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ROLLING MILL CONNECTER

Filed Nov. 17, 1931

2 Sheets-Sheet 1

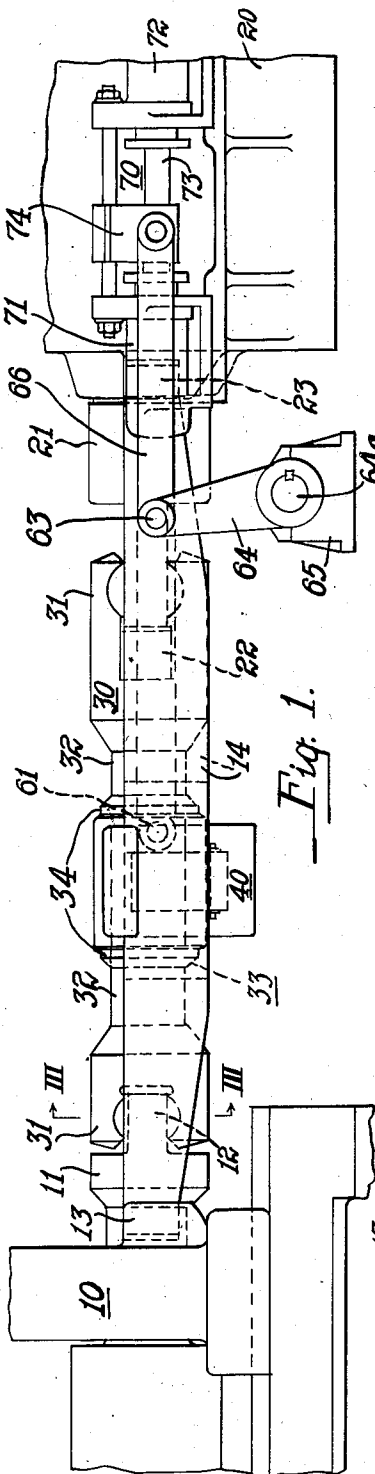


Fig. 1.

