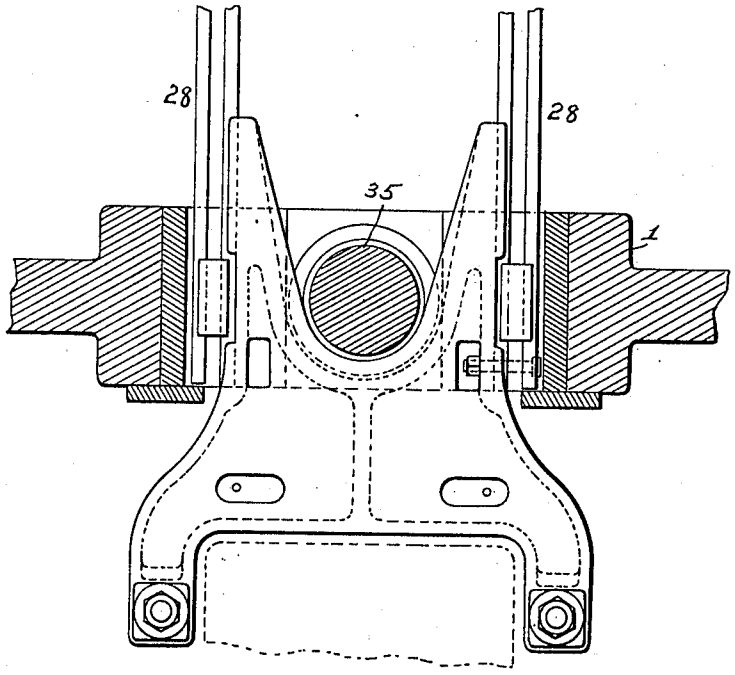
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4 SHEETS—SHEET 4.

Fig. 4.



WITNESSES

E. D. Nottingham

G. F. Downing.

INVENTOR

C. L. Taylor

By A. G. Seymour

Attorney

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CLARENCE L. TAYLOR, OF ALLIANCE, OHIO, ASSIGNOR TO THE MORGAN ENGINEERING COMPANY, OF ALLIANCE, OHIO.

THREE-HIGH-ROLL MILL.

1,004,500. Specification of Letters Patent. **Patented Sept. 26, 1911.**

Application filed August 20, 1907. Serial No. 389,374.

To all whom it may concern:

Be it known that I, CLARENCE L. TAYLOR, of Alliance, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Three-High-Roll Mills; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in three high roll mills, the object being to provide positively and comparatively simple means for elevating and lowering the middle roll for changing the pass from the bottom to the top and vice versa.

A further object is to provide improved means for yieldingly holding the upper roll in contact with the screws which control the vertical adjustments of the upper roll.

A further object is to provide means for elevating the several rolls, during the operation of changing the rolls or renewing the bearings.

With these objects in view my invention consists in the parts and combinations of parts as will be hereinafter more fully described and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in end elevation partly in section of my improved mill. Fig. 2 is a view in vertical section through the rolls and their supporting bearings and through the counterbalancing cylinder, Fig. 3 is a vertical longitudinal sectional view and Fig. 4 is a view in plan of the projecting end of the upper roller suspending frame.

1 represents the frame of the mill suitably mounted and supported on the base 2. The frame consists of the two side members 1, supported and secured to base 2, and connected near the top by the brace 3.

Mounted in bearings carried by the end frames 1 are the rolls 4—5 and 6. The lower roll 6 is mounted in fixed bearings, while the upper and intermediate rolls 4 and 5 are mounted in movable bearings, the upper bearings being adjustable, or movable to accommodate slabs, plates etc., of different thicknesses, while the intermediate roll 5 is moved or adjusted to change the pass from top to bottom and from the bottom to the top.

Secured to one side frame 1 of the machine, adjacent to the base thereof, as shown in Fig. 1, is the hydraulic cylinder 7 which latter is in communication with an accumulator or other source of water supply under pressure. The plunger or piston 8 is mounted in the cylinder and is engaged by the lower end of pitman 9, the plunger being recessed as shown to receive the lower end of the pitman. The upper end of the pitman 9 engages the rocking lever 10, which latter as shown in Fig. 1 is in the form of a bell-crank lever secured to rocking-shaft 11. The upper end of pitman 9 rests in a recessed seat 12 integral with said lever in a plane below the free end of the upper or vertical member 13 of lever 10 so that the upward push of the pitman will be in the direction of movement of the free end of the member 13.

The free end of member 13 is connected by rod 14 with the free end of the depending or vertical member 15 of bell crank lever 16. Each lever 10 and 16 shown in Fig. 1, has an inwardly projecting or horizontal member 17 on the inner ends of which are pivotally mounted the bars 18, the lower ends of which terminate in inwardly facing hooks 19, which latter engage trunnions on middle roll rest bars prolonged through bearing boxes.

From the construction thus far described, it will be seen that if water under pressure be admitted to cylinder 7, the plunger 8 will rise therein and elevate the pitman 9, thus turning bell crank 10 on its fulcrum 11. This turning movement of the bell-crank elevates the hook rod 18, 19 and also the hook rod carried by bell-crank 16, thus elevating the bearing at one end of roll 5.

The cylinder, lever and hook rod mechanism shown in Fig. 1 is duplicated at the other end of the mill, so that the two ends of the middle roll are supported on four hooks.

With the machine thus constructed, if water be admitted to cylinders 7 which are duplicates, one on each side of mill, all the bell-crank levers will be simultaneously raised, thus elevating roll 5 into contact with upper roll 4, and opening the pass between rolls 5 and 6. After the sheet has been passed between the lower and intermediate rolls, the latter is lowered onto the lower roll, by permitting the water to escape from cylinders 7, thus opening the upper pass.

