No. 749,745. PATENTED JAN. 19, 1904.

C. VON PHILP.

ROLLING MILL.

APPLICATION FILED SEPT. 10, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

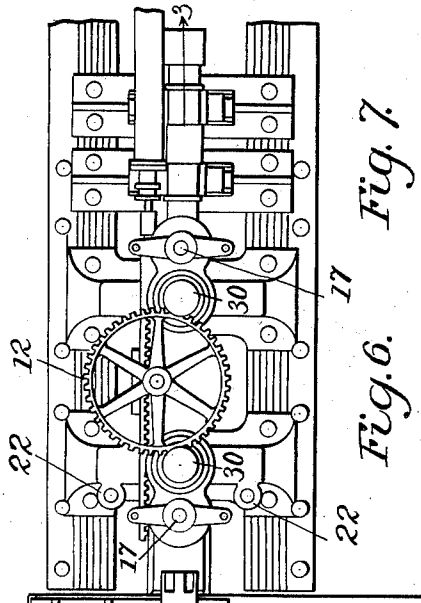


Fig. 7.

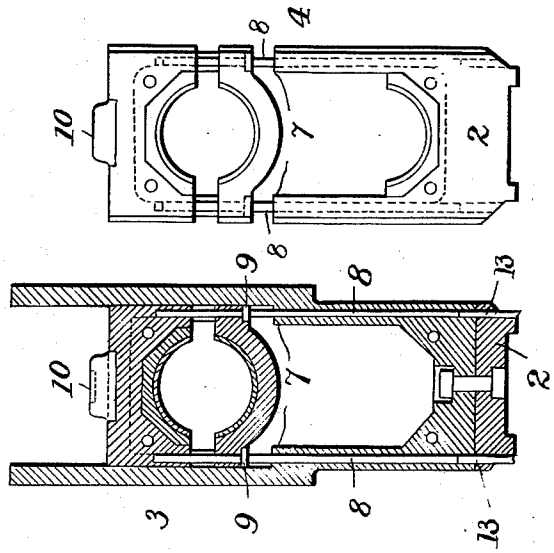


Fig. 6.

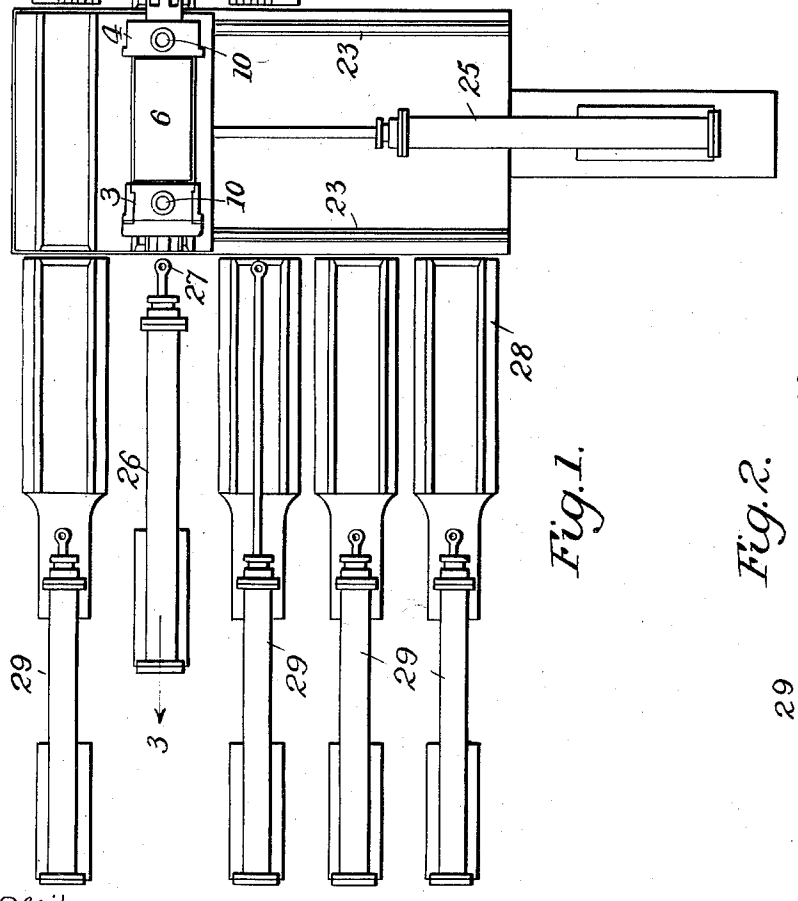


Fig. 1.

