United States Patent

Hlafcsak

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[54] **MILL ROLL CHANGING ARRANGEMENT**

[72] Inventor: **Joseph L. Hlafcsak,** Pittsburgh, Pa.

[73] Assignee: **Mesta Machine Company,** Pittsburgh, Pa.

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[52] **U.S. Cl.** **72/199,** 72/238, 72/366

[51] **Int. Cl.**.....**B21b 13/08,** B21b 31/00

[58] **Field of Search**.....72/225, 224, 239, 237, 199

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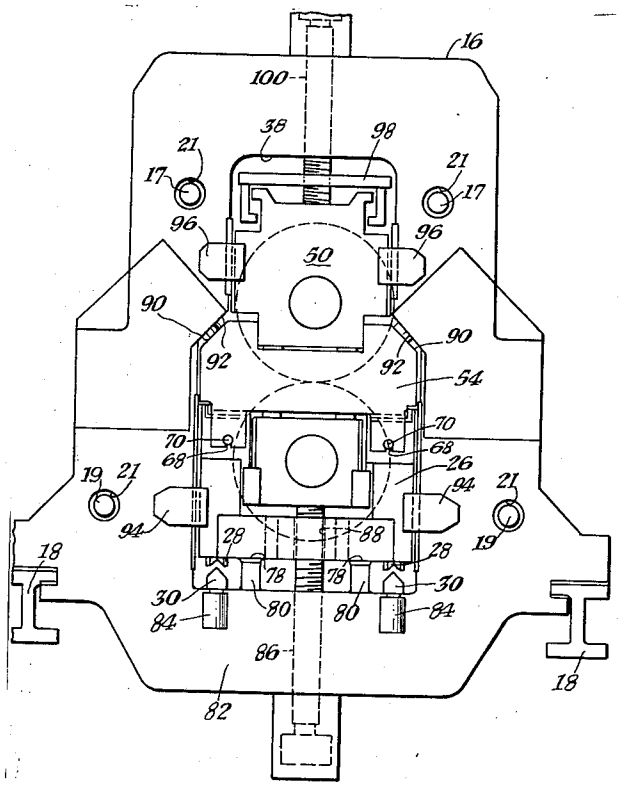
Primary Examiner—Milton S. Mehr

Attorney—Don J. Smith

[57] **ABSTRACT**

A quick-replaceable roll assembly for a rolling mill stand, said assembly comprising an inner carriage, rail engaging wheels rotatably mounted on said carriage, means for mounting a lower roll and a pair of bearing structures therefor on said carriage, said means comprising a number of balancing plungers reciprocatably mounted on said carriage and engaging said bearing structures, and means for mounting an upper roll and bearing structures therefor on said assembly in faced engagement with said lower roll.

