

Dec. 20, 1938.

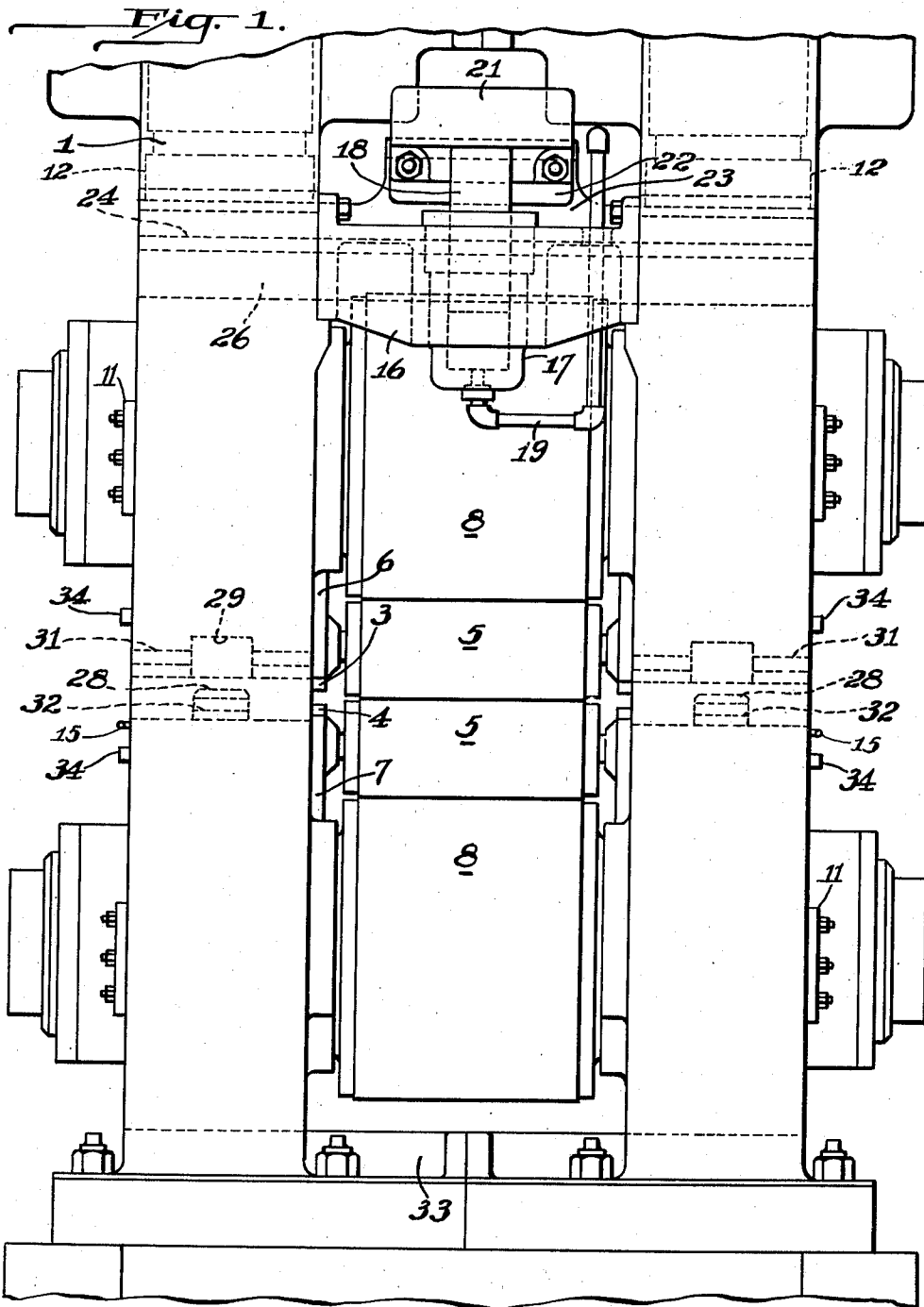
H. H. TALBOT

2,140,929

ROLLING MILL

Filed April 17, 1936

2 Sheets-Sheet 1



WITNESSES  
*A. Wallace.*  
*V. A. Peckham.*

BY

INVENTOR.  
*Howard H. Talbot*  
*Brown, Critchlow & Flick*  
his ATTORNEYS.