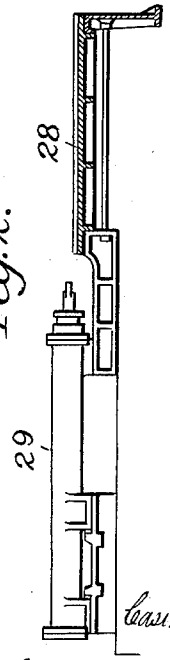


Fig. 2.

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NO MODEL. 3 SHEETS—SHEET 2.

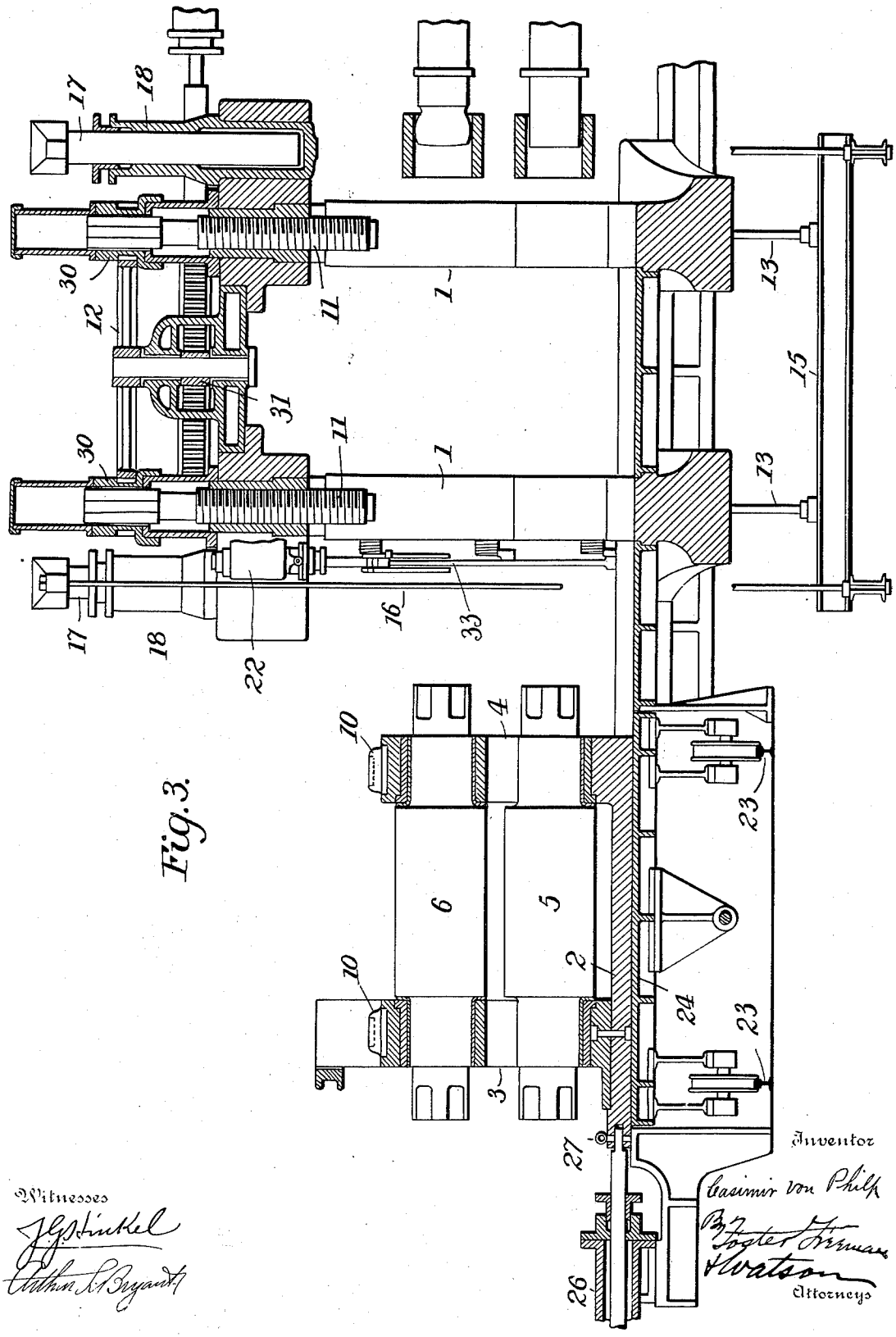


Fig. 3.