9 Claims, 7 Drawing Figures



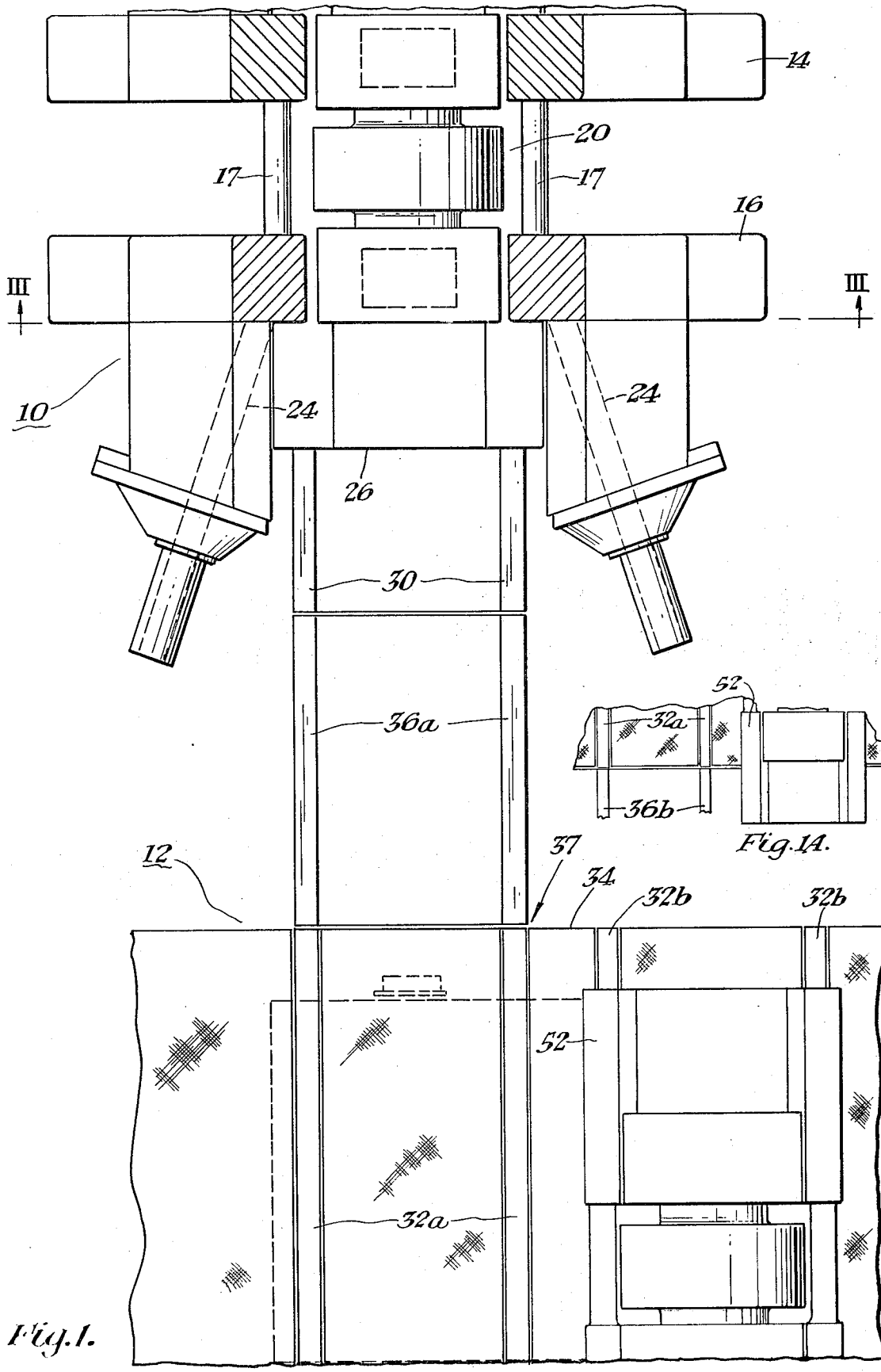

14
20
17
17
16
III
III
10
24
24
26
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36a
12
37
34
32b
32b
52
32a

Fig. 1.

52
32a
36b

Fig. 1A.