Dec. 20, 1938.

H. H. TALBOT

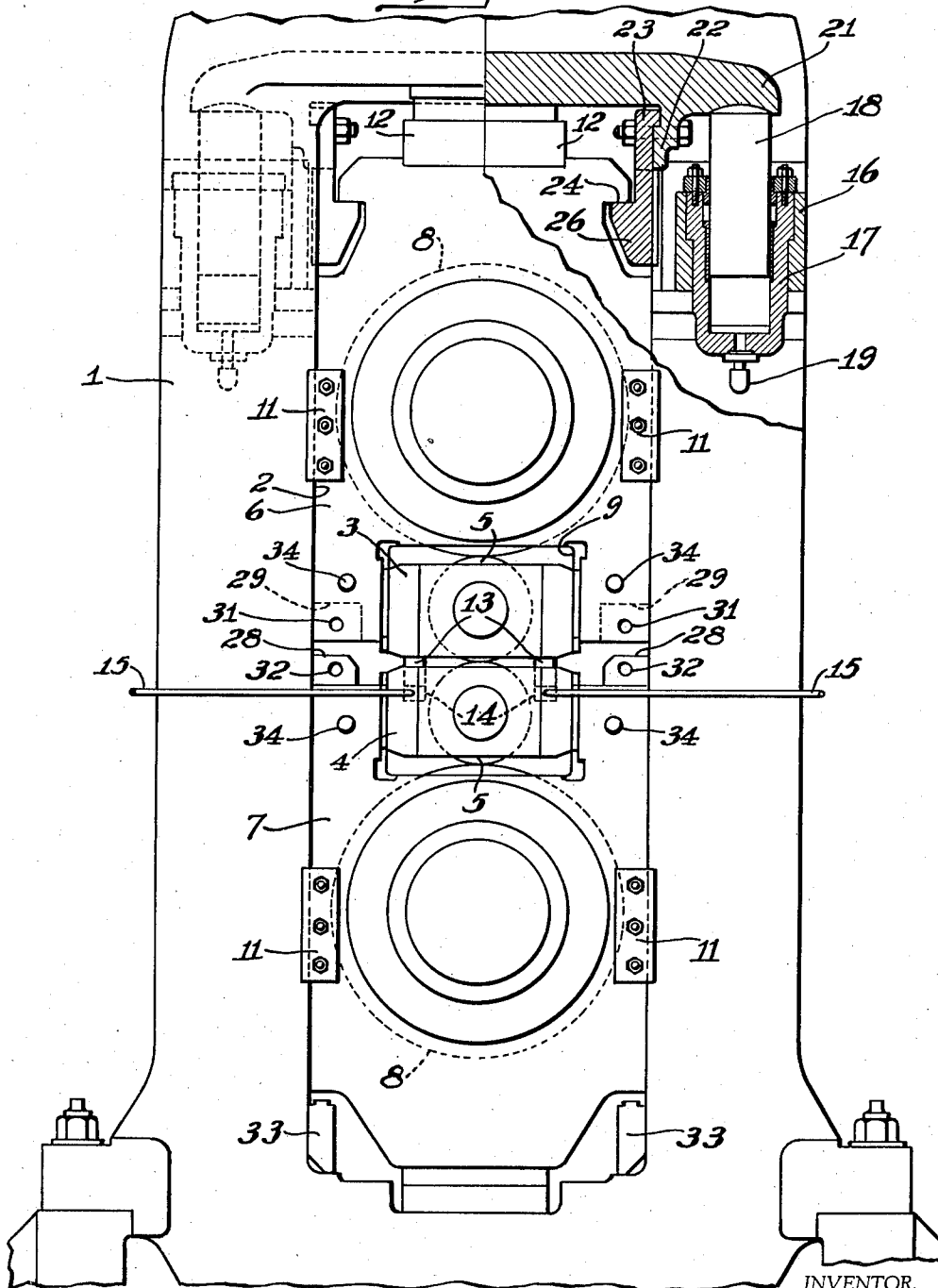
2,140,929

ROLLING MILL

Filed April 17, 1936

2 Sheets-Sheet 2

Fig. 2.