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ROLLING MILL.

NO MODEL. APPLICATION FILED SEPT. 10, 1903. 3 SHEETS—SHEET 3.

Fig. 4.

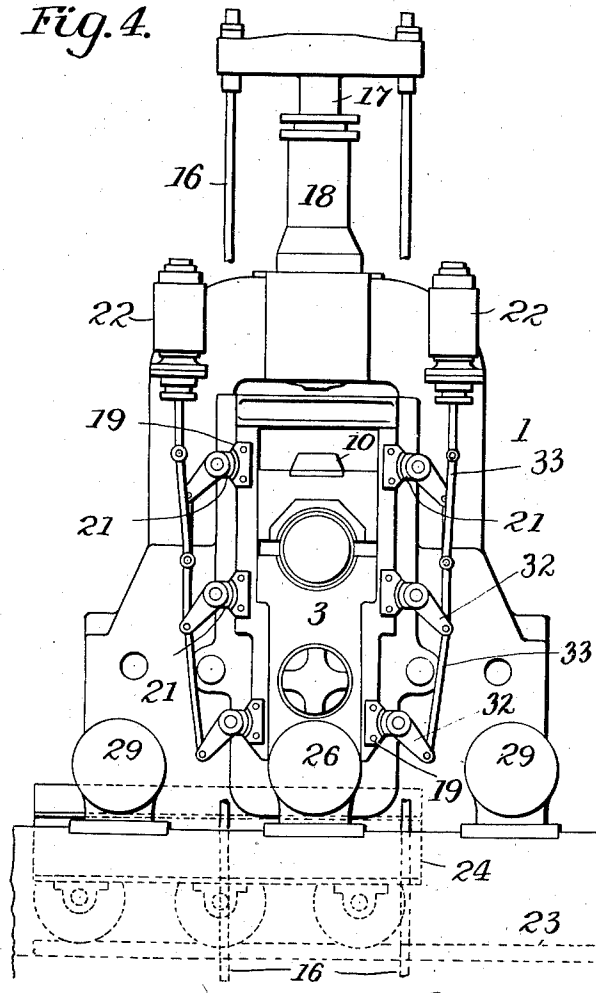
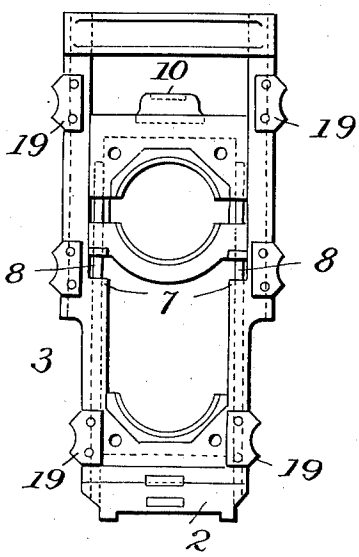


Fig. 5.