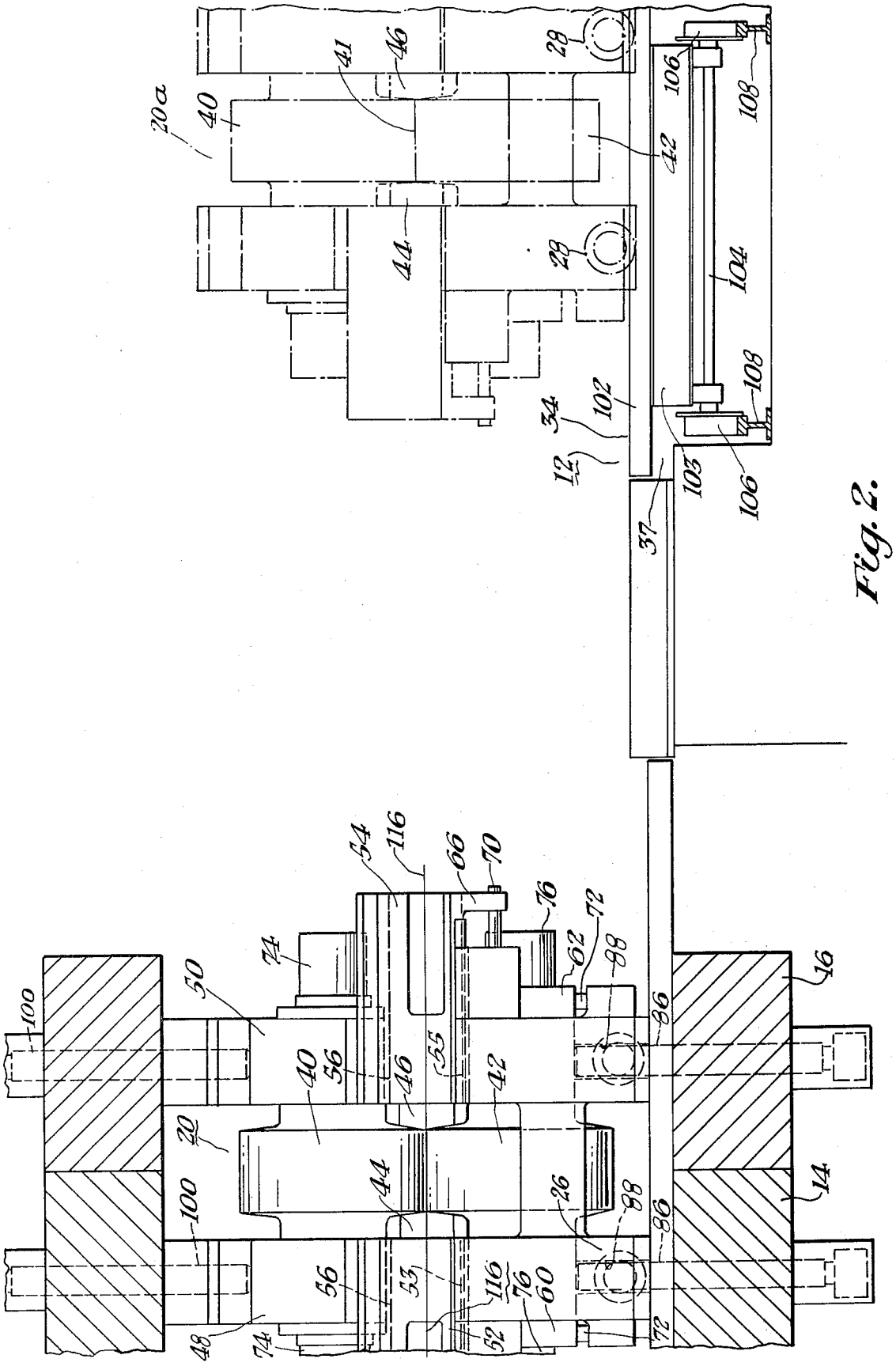

20a
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41
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28
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106
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102
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116
66
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74
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Fig. 2.

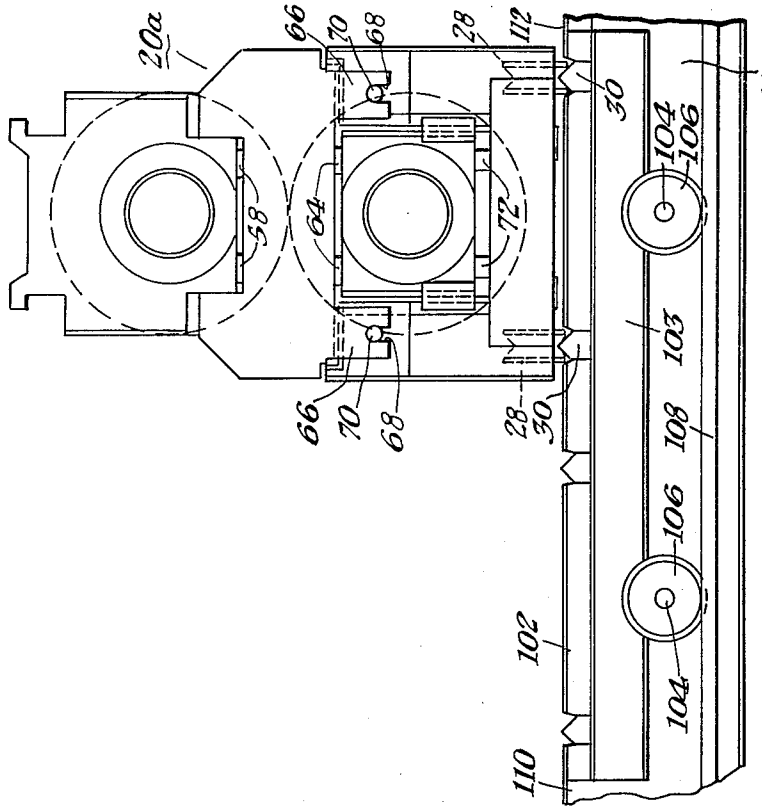

20a
66
70
68
28
112
30
114
104
106
58
64
72
103
108
102
110

Fig. 4.