WITNESSES  
*A. Wallace.*  
*V. A. Peckham.*

BY

INVENTOR.  
*Howard H. Talbot*  
*Brown, Britchlow & Flick*  
his ATTORNEYS.

## UNITED STATES PATENT OFFICE

2,140,929

## ROLLING MILL

Howard H. Talbot, Pittsburgh, Pa., assignor to  
United Engineering & Foundry Company, Pitts-  
burgh, Pa., a corporation of Pennsylvania

Application April 17, 1936, Serial No. 74,920

14 Claims. (Cl. 80—56)

This invention relates to rolling mills, and more particularly to a roll balance for the uppermost roll of a mill. In patent application Serial No. 758,035, filed December 18, 1934, by Charles F. Bunte, a rolling mill is disclosed in which the upper backing roll chucks are supported against the screw-downs by hydraulic plungers between the backing roll chucks at each side of the mill, while similar plungers urge the working roll chucks apart. To permit the entire roll assembly to be removed as a unit from the housing, plungers are disposed below the lowermost roll chucks for raising the assembly so that a roll-changing carriage can be run under it to remove it from the housing. In that mill the roll-balancing plungers and the roll assembly elevating plungers are in the path of the constant shower of water and scale coming from the strip being rolled, whereby it is difficult to maintain the numerous plungers in proper working condition. Furthermore, in order to remove the rolls the hydraulic connections with the roll-balance plungers must first be disconnected.

It is among the objects of this invention to provide a rolling mill in which the upper roll is balanced by a roll balance disposed out of the path of scale and water, in which the entire roll assembly can be raised by said balance to permit a roll-changing carriage to be run under the assembly, in which it is unnecessary to disconnect the hydraulic conduits leading to the backing roll balance in order to remove the backing rolls, in which the balance is disposed between the sides of the roll housing and above the upper roll, and in which the number of balancing and elevating plungers is materially reduced.

The preferred embodiment of this invention is illustrated in the accompanying drawings in which Fig. 1 is an end view of a rolling mill constructed as contemplated by this invention; and Fig. 2 is a side view of the mill partly broken away to show an overhead roll balance in vertical section.

In accordance with this invention a rolling mill is provided with means for connecting its uppermost chucks to its lowermost chucks. A balance for the upper roll, preferably mounted above the shower of scale and water from the strip being rolled, is adapted to lift the upper and lower chucks and rolls as a unit when they are connected, whereby to permit roll-removing means to be inserted under the lower chucks for removing the entire roll assembly from the housing through its windows. Preferably, the balance is mounted between the sides of the housing and extends over the upper roll so that it is unnecessary to remove the hydraulic connections to the balance in order to permit the backing rolls to be removed from the housing.

Referring to the drawings, a mill housing 1 is

provided with the usual windows 2 in each of which are mounted chucks 3 and 4 for one end of the working rolls 5, and chucks 6 and 7 for the backing rolls 8. The working roll chucks are preferably nested in the backing roll chucks, as shown in Fig. 2, where the former are slidably mounted in recesses 9 in the latter. The backing roll chucks are normally retained in the housing window in any suitable manner, such as by latches or plates 11 overlapping the housing and bolted to the outer faces of the chucks which are thereby left free to be moved vertically in the housing. Upward movement of upper chucks 6 is limited by vertically adjustable screw-downs 12 of any suitable form extending downwardly through the top of the housing and into the windows where they engage the tops of the upper chucks.