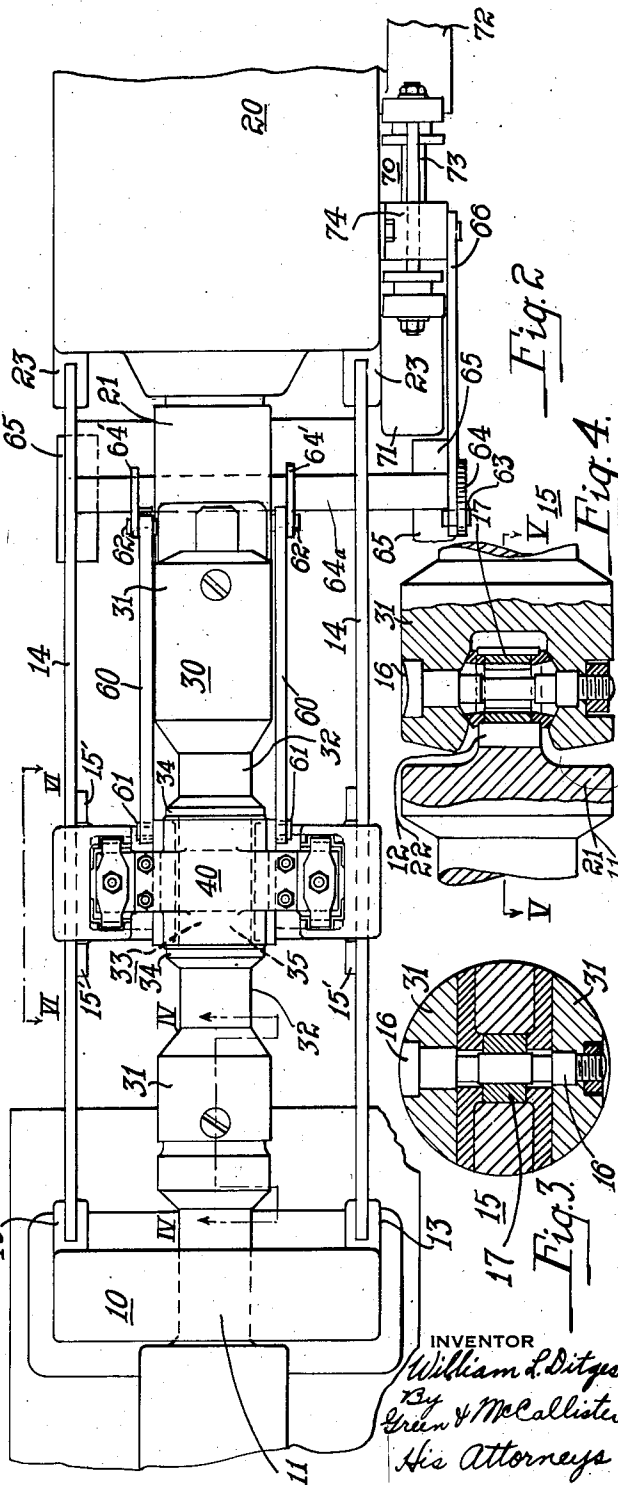


Fig. 2.

Fig. 4.

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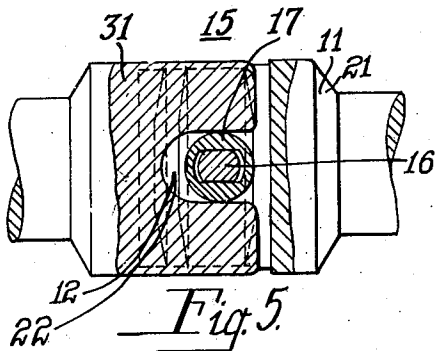
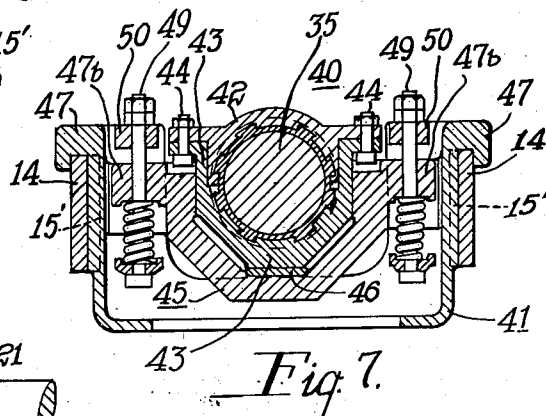
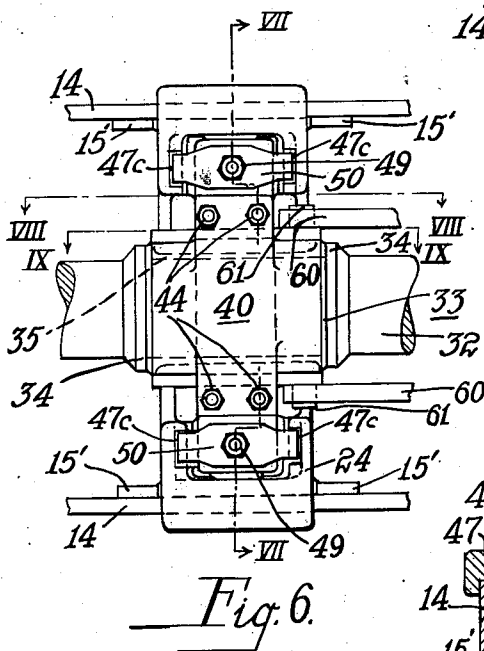
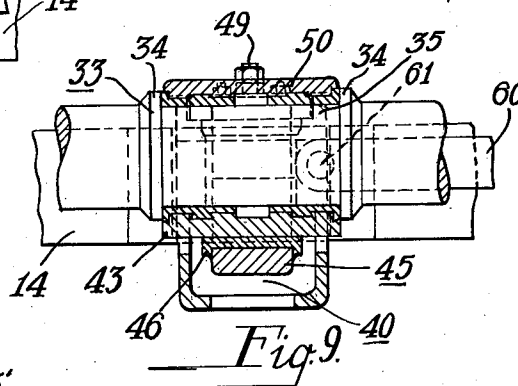
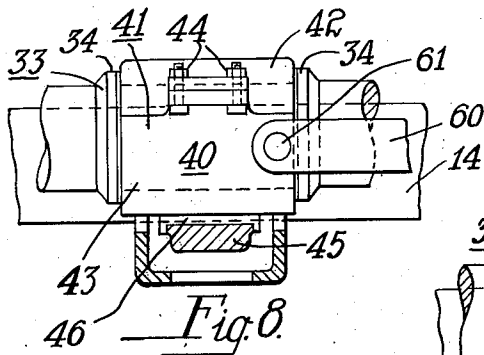
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