The upper roll 4 is mounted at its ends

in bearings composed of sections 21 and 22, the upper section 21 of which embraces the top and sides of the roll neck, while the lower section 22 passes under the latter.

The bearings at opposite ends of the roll 4, are mounted and supported on rods 25, by cotter-pins 26 and 27, pins 26 supporting the upper sections of the bearings and pins 27 the lower sections. Rods 25 are connected at their upper ends to the parallel suspending beams 28 which latter extend lengthwise the machine, are spaced apart and braced by the spacing sleeves 29 and bolts 30, and are suspended by links 31 from the cross head 32 of plunger 33. This plunger rests and moves in cylinder 34 which latter is constantly open to an accumulator and operates to counterbalance the weight of roll 4 and hold its end bearings in contact with the bearing adjusting screws 35. The cylinder 34 is as before stated in constantly open communication with the water supply, the pressure of which is sufficient to hold the roll 4 elevated and cause it to follow the upward movements of screws 35, the downward movements of the screws expelling the water from cylinder 34.

The screws 35, one in each end frame 1, are mounted to rotate in the nuts 35ª. The upper end of each screw is embraced by a sleeve 36 which latter is mounted to turn on the bearing 37 on the upper end of end frame 1, and which is constructed to rotate the screw and permit the latter to move vertically therein. Each sleeve 36 is provided with a worm wheel 38 preferably integral therewith which is engaged by a worm shaft for rotating same. The lower ends of the screws are provided with the shoes 39 which are engaged by the upper sections 21 of the bearing for the upper roll 4, and which limit the upward movement of the upper roll, the counterbalance cylinder and plunger before referred to operating to hold the roll up against the shoes on the lower ends of the screws.

Mounted on the upper end of each screw 35 is a cross head 40, the cross heads of the two screws being connected by the frame 43ª. Each cross head carries shaft 41, on which are mounted or secured two parallel pulleys 43 over which the cables 44 pass. These cables 44 are each secured to the frame of the mill at 45, pass upwardly over the sheaves, and down outside the end frames of the mill.

When it is necessary to change the rolls, the middle roll 5 is lowered by the mechanism previously described, onto roll 6 and the upper roll 4 is forced down onto middle roll 5 the sustaining pressure of the fluid in cylinder 34 being withdrawn either before or after lowering the top roll, by shutting off the supply to the cylinder and then permitting the fluid in the latter to escape. Cotter pins 27 are then withdrawn from rods 25 thus releasing lower sections 22 of the bearings for the upper roll, and letting the upper roll rest on the bearings carrying the middle roll. By now passing the ends of the cables 44, or a lifting strap or yoke connected to the ends of said cables, under the roll necks, (the rolls having been previously disconnected from the power transmitting spindle, and the screws moved away from the roll) and continuing the upward movement of the screws the roll 4 will be elevated sufficiently above the middle roll 5 to permit a truck mounted on ways carried by another truck, to be moved under the roll. The roll is then lowered onto the truck and disconnected from the lifting chains after which the truck is moved outwardly onto the larger truck. After the roll has been withdrawn it can be moved to a position to be picked up by a crane. The middle and bottom rolls can now be disconnected from their bearings, and from the power transmitting spindle rotating the bottom roll, and be removed in a similar manner.

Bringing a new set of rolls into position and putting the mill in working order, simply requires the reverse of the operation above described.

It is evident that many slight changes might be resorted to in the relative arrangement of the parts shown and described without departing from the spirit and scope of my invention hence I would have it understood that I do not wish to confine myself to the exact construction shown and described, but,

Having fully described my invention what I claim as new and desire to secure by Letters-Patent, is:—

1. In a three high roll mill, the combination with upper and lower rolls, adjusting screws for the upper roll, means for yieldingly holding the upper roll in contact with the adjusting screws, and means whereby the upper roll may be released from its yielding supporting means, of pulleys carried by the adjusting screws and cables passing over said pulleys and adapted to be connected with the ends of the rolls for temporarily supporting and for lifting and lowering the rollers.

2. In a three high roll, the combination with the rolls, adjusting screws for the upper roll, means for yieldingly holding said roll in contact with the screws, means whereby said upper roll may be released from its yielding supporting means, and fluid pressure mechanism connected by detachable supports to the bearings carrying the intermediate roll, of pulleys carried by the screws and cables passing over said pulleys and adapted to temporarily support and lift and lower the rolls when the latter are disconnected from their main supporting devices.

3. In a rolling mill, the combination with a frame, an upper roll and screws for controlling the vertical adjustments of said upper roll, of a pulley carried by each screw above the frame, and roll lifting cable carried by each pulley, each cable being secured at one end to the frame of the mill.

4. In a rolling mill, the combination with an upper roll and screws for controlling the vertical adjustments of same, of cross head on each screw, a pair of pulleys carried by each cross head above the frame, and cables, each secured at one end to the frame of the mill and passing over a pulley, the free ends of the cable adapted to be connected to the necks of the roll.

5. The combination with upper and lower rolls, screws for adjusting the upper roll, and hydraulic devices for retaining the end bearings of said upper roll against the screws, of an intermediate roll, connected levers arranged in pairs at each end of the mill, a hooked rod depending from each lever, the four hooks supporting the end bearings of the intermediate roll and adapted to swing by gravity away from said bearings when disconnected from the latter, and hydraulic devices for actuating the connected levers.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

CLARENCE L. TAYLOR.

Witnesses:
A. L. ROBERTS,
N. C. FETTERS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."