To hold the upper working roll 5 firmly against the upper backing roll so that there will be no slippage between them and no chattering when material enters and leaves the roll pass, the two working rolls are constantly urged apart, preferably by plungers 13 slidably mounted in hydraulic cylinders 14 in the lower working roll chucks 4, the plungers bearing against the bottoms of upper roll chucks 3. The cylinders are connected by conduits 15 to a suitable source of hydraulic pressure.

It is a feature of this invention that upper backing roll chucks 6 are balanced, that is, held firmly against the bottoms of the screw-downs 12, by a roll balance which, instead of being mounted between the upper and lower backing roll chucks, is mounted in the upper part of the mill housing where it engages the upper backing roll chucks only. Accordingly, a block 16 is disposed at each side of the upper backing roll between the sides of the housing to which it is securely connected, as shown in Fig. 1. Mounted in each block is a cylinder 17 in which a plunger 18 is slidably disposed, the bottoms of the cylinders being connected by conduits 19 to a source of fluid pressure, such as hydraulic pressure. Extending through the mill housing and over the top of the upper backing roll is a heavy beam 21 the ends of which rest on the tops of the two plungers 18 (Fig. 2) by which the bar is adjustable vertically.

Spaced inwardly from the plungers the beam is provided with depending ribs 22 to which are rigidly connected upwardly extending portions of bars 23. Each bar extends from side to side of the housing through its windows, the upper portions of the upper backing roll chucks being provided in their sides with recesses which receive the bars and the upper walls of which form shoulders 24 (Fig. 2). Each bar is reinforced throughout its length by a rib 26 the end portions of which engage shoulders 24, whereby the upper

chucks are supported by bars 23 and the balance members associated therewith.

Sufficient fluid pressure is normally supplied to cylinders 17 through conduits 19 to cause plungers 18 to elevate roll balance beam 21 and bars 23 sufficiently for holding the upper chucks firmly against the screw-downs, and fluid pressure supplied to cylinders 14 in lower working roll chucks 4 causes plungers 13 to hold the upper working roll against the upper backing roll. When it is desired to remove the rolls from the mill housing the screw-downs are raised and enough additional fluid pressure is supplied to cylinders 17 to lift the upper backing roll off the working rolls which are then removed endwise through one of the housing windows after conduits 15 have been disconnected from chucks 4. The pressure in cylinders 17 is then released to lower the upper backing roll chucks onto the lower backing roll chucks to which, according to this invention, they are securely fastened in any suitable manner.

Preferably, as shown in Fig. 2, to permit the chucks to be thus connected each of the lower backing roll chucks 7 is provided on its upper surface with a pair of bosses 28 integral therewith and adapted to register with cooperating recesses 29 in the lower surface of upper chucks 6. The upper chucks are provided with openings 31 extending into recesses 29, and bosses 28 are provided with openings 32 which register with openings 31 when the upper chucks are resting on the lower chucks. Rods or pins (not shown) are inserted into these registering openings to connect the upper and lower chucks together to prevent them from separating. Fluid pressure is then admitted again to cylinders 17 to cause the roll balance beam and bars 23 to lift the upper and lower backing roll chucks and their rolls as a unit high enough to permit a roll-changing carriage (not shown) to be run on tracks 33 under the lower backing roll chucks. The pressure in cylinders 17 is then released, whereupon the roll assembly settles onto the carriage by which the assembly is pulled out of the housing through one of its windows.

If it is desired to remove the working rolls from the housing along with the backing rolls, rather than prior thereto, filler blocks are preferably inserted between the upper and lower backing roll chucks to prevent them from tipping, after which the upper and lower backing roll chucks are connected together in some manner to permit the working rolls and the lower backing roll to be lifted by the upper backing roll chucks so that a roll-removing carriage can be run under the entire roll assembly. A suitable way of connecting the backing roll chucks together when they are separated by the working rolls is by plates or hooks. For example, the outer faces of the backing roll chucks may be provided with bosses 34 adapted to project through openings in removable plates, (not shown) spanning the gap between upper and lower chucks 6 and 7 and detachably secured to the chucks in any suitable manner.