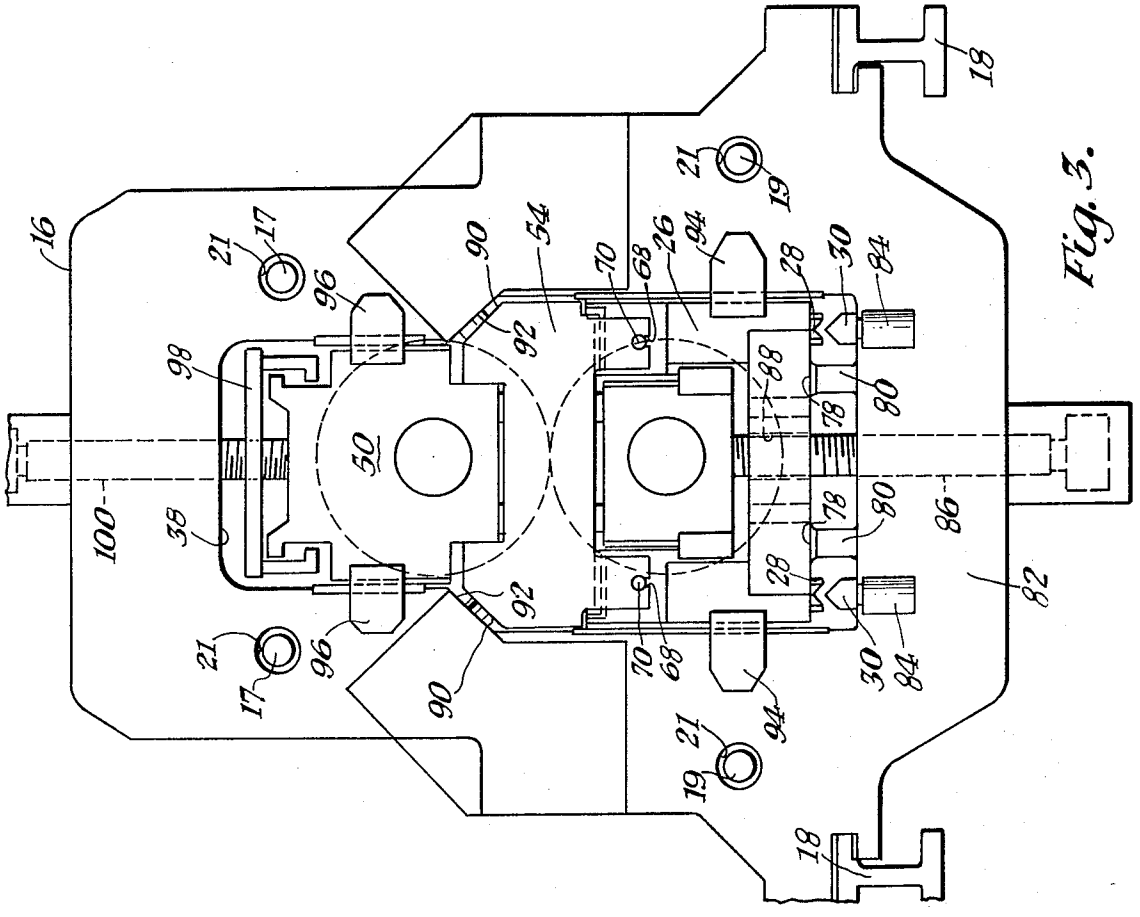

16
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21
19
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92
96
98
50
100
38
26
94
84
88
78
80
86
82

Fig. 3.

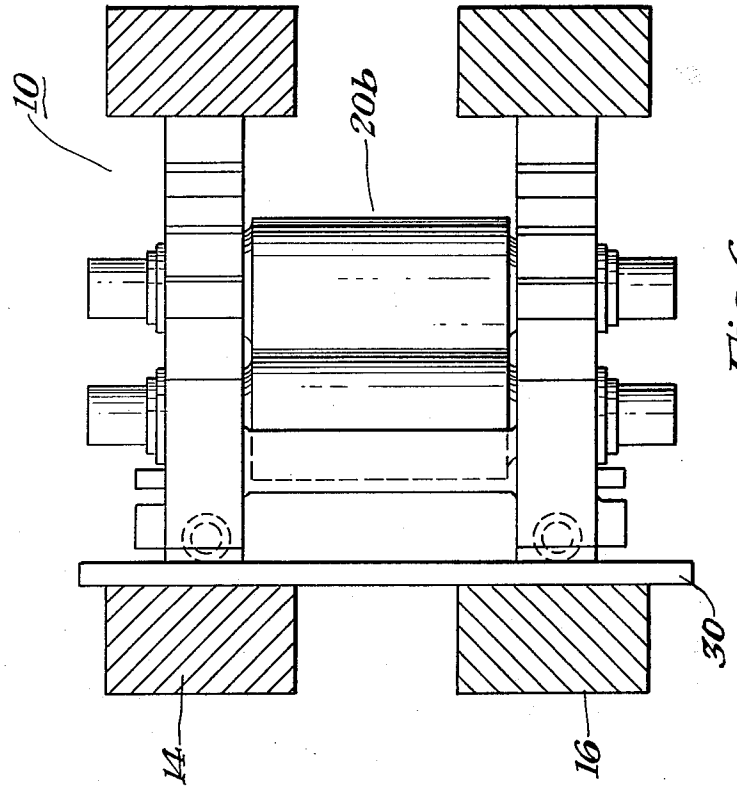


Fig. 6.