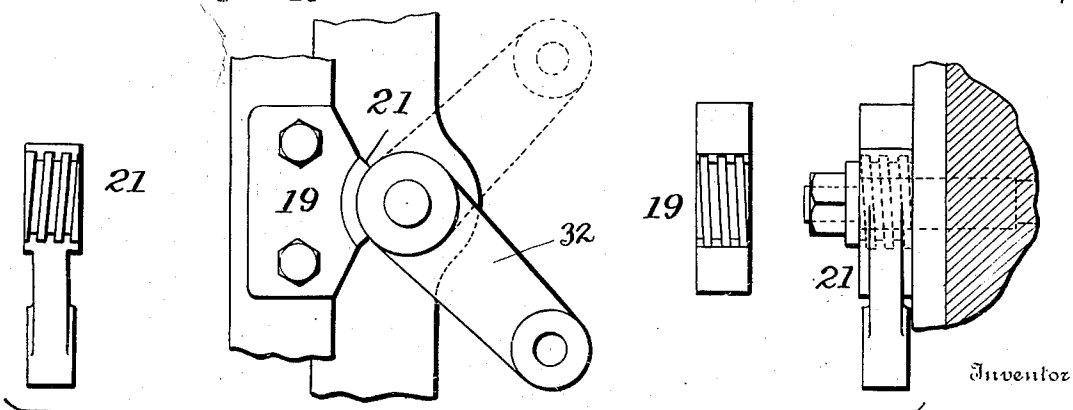


Fig. 8.

Witnesses
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No. 749,745. Patented January 19, 1904.

UNITED STATES PATENT OFFICE.

CASIMIR VON PHILP, OF WEST BETHLEHEM, PENNSYLVANIA, ASSIGNOR TO BETHLEHEM STEEL COMPANY, OF SOUTH BETHLEHEM, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

ROLLING-MILL.

SPECIFICATION forming part of Letters Patent No. 749,745, dated January 19, 1904.

Application filed September 10, 1903. Serial No. 172,641. (No model.)

To all whom it may concern:

Be it known that I, CASIMIR VON PHILP, a citizen of the United States, residing at West Bethlehem, in the county of Lehigh and State of Pennsylvania, have invented certain new and useful Improvements in Rolling-Mills, of which the following is a specification.

The present invention relates to an improvement in rolling-mills, and particularly to the provision of means by which a change of the rolls of a mill may be effected.

It is frequently desired to change the rolls of a rolling-mill in order that it may be adapted for rolling different shapes or sizes of material or to replace rolls which have become worn. The means and methods commonly used for effecting such a change require considerable time.

The primary object of the present invention is to provide means by which such a change can be made very rapidly.

In the accompanying drawings, Figure 1 is a plan view of a rolling-mill, showing the present invention applied thereto. Fig. 2 is an elevation of the manipulating-cylinders, showing a section through the bed on which is placed the roll-supporting frame, hereinafter described. Fig. 3 is a longitudinal vertical section on the line 3 3 of Fig. 1 on an enlarged scale. Fig. 4 is an end elevation of the rolling-mill on the same scale as Fig. 3. Figs. 5 and 6 are respectively an end elevation and a vertical section of the removable roll-supporting frame, the bearing for the upper roll being shown in an elevated position. Fig. 7 is an elevation of the inner end of the removable roll-supporting frame, the parts being in the same position as in Figs. 5 and 6. Fig. 8 shows the device for locking the removable frame to the mill-housing.

Referring to the drawings, in which like reference characters indicate corresponding parts in the several figures, there is illustrated a rolling-mill in which the housings 1 have openings or windows arranged to receive a removable frame. The rolls are mounted in suitable bearings and placed in said frame, which consists of a base 2 and uprights or standards 3 4. The bearings for the lower roll 5 are stationary and rest in the bottom of the uprights 3 and 4 of the removable roll-frame. The bearings for the upper roll 6 are carried in the inner housing 1 and in the upper part of upright 3 and in normal position rest on shoulders 7, but are capable of moving vertically to vary the distance between the working surface of the rolls, as may be desired. Two rods 8 extend from the lower section of the bearing for the upper roll down through passages in the uprights 3 and 4 and up into the upper section of the upper-roll bearings. The rods 8 are of suitable length so that in their lowest position they do not extend below the lower side of base 2. Directly under the rods 8 and alining with them are other rods, 13, which are suspended in passages in the housings 1 and mounted in frame 15. The rods 13 are of suitable length so that in their lowest position they will not extend above the lower side of base 2. The rods 8 being wholly within the movable frame and the rods 13 being wholly within the main housings of the mill, they do not offer any resistance to the moving of the frame carrying the rolls into and out of the mill.