In a rolling mill constructed in accordance with this invention the balance for the upper backing roll is preferably disposed above that roll and between the sides of the housing so that the hydraulic connections to it do not have to be removed before the roll can be removed from the housing. Two plungers in this balance take the place of the four formerly used, and they are out of the path of scale and water showering off

from strip being rolled in the mill. These two plungers also supplant the two formerly located below the bottom backing roll chucks for raising the roll assembly to permit a roll-removing carriage to be run under it. In other words, two hydraulic plungers located in a desirable position take the place of six plungers located in undesirable positions, and these two plungers not only serve to balance the upper backing roll, but also raise the roll assembly as a unit when it is wished to run a roll-removing carriage under it. Furthermore, ribs 26 on bars 23 serve as tracks on which the uppermost chucks are guided into and out of the housing when the rolls are being changed.

According to the provisions of the patent statutes, I have explained the construction and mode of operation of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. In a rolling mill having upper and lower rolls journaled in chucks mounted in a housing, and screw-downs for engaging the upper chucks, a roll balance for the upper roll connected to said upper chucks, hydraulic pressure means causing said balance to hold said upper chucks against said screw-downs, and detachable means for connecting said upper chucks to the lower chucks, said hydraulic pressure being great enough to cause said balance to lift said connected chucks and rolls as a unit when said screw-downs are retracted, whereby to permit roll-removing means to be inserted under said lower chucks for removing said rolls and chucks as a unit endwise from said housing.

2. In a rolling mill having upper and lower rolls journaled in chucks mounted in a housing, a roll balance for the upper roll connected to the upper chucks, the opposing faces of said upper and lower chucks being provided with bosses and recesses adapted to telescope together, and means for locking said bosses in said recesses to connect said upper and lower chucks together, said balance being adapted to lift chucks and rolls as a unit when the chucks are connected.

3. In a rolling mill having upper and lower rolls journaled in chucks mounted in a housing, a roll balance for the upper roll connected to the upper chucks, the opposing faces of said upper and lower chucks being provided with bosses and recesses adapted to telescope together, the recessed chucks being provided with lateral openings into said recesses and said bosses being provided with openings registering with said first openings, and means adapted to be inserted in said registering openings for connecting said upper and lower chucks together, said balance being adapted to lift said connected chucks and rolls as a unit to permit roll-removing means to be inserted under said lower chucks for removing said rolls and chucks from said housing.

4. In a rolling mill having upper and lower rolls journaled in chucks mounted in the windows of a housing, a roll balance for the upper roll comprising a hydraulic cylinder disposed between the sides of the housing at each side of said upper roll, a vertically movable plunger disposed in each cylinder and projecting above it, a beam extending across the top of the upper roll and supported at its ends on said plungers, and a pair of sub-

stantially parallel bars supported by said beam, each of said bars being provided on its inner surface with a longitudinally extending rib, the end portions of each of said bars projecting into the housing windows, and the upper chucks being provided with recesses for receiving said end portions of the bars, said chucks resting on said ribs.

5 In a four-high rolling mill having working and backing rolls journalled in chucks mounted in a housing, a roll balance for the upper backing roll connected to its chucks, and means projecting from the outer faces of the upper and lower backing roll chucks for receiving chuck-connecting means, said balance being adapted to lift all of said chucks and rolls as a unit when the chucks are connected, whereby to permit roll-removing means to be inserted under said lower chucks for removing said rolls and chucks endwise from said housing.

20 6. In a four-high rolling mill having working and backing rolls journalled in chucks mounted in a housing, a roll balance for the upper backing roll connected to its chucks, and bosses integral with the upper and lower backing roll chucks and projecting from the outer faces thereof for receiving chuck-connecting means, said balance being adapted to lift all of said chucks and rolls as a unit when the chucks are connected, whereby to permit roll-removing means to be inserted under said lower chucks for removing said rolls and chucks endwise from said housing.