1,985,405

ROLLING MILL CONNECTER

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Application November 17, 1931, Serial No. 575,499

25 Claims. (Cl. 64—91)

This invention pertains to rolling mills, and more particularly, to an improved form of disengaging connection between driving and driven members thereof.

Previous to the present invention, there have been different types of mechanisms for the purpose of connecting and disconnecting mill spindles from their driving pinions and from the associated rolls driven thereby.

One type of mechanism makes provision for assembly and disassembly by moving the spindle and its carrier; another type maintains the spindle carrier in a stationary relation, and the journaled portion of the spindle is moved back and forth within its bearing.

The first type is disadvantageous, in that the spindle carrier is necessarily a large and heavy casting, and thus renders the construction of an efficient operating slide and associated mechanism quite cumbersome. The second type requires a spindle having a journal surface of about twice the ordinary width; and, a shoulder will be formed by the continual rotation in one position, and more readily so, due to the presence of dirt, grit, scale, and the like; aside from this, the shoulder hinders easy passage of the spindle through the bearing.

For these reasons, I have endeavored to devise an improved form of connection which will have the advantages of the previously devised types and will eliminate their disadvantages.

An object of my invention has been to devise an improved form of spindle shifting mechanism of simplified construction.

And, it has been another object of my invention to devise a spindle shifting mechanism whereby the bearing shell remains stationary with respect to the associated journaled portion of the spindle.

Another object of my invention has been the provision of a spindle slide mechanism whereby the bearing support remains stationary.

A further object of the present invention has been to devise a driving spindle for rolling mills that is slidable with its associated bearing within the bearing support.

A still further object has been to provide a spindle slide mechanism having longevity of parts, that is positive in operation, easy of manipulation, sensitive and efficient in action, and simple in design and construction.

These and many other objects will appear to those skilled in the art from the following description taken in conjunction with the accompanying drawings, in which:

Figure 1 is a side view in elevation of a preferred form of my invention, showing it in a mounted position;

Fig. 2 is a top plan view of Fig. 1;

Fig. 3 is an end section taken along the line III—III of Fig. 1;

Fig. 4 is a side section taken between the lines IV—IV of Fig. 2;

Fig. 5 is a view of the feature of Fig. 3, but shows a top instead of a side section and is taken along line V—V of Fig. 4;

Fig. 6 is a top view of a section taken between lines VI—VI of Fig. 2;

Fig. 7 is an end sectional view taken along the line VII—VII of Fig. 6;

Fig. 8 is a side view partially in section and is taken along line VIII—VIII of Fig. 6; and

Fig. 9 is a side center section taken along line IX—IX of Fig. 6.

The specific embodiment of my invention chosen for the purpose of illustration includes a spindle 30, at one end coupled or secured by a universal joint to a roll neck 11 and at the other end coupled or secured to driving pinions 21.

The spindle 30 includes female or mouth universal joint portions 31 of enlarged diameter at each end thereof for connecting up with the male universal joint portions 11 and 21 of a driving pinion unit 20 and a driven roll unit 10.

Near its substantial center, the spindle has been provided with a journal portion 33, having a somewhat larger diameter than the adjacent portions 32 of the spindle; the portion 33 is provided with annular guide ridges 34 at each end thereof and a central seat portion 35 having a lesser diameter than the ridges. These provisions have been made particularly to facilitate longitudinal movement of the spindle.