When the upper roll 6 is raised, the frame 15 is lifted by the hydraulic cylinders 18 and plungers 17, which are connected to frame 15 by means of rods 16. The rods 13 are thus brought into contact end to end with the rods 8. The lower section of the bearing carrying the upper roll 6 is lifted from the shoulder 7 of the movable frame by means of rods 8, on which are collars or nuts 9, which are suitably seated in the lower section of the upper-roll bearing. The upper section of the upper-roll bearing is provided with a shoe 10, which abuts with the end of adjusting-screw or stop 11, which determines the extent of the upward motion of the said roll. The stops 11 are adjusted by means of the toothed collars 30, which are spline-connected with the said stops and engage with the gear 12, which is driven by the pinion 31, which in

turn is actuated by a rack and hydraulic cylinder, as shown in Fig. 1. This arrangement of adjusting the stops 11 is in common use. Means are provided for locking the removable roll-frame when in position in the mill from any lateral movement.

In the embodiment of the invention illustrated said frame is provided at the outer end with a plurality of plates 19, which are threaded to form segments of nuts. A series of pieces 21, threaded to form segments of screws, are pivoted to the outside of the mill-housing and are engaged with the threaded portion of the plates 19 by means of the hydraulic cylinder 22 through the levers 32 and rods or links 33, as shown. The locks thus act simultaneously and secure the removable frame containing the rolls against the mill-housing.

From the above description it will be seen that means are provided by which both of the rolls of the mill can be moved therefrom as a unit and that it is not necessary to remove any of the parts of the main frame of the mill when changing from one pair of rolls to another. The means for effecting such removal in a minimum amount of time will now be described.

23 designates a track which is arranged at one side of the mill adjacent the "window" therein through which the rolls are to be removed, and on this track is mounted a car or movable support 24. This car is connected to the piston of a hydraulic or other suitable power cylinder 25, by means of which it can be moved over the track 23. On the opposite side of the track 23 from the mill and in alinement with the aforesaid window there is arranged a hydraulic or other power cylinder 26, the outer end of the piston or plunger of which is adapted to extend into a suitable socket formed in the base 2 of the roll-supporting frame and to be secured therein by a removable pin 27.

Any suitable number of platforms or supports 28 are arranged on the same side of the track 23 as the power-cylinder 26, each of said platforms being adapted to support such a supplemental roll-supporting frame as has been described, and adjacent each of said platforms is arranged a hydraulic or other power cylinder 29, similar to the one 26.

In using the apparatus before described at least two roll-supporting frames are provided, the one not in use being mounted on a support or platform 28.

When it is desired to change the rolls or a mill, the rolls to be substituted for the ones in use are properly placed in the supplemental frame then on the platform 28. The car 24 is brought into alinement with said platform and the supplemental frame mounted thereon transferred to said car by operating the proper cylinder 29. The car is then, by means of its propelling-cylinder 25, brought into alinement with the cylinder 26 and the window in the end frame of the mill. The rod of the piston arranged in the cylinder 26 is connected to the base of the supplemental frame within the mill, and after the rods 13 and the locking-cams 21 have been withdrawn from operative position the said frame and the rolls are easily withdrawn from the mill. The pin 27 is then withdrawn and the car 24 adjusted on the track 23 to bring the second roll-supporting frame into alinement with the power-cylinder 26, and by proper actuation of the piston in said cylinder the frame and the rolls therein are moved from the car into operative position within the mill. The said frame containing the rolls is then secured in place by means of the locking device herein described. Such a change of rolls can by means of this invention be effected within an extremely short time and with a minimum of labor on the part of the mill attendants.

It will be apparent that this invention is not limited to the specific details of the construction of the embodiment thereof selected for illustration, but various modifications can be made without departing from the spirit of the invention. For instance, instead of employing a car 24, mounted on wheels, any other form of movable support might be employed.

Without limiting myself to the precise construction and arrangement of parts shown, I claim as my invention—

1. The combination of a rolling-mill having its rolls mounted in a frame that is movable through a window in one of the side frames of the mill, and means for moving said frame and the rolls therein to and from the mill through said window.