30 7. In a four-high rolling mill having working and backing rolls journalled in chucks mounted in a housing, the backing roll chucks being provided with recesses receiving the working roll chucks, a roll balance for the upper backing roll connected to its chucks, and bosses integral with the upper and lower backing roll chucks and projecting from the outer faces thereof at the sides of said recesses for receiving chuck-connecting means, said balance being adapted to lift all of said chucks and rolls as a unit when the chucks are connected.

45 8. In a rolling mill having upper and lower rolls journalled in chucks mounted in the windows of a housing, a roll balance for the upper roll comprising a hydraulic cylinder disposed between the sides of the housing at each side of said upper roll, a vertically movable plunger disposed in each cylinder and projecting above it, a substantially straight beam extending across the top of the upper roll and supported at its ends on said plungers, a bar extending transversely of said beam adjacent each end thereof and connected to the lower portion of the beam, said bars being substantially parallel with their end portions projecting into the housing windows, and means for connecting said end portions to the sides of said upper chucks.

60 9. A rolling mill comprising a pair of horizontally spaced upright housings, a bearing mounted in each housing, a horizontal roll supported at its ends in said bearings, the bearings and the roll being removable from the housings as a unit assembly in an endwise direction, guide means extending horizontally between the bearings to support the weight of the said unit assembly and to guide the same during removal and insertion thereof, means to apply upward force to the guide means, and adjustable means to limit the upward movement of the bearings under the influence of said force.

10. A rolling mill comprising a pair of horizontally spaced upright housings each having a window therein, a bearing mounted in each window, a horizontal roll supported at its ends in said bearings, the bearings and the roll being removable from the housings as a unit assembly in an endwise direction, a pair of rails parallel to the roll with their end portions located in the windows and engaging the bearings on opposite sides, the rails serving to support the weight of said unit assembly and to guide the same during removal and insertion thereof, means to apply upward force to the rails, and adjustable means to limit the upward movement of the bearings under the influence of said force.

15 11. A rolling mill comprising a pair of horizontally spaced upright housings each having a window therein, a bearing mounted in each window and shaped to provide flanges which project horizontally from opposite sides, a horizontal roll supported at its ends in said bearings, the bearings and the roll being removable from the housings as a unit assembly in an endwise direction, a pair of rails parallel to the roll with their end portions located in the windows, the rails engaging the lower surfaces of the flanges to support the weight of the said unit assembly and to guide the same during removal and insertion thereof, means to apply upward force to the rails, and adjustable means to limit the upward movement of the bearings under the influence of said force.

20 12. A rolling mill comprising a pair of horizontally spaced upright housings each having a window therein, a bearing mounted in each window and shaped to provide flanges which project horizontally from opposite sides, a horizontal roll supported at its ends in said bearings, the bearings and the roll being removable from the housings as a unit assembly in an endwise direction, a pair of rails parallel to the roll with their end portions located in the windows, the rails being L-shaped in cross section to provide shoulders which engage the lower surfaces of the flanges, these shoulders serving to support the weight of the said unit assembly and to guide the same during removal and insertion thereof, means to apply upward force to the rails, and adjustable means to limit the upward movement of the bearings under the influence of said force.

35 13. In a rolling mill having upper and lower rolls journalled in chucks mounted in a housing, a roll balance for the upper roll connected to the upper chucks, and means adapted to connect said upper chucks to the lower chucks, said balance being adapted to lift said chucks and rolls as a unit when the chucks are connected, whereby to permit roll-removing means to be inserted under said lower chucks for removing said rolls and chucks as a unit endwise from said housing.

50 14. In a rolling mill having upper and lower rolls journalled in chucks mounted in a housing, a roll balance for the upper roll connected to the upper portions of the upper chucks, and means adapted to connect said upper chucks to the lower chucks, said balance being adapted to lift said chucks and rolls as a unit when the chucks are connected, whereby to permit roll-removing means to be inserted under said lower chucks for removing said rolls and chucks as a unit endwise from said housing.

70 HOWARD H. TALBOT.