For rotatably supporting or journaling the portion 33, a bearing box unit or container, designated in its entirety by 40, is provided. In order to securely position the unit 40, the oppositely facing ends of the mill housing 10 and the pinion housing 20 are each provided with a pair of spaced, upwardly-open, slotted, supporting brackets 13 and 23 in which the extending ends of two, parallel and oppositely-spaced bridging-beams or members 14 are adapted to rest (see Figs. 1 and 2). That is, the bridging members 14 are disposed to extend from opposite ends of the respective housings 10 and 20 and to rigidly support the bearing box unit 40 therebetween.

The bearing supporting box unit or container 40 which is supported by the bridging members 14, and in turn, which supports the spindle 30 at 55

the journaled portion 33 thereof, is designed to slide within itself in order that it may be employed for connecting and disconnecting the spindle from the associated driving member 20 and/or driven member 10 (see Figs. 6 and 7); it includes primary, secondary, and tertiary members. The primary or transversely extending guideway supporting member 41 is at each end securely and non-slidably mounted on and suspended between the bridging members 14 by downwardly bent flanges 47 and by small stops or wedges 15' that may be welded or in any other suitable manner secured in position (see Figs. 2 and 6). As shown, the primary member 41 is somewhat centrally grooved, slotted or cut out to suitably receive the secondary and tertiary members.

The secondary, guideway or slide supporting member 45 is somewhat resiliently suspended or held in transverse position with respect to the spindle by suitable spring bolts 49 at one end extending through and below outwardly-projecting oppositely-disposed lips 47^b and at the other end, supported within oppositely disposed, longitudinally extending clamps or positioning bars 50. It will be noted that the primary member 41 is provided with slotted out steps or depressions 47^c (see Fig. 6) to loosely receive and support the opposite ends of each clamp or bar 50 therein and prevent excess slide thereof within the plane of the primary member. Of course the nuts of bolts 49 may be tightened and loosened as desired to adjust the tension of the springs, and thus, to adjust the relative positioning between the primary member 41 and the secondary member 45.

The above mentioned resilient suspension feature of the secondary member 45, not only permits automatic adjustment for wear, but also prevents any binding of the tertiary sleeve slide, and/or journal member 43. In order that the tertiary member 43 may slide within the secondary member 45, or vice versa, they are provided with somewhat central portions (see Fig. 7) of U-shaped, trough-like, or complementary concave outline, whose inclined surfaces are somewhat complementarily slotted or cut out; and, the lower, flat, supporting face of the secondary member 45 is slotted to receive a longitudinally extending bearing strip 46 therein. The tertiary member 43 has an ordinary form of journal cap 42 rigidly secured thereto by suitable demountable bolts 44; both the cap and member are, of course, suitably babbitted.

As shown in the drawings, the secondary member abuts or immediately receives a portion of the outer surface or periphery of the tertiary member, and both the primary and secondary members may extend substantially co-axially along the longitudinal (or working) axis of the spindle and lie within or between the longitudinal and transverse planes of such spindle member. But, my invention is not limited to the exact specific locations above-enumerated, particularly, those last mentioned.

As shown in Figures 1, 2, and 6, the spindle 30 and its associated journal or tertiary member 43 are adapted to slide as a unit within the slide supporting or secondary member 45. In order to accomplish this result, any suitable form of slide motivating mechanism may be successfully utilized, although for the purposes of illustration, I have shown a hydraulic device 70 having cylinders 71 and 72, a piston 73, and a cross-head 74 secured thereto. A lever mechanism is employed to connect the driving unit 70 with the tertiary or slide member 43; it includes: a connecting

rod 66 pivoted at one end to the cross-head 74 and at the other end by a pin 63 to a lever 64 keyed to a shaft 64^a, two mounting stands 65 journaling each end of the shaft 64^a, a plurality of levers 64' disposed in spaced relation along the shaft 64^a and keyed thereto, oppositely disposed connecting rods 60 pivoted at one end by pins 62 to the levers 64' and pivotally secured at the other end, 61, to the tertiary member or slide 43.