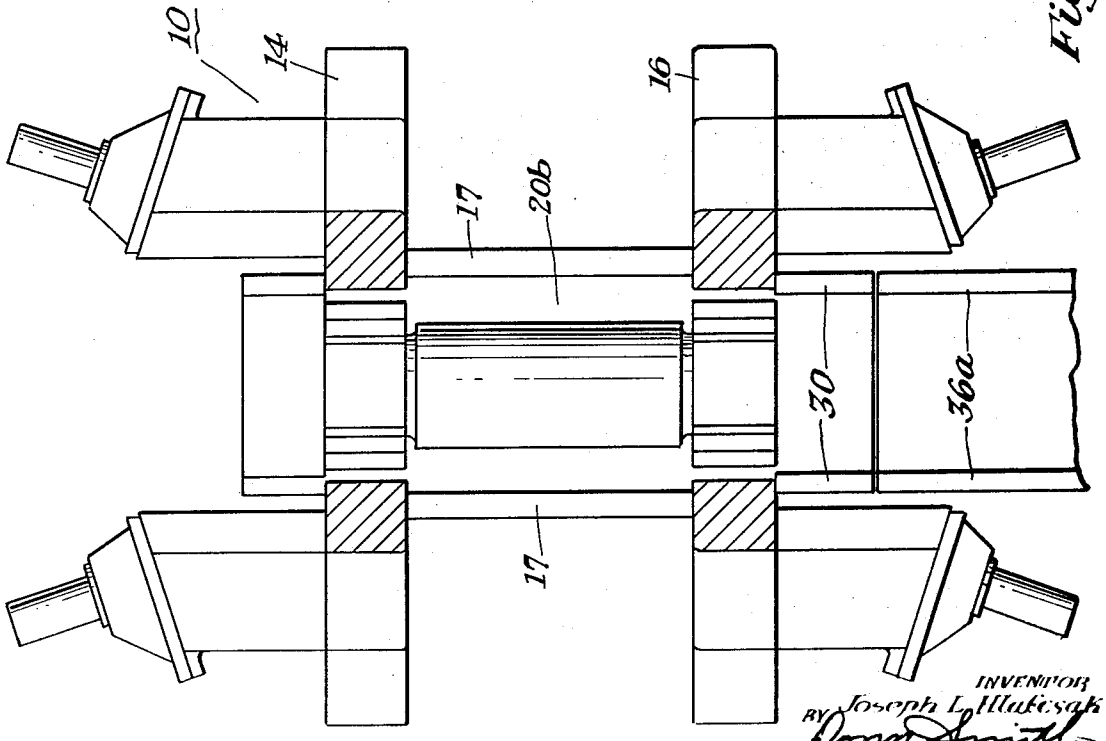


Fig. 5.

INVENTOR
Joseph L. Hlavicsak
BY Donn Smith
HIS ATTORNEY

MILL ROLL CHANGING ARRANGEMENT

The present invention relates to a rolling mill and more particularly to a roll changing rig or similar means to facilitate replacing the work rolls of the one or more mill stands of the mill. The invention is especially useful in conjunction with wide flange and other structural mills wherein product changes are frequently made, which of course necessitate corresponding work roll changes in addition to replacement of worn out work rolls.

Although the invention is described primarily in conjunction with structural mills and more particularly a wide flange beam mill, it will be observed that the principles of the invention can be applied to advantage to other types of mills such as plate, strip, or slabbing mills.

As intimated above, the operation of most beam and other structural mills requires frequent product changes and attendant replacement of the work rolls to accommodate the several products of a typical structural mill. In many cases it is necessary to change the mill rolls as frequently as eighty to ninety times per month. Of course the number of changes will vary from one installation to the next and the numbers of these changes, moreover, are dictated primarily by product changes rather than by replacement of worn work rolls. In most structural mills, the work rolls exhibit a long wearing characteristic, as the rolling forces are usually about half of those encountered in a typical cold mill. However, the tolerances of the work rolls in most structural mills are more critical, e. g. to ensure orthogonality of flanges in the case of a beam mill and in general the straightness of the structural members. These considerations contribute to the frequency of and necessity of roll changes in a typical structural mill, including but not limited to a wide flange beam mill of either the dual or single purpose variety. It is impossible to minimize the importance of shortening the mill down time by decreasing the time and labor involved in the aforementioned relatively large number of roll changes.

Known forms of mill roll changing procedures for this purpose have consumed inordinant amounts of time and labor for withdrawing the mill rolls from each mill stand and replacing them with a new set of rolls either for product changes or for wear consideration. In consequence, production programs have been unduly lengthened and unit production time has been unavoidedly increased, particularly for short-run products. Known procedures also have resulted in the use of additional operating personnel, who are not otherwise necessary to the actual operation of the mill.