2. The combination with a rolling-mill provided with rolls that are movable endwise through a window in one of the housings or side frames thereof, a support for a pair of rolls arranged at one side of the mill, a transfer-car adapted to travel from said support to said window in the mill, and devices for moving a pair of rolls from said support to said car and from the car to the mill or vice versa.

3. The combination of a rolling-mill having its rolls mounted in a frame that is removable from the main frame of the mill, a support for such frame outside of the mill, and power devices for transferring said frame and the rolls mounted therein to and from the mill and said support.

4. The combination of a rolling-mill, having a window or passage formed in one of its side frames, a frame supporting a pair of rolls and adapted to be moved to and from the mill through said window, and means for locking said roll-frame in position in the mill.

5. In a rolling-mill, the combination of a main frame, a supplemental frame supporting the rolls and movable endwise in and out through a window in one of the sides of the main frame, and a series of locking devices

arranged on opposite sides of said window and engaging said roll-frame when the rolls therein are in operative positive.

6. In a rolling-mill, the combination of a main frame, a supplemental frame supporting the rolls and movable to and from the main frame, a series of locking-cams pivotally mounted on the main frame on opposite sides of the roll-frame therein, and means for simultaneously moving said cams into and from engagement with said roll-frame.

7. In a rolling-mill, the combination of a main frame, a supplemental frame supporting the rolls and movable to and from the main frame through a window or opening in one of the side frames thereof, a series of locking-cams pivotally mounted on the main frame on each side of said window, and provided with sectional screw-faces adapted to engage the sides of the roll-frame, and means for simultaneously moving said screw-faces to and from engagement with the roll-frame.

8. In a rolling-mill, the combination of a main frame, a supplemental frame adapted to move to and from the main frame through a window formed in one of the side frames thereof, a lower roll mounted in stationary bearings on said supplemental frame, an upper roll mounted in bearings that are adjustable vertically of said roll-frame, and means for adjusting said upper roll vertically and maintaining it in its adjusted position, said means comprising separable parts secured respectively to the main and supplemental frames of the mill, whereby the latter, and the rolls therein, can be moved to and from a position within the main frame.

9. In a rolling-mill, the combination of a main frame, a supplemental frame movable to and from engagement with the main frame, a pair of rolls mounted in bearings in said supplemental frame, the bearings of the upper roll being movable to and from the lower roll, adjustable stops for limiting the upward movement of said upper roll, and means on the main frame for moving the bearings of said upper roll against said stops.

10. In a rolling-mill, the combination of a main frame, a supplemental frame movable to and from engagement with the main frame, a pair of rolls mounted in bearings in said supplemental frame, the upper roll being adapted to move vertically in said frame toward and from the lower roll, means on the main frame for moving the upper roll away from the lower roll, and means for withdrawing said lifting means from engagement with the supplemental frame when it is desired to withdraw the latter from the mill.

11. In a rolling-mill, the combination of a main frame, a supplemental frame adapted to slide through a window in one of the sides of the main frame, a pair of rolls mounted in bearings in said supplemental frame, rods extending downward from the bearings of the upper roll, rods mounted in guides on the main frame in alinement with the rods in the supplemental frame when the latter is within the mill, and means for moving said rods vertically to adjust the upper roll to and from the lower roll.

12. The combination of a rolling-mill having its rolls mounted in a frame that is movable endwise in and out from the main frame of the mill, a support for such supplemental frame and rolls at one side of the mill, a hydraulic or other power cylinder, and a piston arranged in said cylinder and adapted to be detachably connected to said supplemental frame to move it and the rolls therein from the mill onto said support, or vice versa.

13. The combination of a rolling-mill having its rolls mounted in a frame that is movable endwise in and out through a window in a side of the main frame of the mill, a hydraulic or other power cylinder arranged opposite said window in the frame of the mill, a piston fitted in said cylinder and adapted to be connected to the said roll-frame, and a movable support for said roll-frame and rolls arranged between the mill and said power-cylinder.

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

CASIMIR VON PHILP.

Witnesses:
C. M. YOUNG,
ROBERT PALM.