To allow the spindle or connecting member 30 to be slid into and out of engagement with the driven member 11, the universal joints 15 have a special construction (see Figs. 1-5). The male tongues 11 and 21 each have a slotted center portion 12 and 22 that receives a mounting bolt 16 removably positioned to extend through opposite legs of the mouth 31 of the spindle 30, and also receives a sliding shank sleeve 17 in which the bolt 16 is held. The length of slots 12 and 22 in the tongues, is enough to allow the necessary sliding clearance, taken separately and in conjunction with the universal joint 15 at the other end of the spindle 30.

It will thus be seen that the connecting rod 66 oscillates the shaft 64^a through the lever 64, which in turn oscillates the shaft 64^a, the levers 64', and connecting rods 60. The movement of the latter will push and/or pull the tertiary or slide member 43 along the secondary or slide supporting member 45; and thus, the spindle 30, its journaled portion 33, and the associated journal or slide member 43 are moved as a unit within the support member 45 and are changed as to their longitudinal positioning with respect to the associated driving unit 20 and driven unit 10. As a result, the mounting bolts 16 of the mouth 31 slide within the slots 12 and 22 of the tongues 11 and 21, until the necessary clearance is accomplished.

Although, for the purposes of illustration, I have found it advisable to show only a single bearing unit 40, yet, the number may be increased to the number of spindles in line when found advisable. That is, a plurality of units 40 may be mounted in spaced relation along the bridging members 14 and may be operative through suitable lever mechanisms from either stand 10 or 20, or from an independent stand or the like. Nor is my invention limited to the peculiar form of supporting structure shown, as in some cases it may be advantageous to support the bearing unit 40 on the floor of the mill, or on a special bed plate; the slide motivating mechanism may likewise be mounted in any suitable location. Such mentioned changes as well as many others will be apparent to those skilled in the art.

While I have described but one embodiment of my invention, it will be apparent that many changes, modifications, substitutions, additions, and omissions, or combinations thereof may be made in this device without departing from the spirit and scope of the invention as indicated in the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a coupling unit, the combination of driving and driven members, an intermediate member connecting said driving and driven members, a unit for moving said intermediate member with respect to said driving and driven members, said unit including a bearing portion journaled to said intermediate portion, and an adjacent abut-

ting portion, said bearing portion being movably supported within said abutting portion.

2. In a coupling layout having a member releasable by a slide with respect to an adjacent member, of a unit for supporting said member, said unit including a sleeve journaled to said member, and an adjacent carrier slidably abutting and immediately receiving said sleeve, and means cooperating with said sleeve for sliding said sleeve and said releasable member with respect to said carrier.

3. A rolling mill having in combination driving and driven members, a spindle having slidable couplings for connecting up said driving and driven members, said spindle having a bearing portion, a journal member having an upper and lower half, a slide support member, said lower half having an outer face disposed to slide within said slide support member, and means for moving said bearing member within said slide support member, so that said spindle may be readily disconnected from said driving and/or driven members.

4. A rolling mill having in combination driving and driven members, a spindle having slide coupling means for connecting said driving and driven members, at least one container means journaled to said spindle, said container means including therein a slide member having a bearing contact surface and a slide support member having a slide contact surface, and means pivotally secured to said slide member for actuating it.

5. A rolling mill having in combination driving and driven members, a spindle having slidable couplings for connecting said members, said spindle having a bearing portion, and means journaled thereon, the lower half of said means having a convex outline and being disposed to slide within a suitable supporting member, and operating means pivotally secured to said journaled means for actuating it, so that said spindle may be readily disconnected from said driving and driven members.

6. A rolling mill having in combination driving and driven members, a spindle having a female slide coupling at either end thereof, said driving and driven members having a male coupling at one end thereof for cooperating with the female coupling of said spindle adjacent thereto, said spindle having a journal portion of a larger diameter than the normal portions thereof, and a bearing box journaling said spindle, said box including a slide member and a supporting portion therefor, said slide member having a bearing surface in contact with the journaled portion of said spindle, the lower face of said bearing member having a trough-like form and being adapted to slide within its said supporting portion, so that said spindle may be connected and disconnected from said driving and driven members without changing the positions of the latter.