In addition to the physical difficulties involved in handling and transporting the replacement mill roll, known roll changing procedures have dictated a rather extensive adjustment or "zeroing" program after the installation of the replacement rolls and in preparation for a change in products or in product dimensions. Conventionally, after installation of the replacement rolls it is necessary to establish a predetermined reference point with respect to the mill stand and the newly replaced rolls. In the case of a beam mill both the horizontal and vertical roll assemblies must the be adjusted after the replacement procedure with respect to the reference point. After the material to be rolled has entered the work roll area subsequent adjustment is required owing to plastic deformation of the work rolls and associated components under load. This time-consuming procedure considerably and undesireably extends the total time involved in replacing the work roll assembly and further increases mill down time and attendant loss of production.

These disadvantages of the prior art are overcome in an unexpected and inobvious manner, in accordance with my present invention, by providing a roll change rig or means or arrangement characterized by an ability to remove and replace the mill rolls quickly and with a minimum of labor. The use of roll handling equipment, such as overhead cranes and the like, is likewise minimized or eliminated altogether at the rolling mill site. In particular the roll change rig is arranged such that assembly and disassembly of the work rolls can take place in the roll shop or other location remote from the mill stand. Insofar as operation of the rolling mill itself is concerned, the mill rolls can be withdrawn and quickly replaced as a unit or complete assembly all of which contribute to a pronounced and unexpected minimization of the mill down time, in contrast to known roll changing procedures. Naturally, the productional losses intended upon known procedures of roll change are likewise minimized or largely eliminated.

Of prime importance, and potentially of even greater importance is another unexpected feature of my invention. This is the capability of the replacement roll assembly to be zero- positioned as a unit outside of the mill stand. Both the horizontal and vertical rolls (in case of a beam mill) can be adjusted to a definite or predetermined reference point, as required. The significant and unobvious character of this feature of the invention is readily apparent from the fact that the replacement roll assembly can be zero-positioned in the roll shop either during or before withdrawal of the previous roll assembly from the mill stand. With the capability of zero-positioning the replacement roll assembly externally of the mill stand, the mill obviously can be readied for production within a much shorter interval of down time.

Inside the mill stand, the replacement roll assembly can be lowered quickly onto a number of stops permanently mounted in the mill housing in further reduction of replacement time. When the replacement assembly is thus inserted and seated in the mill housing, the bottom mill screw-ups can be actuated to raise the bottom roll of the assembly into operating position, and the top roll screw-downs as well as the vertical roll screws can be quickly and efficiently actuated to their new operating positions.

I accomplish these desirable results by providing a quick-replaceable roll assembly for a rolling mill stand, said assembly comprising an inner carriage, rail engaging wheels rotatably mounted on said carriage, means for mounting a lower roll and a pair of bearing structures therefor on said carriage, said means comprising a number of balancing plungers reciprocatably mounted on said carriage and engaging said bearing structures, and means for mounting an upper roll and bearing structures therefor on said assembly in faced engagement with said lower roll.

I also desirably provide a similar roll assembly wherein said carriage includes a pair of shelf structures for mounting said vertical roll structures respectively.

I also desirably provide a similar roll assembly wherein a side shifting car is mounted for movement transversely of said external track section at an interruption therein, said car having a platform substantially bridging said interruption, a pair of auxiliary track sections spacedly mounted on said platform, said car being shiftable transversely of said external track section such that each of said auxiliary track sections can be selectively inserted into said external track section at said interruption to bridge said interruption, said platform and either of said auxiliary track sections being capable of supporting said roll assembly at position such that another of said roll assemblies can be transversed along said external track section and the other of said auxiliary track sections without interference from the first-mentioned roll assembly.

I also desirably provide a similar roll assembly including said mill stand having a stationary housing and a movable housing, and means for mounting said movable housing for movement longitudinally of said elevatable rails to accommodate differing lengths of roll assemblies within said mill stand.

In the method aspect of my invention I desirably provide a method for setting roll openings in a roll assembly having upper and lower horizontal rolls and a pair of vertical rolls juxtaposed thereto, said method comprising the steps of aligning said vertical rolls relative to a common vertical roll pass line, elevating said lower horizontal roll to face on said pass line, elevating said upper horizontal roll to face against said lower horizontal roll at said pass line to establish a zero roll position, and applying preloading forces to said roll assembly within said mill stand sufficient to induce substantially maximum roll deformations in said assembly and associated components and in said mill stand in order to establish a reference roll position.

I also desirably provide a similar method including the additional steps of relieving said preloading force and withdrawing said rolls from one another to establish roll gaps correspondingly less than the rolling dimensions, and inserting a work piece among said rolls to expand said rolls precisely to said rolling dimensions.

During the foregoing discussion, various objects, features and advantages of the invention have been set forth. These and other objects, features and advantages of the invention together with structural details thereof will be elaborated upon during the forthcoming description of certain presently preferred embodiments of the invention and presently preferred methods of practicing the same.

