This invention relates to supports for rolling mill spindles. The spindles used in rolling mill sets are ordinarily integrally driven from an adjacent pinion stand through separate floating spindles having so-called "wobbler" couplings at each end which function to freely accommodate relative displacement between spindles. The spindles are rather long and heavy and the coupling parts rather loosely interengaged, with the result that the latter are subjected to severe pounding and destructive wear during normal operation. In an effort to remedy this, various attempts have heretofore been made to support and steady the spindles, but none have proven entirely satisfactory.

An aim of the present invention is to provide a new and improved means for supporting and steadying rolling mill spindles.

A more specific object is to provide a unitary support for both spindles and of a design sufficiently flexible to accommodate normal spindle and roll movements.

Other more specific objects and advantages will appear, expressed or implied, from the following description of a spindle support constructed in accordance with this invention:

In the accompanying drawings:
Figure 1 is a side elevation of a spindle support embodying the present invention, and shown applied to the spindles of a conventional rolling mill.

Fig. 2 is a vertical transverse sectional view taken substantially along the line 2—2 of Fig. 1.

Fig. 3 is a vertical sectional view of one of the pedestals shown in Figs. 1 and 2.

The spindle support selected for illustration is designed to support a pair of upper and lower spindles 10 and 11, respectively connected at one end to conventional rolls 12 and 13 through wobbler couplings 14, and also connected at the opposite end through wobbler couplings 15 with a conventional pinion stand 16 from which they are driven. In this instance, each spindle is reduced, as at 17, midway of its end to receive a semi-cylindrical bearing 18 seated in a semi-circular stirrup 19 by which the spindle is steadied and supported. A semi-circular retainer 20, carried by each stirrup, loosely overlines the reduced portion 17 of each spindle.

Each stirrup 19 is rockably supported by a pair of diametrically disposed studs 21 fixed in and projecting horizontally from the upper ends of the stirrup. Each stud 21 of the upper stirrup 19 is rockably engaged in the end of a horizontal positioning link 22 and in the upper end of an upright supporting link 23. The studs 21 of the lower stirrup 19 are rockably engaged in similar positioning links 24 and also in the forward ends of floating levers 25, which in turn are pivotally connected at their rear ends with the lower ends of the upright links 23. Both pairs of positioning links 22 and 24 extend forwardly to the pinion stand 16 where they are rockably supported upon suitable horizontal pivot pins 26 mounted in fixed brackets 27, and the upright links 23 are preferably interconnected by suitable cross bracing 28 to form a rigid frame which serves to stabilize the linkage structure just described.

Each of the floating levers 25 is rockably supported midway of its end upon an appropriate resilient pedestal. In this instance each pedestal comprises an upright cylindrical barrel 29, rigidly supported by a common base plate 30, and each having a piston 31 closely fitted within the upper end thereof and supported by a suitable spring 32 within the barrel. Each piston 31 is guided by a retainer pin 33 extending there-through and engaged in slots 34 formed in the barrel.

In this instance each lever 25 is confined in a slot 35, provided in the projecting end of the piston 31, and rests upon the base 36 of the slot which is preferably curved or otherwise fashioned to provide an appropriate fulcrum for the lever.

It will of course be understood that the load imposed by the lower spindle 11 upon the stirrups 19 is sustained directly by the forward end of the levers 25; that the load imposed by the upper spindle 10 upon its stirrup 19 is sustained by the rear ends of the levers 25 to which such load is transmitted through the links 23; and that the total load imposed by both spindles is sustained by the resilient reaction of the pedestals against the levers 25 at their midpoints. It will be further noted that the same resilient means serves to support both spindles while permitting either spindle to move independently of the other.

The spindle support shown is also capable of performing an additional function, namely, that of aligning the ends of the spindles with the mating ends of the rollers 12 and 13 during assembly of the rolls in the mill. Replacement of rolls is at best a heavy time-consuming task and anything that will expedite and reduce the time ordinarily consumed in that operation is of tremendous importance. The rolls are ordinarily
withdrawn and replaced lengthwise through that side of the mill opposite the driving spindles 10 and 11, and when the rolls are withdrawn, the spindles, with their coupling halves 14, ordinarily drop into positions where they do not register with the ends of the rolls being replaced. The spindle support shown includes means for elevating the spindle ends into roll receiving positions, such elevating means being controllable from any convenient location, such as the remote side of the mill through which the rolls are entered.

For this purpose the barrels 29 of both pedestals may be supplied with fluid pressure through a pipe 35 connected thereto and connectable to an appropriate fluid pressure source through a pipe 36. The pipe 36 contains an appropriate control valve 37 preferably disposed adjacent the far side of the mill. Compressed air is preferably employed as the fluid pressure medium. Each barrel 19 is also equipped with an exhaust cock 38.

The arrangement is such that the springs 32 within the pedestals 29 sustain only a part of the total weight of the spindles so that when the rolls 12 and 13 are withdrawn therefrom the ends of the spindles drop somewhat below the normal levels of the rolls. When replacing the rolls the spindles may be elevated to the normal levels of the rolls by opening the valve 31 and thereby admitting fluid pressure to the barrels 29 beneath the pistons 31. During this operation both exhaust cocks 38 are preferably opened slightly so as to permit air to escape slowly from the barrels, whereupon the pistons 31 may be raised or lowered to the exact level desired merely by regulating the rate of flow of fluid through the valve 37.

Various changes may be made in the embodiment of the invention hereinafter specifically described without departing from or sacrificing the invention as defined in the appended claims.

I claim:
1. A steady support for the roll driving spindles of a rolling mill, comprising the combination of a separate supporting element for each spindle, and unitary supporting means for said elements, including a floating member for sustaining the loads on said elements while permitting free relative movement therebetween in accordance with spindle movements.

2. A steady support for the roll driving spindles of a rolling mill, comprising the combination of a separate supporting element for each spindle, unitary supporting means for said elements, including a member for sustaining the loads on said elements and rockable to accommodate relative movement therebetween, and a resilient support for said member.

3. A steady support for the roll driving spindles of a rolling mill, comprising the combination of a separate supporting element for each spindle, a lever, a yieldable fulcrum for said lever intermediate the ends thereof, means through which the load on one of said elements is transmitted to one end of said lever, and means through which the load on the other of said spindles is transmitted to the other end of said lever.

4. A steady support for the roll driving spindles of a rolling mill, comprising the combination of a separate stirrup disposed intermediate the ends of each spindle to support the same, rocker mechanism for supporting said stirrups, yieldable fulcrum means for said mechanism, means for transmitting the load from one of said stirrups to said rocker mechanism at one side of said fulcrum, and means for transmitting the load from the other of said stirrups to said rocker mechanism at the other side of said fulcrum.

5. In a rolling mill having roll driving spindles, the combination of a separate supporting element for each spindle, unitary supporting means for said elements including a member for sustaining the loads on said elements and rockable to accommodate relative movement therebetween, and a resilient support for said member including fluid pressure means controllable to raise and lower said spindles at will.

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