7. A rolling mill having in combination driving and driven members, an intermediate member having a movable coupling for connecting said driving and driven members, a journal member supporting said intermediate member between said driving and driven members, a carrier member slidably supporting and abutting said journal member adjacent the outer surface thereof, and means for resiliently supporting said carrier member.

8. A mill having in combination driving and driven members, and an intermediate member slidably connecting said driving and driven mem-

bers, and means for sliding said intermediate member with respect to said driven and driving members for disconnecting them, said means including a portion journaling said intermediate member, and a resiliently mounted portion supporting said journaling portion, said journaling portion being slidable in the direction of the major axis of said intermediate member within said resiliently mounted portion.

9. A mill having in combination driving and driven members, an intermediate member slidably coupling said driving and driven members together, and means for sliding said intermediate member with respect to said driving and driven members and disconnecting said intermediate member therefrom, said means including a portion mounted on said intermediate member, and a portion resiliently and slidably supporting said first-mentioned portion.

10. In a coupling layout having driving and driven members, and an intermediate member for connecting said driving and driven members, the combination of a unit for moving said intermediate member with respect to said driving and driven members, said unit including a member journaling said intermediate member, and a trough-shaped member slidably receiving said journaling member, said journaling and trough-shaped members having complementary slotted-out portions terminating in a bottom portion, and a bearing insert mounted in one of the bottom portions for cooperating with the other bottom portion.

11. A rolling mill having in combination driving and driven members and suitable housings therefor, a spindle member connecting said driving and driven members, and bridging members disposed to extend across from and between and above the floor level of the housings of said driving and driven members, means mounted on said bridging means for rotatably, and along the major axis thereof, slidably supporting said spindle member therein, and means for sliding said last-mentioned means, so that said spindle may be disconnected from one of the above-mentioned members.

12. A rolling mill having in combination driving and driven members and suitable housings therefor, a spindle member connecting said driving and driven members, and bridging members disposed between and above the floor level of the housings of said driving and driven members and rotatably and slidably supporting said spindle member therein, means for sliding said spindle member which includes a driving unit mounted on one of the above-mentioned housings, an operating shaft, a connecting rod directly connected between said driving unit and said operating shaft, and a plurality of spaced and oppositely positioned connecting rods at one end mounted on said operating shaft and at the other end cooperatively associated with said bridging members.

13. A rolling mill having in combination driving and driven members and suitable housings therefor, a spindle having slidable couplings for connecting up said driving and driven members, said spindle having a journaled portion, bridging members disposed between the respective housings of said driving and driven members, a bearing box secured between said bridging members and having a contact portion rotatably positioned upon the journal portion of said spindle, said contact portion being slidable within another portion of said bearing box, so that said spindle

may be readily disconnected from said driving or driven members.

14. A rolling mill having in combination driving and driven members and suitable housings therefor, bridging members disposed to extend between slotted brackets extending from the opposite ends of the housings of said respective driving and driven members, a spindle member provided with suitable couplings for connecting said driving and driven members, means supporting said spindle having slidable and non-slidable members, said slidable member including a bearing contact surface for journaling said spindle, said non-slidable member being a slide supporting member and being rigidly secured between said bridging members.

15. A rolling mill having in combination driving and driven members and suitable housings therefor, a spindle provided with slide couplings for connecting said driving and driven members, said spindle having a bearing portion, bridging members disposed to extend between and above the floor level of the respective housings of said driving and driven members, said members being provided with a journaling member for supporting the bearing portion of said spindle therein, said journaling member including portions one of which is slidable with respect to the other and means for actuating the slide portion of said journaling member, so that said spindle may be readily disconnected from one of said members.

16. In a coupling layout, the combination of driving and driven members, an intermediate member slidably connecting said driving and driven members, and means for sliding said intermediate member with respect to said driving and driven members; said means including a member mounted on said intermediate member, a member slidably supporting said first-mentioned member, and a member loosely receiving said second-mentioned member.