In the accompanying drawings, I have shown certain presently preferred embodiments of the invention and have illustrated certain presently preferred methods of practicing the same, wherein:

FIGS. 1 and 1A constitute a composite tope plan view, partially in section, of one form of rolling mill stand together with a roll changing arrangement therefor.

FIG. 2 is a side elevational view, partially in section, of the equipment shown in FIG. 2.

FIG. 3 is a front elevational view of the mill mill stand shown in FIG. 1, partially sectioned, and taken generally along reference line 3—3 thereof and

FIG. 4 is a side elevational view of the roll change rig shown in FIG. 1 and taken along reference line 4—4 thereof

FIG. 5 is a partial top plan view, partly in section, similar to FIG. 1 and further illustrating a moveable housing feature of the invention and,

FIG. 6 is a front elevational view of the apparatus as shown in FIG. 5, with parts in section and other parts broken away to illustrate the invention more clearly.

Referring now more particularly to FIGS. 1–4 of the drawings, the exemplary form of the invention shown therein comprises a mill stand **10** and a roll changing rig denoted generally by the reference character **12**. The mill stand **10** in this example includes a pair of housings **14, 16** with the housing **16** being mounted for movement along a pair of rails **18**. The moveable housing **16** thus can be moved to a position relative to the stationary housing **14** as to accommodate a particular length of roll assembly **20** therein. The two housings **14, 16** are stabilized by pairs of rods **17, 19** which are rigidly secured to one of the housings for example the stationary housing **14** and are engaged with the other of the housings by slideable insertion through aperture means **21**. Generally the housings **14, 16** are aligned with upper and lower bearing chocks of the roll assembly **20** when in their operating positions. In the particular example shown the roll assembly **20** is of minimum length, with the result that the upper and lower sections of the housings **14, 16** can be placed in abutting relation as evident from FIG. **2**. As also shown in the latter figure the roll assembly **20** is mounted on an inner carriage **26** provided with a set of rail engaging wheels **28**. The wheels **28** are so spaced and are otherwise shaped to engage elevatable rail sections **30** of the mill stand **10**, intermediate section **36*a***, auxiliary rail sections **32** of the side shifting car **34**, and the external section **36*b***.

In the disclosed arrangement of the invention, the roll assembly **20** is shaped for closely fitted insertion through a window **38** of each of the mill stand housings **14, 16**, as better shown in FIG. **3**. The roll assembly **20** in this case is configured for rolling wide flange beams and the like and includes upper and lower horizontal rolls **40, 42** and vertical rolls **44, 46**, all of which are mounted, as presently described on the inner carriage **26** to form with the carriage **26** the unitary roll assembly **20**. In furtherance of this purpose, the upper horizontal roll bearing chocks **48, 50** are nested onto the vertical roll housings **52, 54** respectively, each of which are troughed at **56** for this purpose. Each of the vertical roll housings **52, 54** is provided with spacers **58** to aid in aligning the upper horizontal roll chocks **48, 50**. Each of the vertical roll housings **52, 54** in turn is slidably mounted respectively on shelf structure **53** or **55** of the inner carriage **26** in contrast to previous practices of mounting the vertical rolls directly on the mill housings. Each lower horizontal roll bearing chock **60** or **62** is provided with means such as the spacers **64** for aligning the vertical rolls **44, 46**. In furtherance of this purpose each vertical roll housing **52, 54** is provided with a pair of downward extensions **66** each of which is notched at **68** for engagement with positioning plungers **70** which are mounted in the inner carriage **26** as shown. The plungers **70** and extensions **66** therefor stabilize and position the vertical roll housings **52, 54** on the roll assembly **20** and particularly with respect to the upper and lower rolls **40, 42**.

Similarily the inner carriage **26** is provided with pairs of plungers **72** for similarily elevating and balancing the

lower horizontal roll **42**. The plungers **72** can be hydraulically actuated if desired, and the plungers can be fitted into suitable bores or cylinders for that purpose.

Roll necks **74, 76** of the upper and lower horizontal rolls **40, 42** respectively protrude through the associated bearing chocks for engagement by suitable drive spindle couplings (not shown). The vertical rolls **44, 46** are not necessarily driven in this application.