17. In a coupling layout, the combination of driving and driven members, an intermediate member connecting said driving and driven members, and means for sliding said intermediate member with respect to said driving and driven members; said means including a portion journaled to said intermediate member, a second portion slidably supporting said journaled portion, and a third portion resiliently supporting said second portion.

18. A mill having in combination driving and driven members, an intermediate member slidably connected therebetween, and means for sliding said intermediate member with respect to said driving and driven members and disconnecting said intermediate member from said driving and driven member, said means including a portion mounted on said intermediate portion, a portion slidably supporting said mounted first-mentioned portion, and another supporting portion, said second-mentioned portion being movably mounted with respect to at least one of said-mentioned portions.

19. In a mill having driving and driven members, an intermediate member slidably connected therebetween, and means for sliding said intermediate member with respect to said driving and driven members and disconnecting said intermediate member from said driving and driven members; said means including a primary and guideway supporting member, a secondary and guideway member resiliently suspended in a transverse position with respect to said intermediate member upon said primary member, said

primary member being slotted for cooperatively receiving said secondary member, a tertiary member rotatably and non-slidably mounted on said intermediate member and slidably mounted with respect to said secondary member.

20. In a coupling layout having driving and driven members, and an intermediate member provided with movable couplings for connecting up said driving and driven members, the combination of a unit for moving said intermediate member with respect to said driving and driven members, said unit including a primary member of trough-shape having a longitudinally slotted-out portion near each transverse end thereof, a secondary and slide support member of trough-shape, and clamps adapted to be mounted within the longitudinally slotted-out portions of said primary member and to support said secondary member therein, and a tertiary member for journaling said intermediate member, said tertiary member being slidable within said secondary member.

21. A rolling mill having in combination driving and driven members and suitable housings therefor, a spindle member connecting said driving and driven members, and oppositely disposed and spaced bridging member disposed to extend across from and between the housings of said driving and driven members, and means suspended from said bridging members, said means including a member journaling said spindle member, and including a member adjustably supporting said journaling member.

22. A rolling mill having in combination driving and driven members and suitable housings therefor, a spindle member connecting said driving and driven members, a pair of spaced and substantially parallel bridging members disposed to extend across and between the housings of said driving and driven members, said bridging members being spaced from the floor level of the mill, and means carried by said bridging members for supporting said spindle member substantially centrally thereof, said means including a sleeve portion journaling said spindle, and a trough portion slidably and adjustably carrying said sleeve portion substantially parallel to the axial plane of said spindle member.

23. In a coupling layout having driving and driven members, an intermediate member having movable couplings for connecting up said driving and driven members, the combination of unit means for moving said intermediate member with respect to said driving and driven members, said unit including a member journaling said intermediate member, a member slidably supporting said journaling member, and a transversely extending shell member receiving said journaling and said slide support members therein, and means suspending said slide support member from said shell member.

24. A rolling mill having in combination driving and driven members and suitable housings therefor, a spindle member having suitable couplings connecting said driving and driven members, the opposite ends of the housings of said driving and driven members having slotted brackets extending therefrom, bridging members disposed to extend between said housings and to rest in said slotted brackets, a supporting member for said spindle including parts one of which is slidable within the other, said supporting member being mounted between said bridging members, and a lever mechanism pivotally secured to said supporting member for sliding one part

within another, so that said spindle may be connected and disconnected from said members.

25. A rolling mill having in combination driving and driven members and suitable housings therefor, a spindle member having mouth coupling portions at either end thereof, said driving and driven members having at one end thereof a male coupling portion slotted in the tongue thereof, bolt members positioned to extend across the mouth in each coupling end of said spindle and through the slotted tongue portions of the

male coupling of the associated driving and driven members, each of said bolts having a centrally disposed sleeve adapted to slide within the slotted tongue of the said associated driving and driven members, a suitably supported slidable unit having a bearing portion journaled upon said spindle, and means for sliding said bearing portion, so that said spindle may be connected and disconnected from said driving and driven members.

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