The inner side of the inner carriage **26** is provided with a number of stop surfaces **78** at which the inner carriage is brought to rest on pairs of stops **80** permanently secured to the sill structure **82** of each housing window **38** as better shown in FIG. **3**. The stop surfaces **78** and stops **80** are engaged when the mill stand rail sections **30** are lowered, for example by actuation of cylinder arrangements **84**. At this time the roll assembly **20** including the inner carriage **26** is stationarily and rigidly supported on the pairs of housing stops **80**. However, before operation of the mill stand is commenced, it is in accord with another unexpected feature of my invention that the inner carriage **26** is completely unloaded as far as the roll assembly **20** is concerned, and the lower roll **42** of the latter is supported directly by the mill housings **14,16**. This accomplished by supporting the roll assembly, in particular the lower horizontal roll **42** thereof, directly by the mill stand screw-ups **86**.

In furtherance of this purpose each screw-up **86** is threaded through the bottom of each mill housing **14** or **16** and extends into bearing engagement with the associated lower horizontal roll chock **60** or **62** through an aperture **88** therefor in the adjacent end of the inner carriage **26** (FIGS. **2** and **3**). Thus, when the roll assembly **20** has been properly installed within the mill housings **14, 16** by convenient use of the inner carriage **26**, the roll assembly **20** then can be engaged directly by the mill stand in the usual manner. For this purpose each vertical roll housing **52** or **54** is provided with a pair of inclined stop surfaces **90** for engagement respectively by a pair of clamping plungers **92** carried in the associated mill housings **14** or **16**.

The position of inner carriage **26** within the mill stand is secured by a pair of lower clamp plates **94** mounted on the moveable housing **16** adjacent the window **38** thereof to properly contain the roll assembly **20** in the mill stand **10**. Similar and cooperating upper clamp plates **96** can be mounted in like manner on the moveable housing **16** adjacent the window **38** for the same purpose.

The upper horizontal roll **40** can be positioned for adjusting the horizontal roll gap by means of screwdowns **100** mounted in the upper sections of the mill housings **14, 16**. Likewise, hold-down forces also are applied to the work roll chocks **48, 50** of the upper horizontal roll **40** by means of the same screwdowns **100**.

As noted previously the elevatable housing rails **30** are aligned with the intermediate track section **36*a*** which is interrupted at **37**, and with the juxtaposed pair of the auxiliary track segments **32*a*** or **32*b*** of the side shifting car **34** depending on the position thereof, and with the external track section **36*b***. The external track section **36*b*** can extend to a roll shop (not shown) or to suitable warehousing facilities for the roll assemblies located remotely of the rolling mill.

The use of the side shifting car **34** affords a temporary holding area for a replacement roll assembly **20*a*** to permit withdrawal of the used roll assembly **20** (FIG. **1**) without interference between the withdrawn and replacement roll assemblies.

The side shifting car **34** provided in accordance with this feature of the invention, includes a platform **102** supported on axles **104** and railway trucks **106**. The car **34** is moveable along a relatively short length of track including rails **108**. Mounted on the platform **102** are the pairs of rails **32*a***, **32*b*** mentioned previously. These rails are spaced sufficiently to permit passage of the roll assemblies **20**, **20*a*** or other forms of roll assemblies, the widths of which are limited by the housing windows **38**. The width of the car platform **102** provides rail segments **32*a***, **32*b*** of sufficient length to accommodate the longest roll assembly that can be incorporated into the side shifting mill housing structure **14, 16**. An example of such roll structure is denoted at **20*b*** in FIGS. **5** and **6** of the drawings. FIGS. **5** and **6** also show the rods **17, 19** in the expanded position and the increased separation of the mill stand housings **14, 16** to incorporate the longer roll assemblies **20*b***.

The platform **102**, including the rails **32*a***, **32*b*** which can be recessed therein as shown in FIG. **4**, is mounted on a base structure **103** for added strength, which in turn is mobilized by the axles **104** and railway trucks **106**.

As better shown in FIGS. **1** and **4**, slideable metal plates **110, 112** can be joined respectively to the end portions of the car platform **102** to cover the well **114** or recess in which the side shifting car **34** is reciprocated. The sliding plates **110, 112** thus provide coverage for the car well **114** irrespective of the position of the side shifting car **34**. A personnel hazard is thereby eliminated.

The carrying out of the roll-changing procedure will now be described. Prior to withdrawal of the used roll assembly **20** (FIG. **1**), replacement roll assembly **20*a*** is brought from the roll shop or from a suitable storage area along the external track section **36*b***. Suitable traction means (not shown) can be employed to propel the replacement roll assembly **20*a*** along the external track section **36*b***. Before the replacement roll assembly **20*a*** reaches the side shifting car **34**, the latter is reciprocated to the left of its position as shown in FIG. **1**, such that its auxiliary track section rail segments **32*b*** are aligned with the external track section **36*b***. The replacement roll assembly **20*a*** is then pushed onto the side shifting car **34** and the latter is moved to the right to the position thereof as shown in FIG. **1**. This places the replacement roll assembly **20*a*** in the position as shown in FIG. **1** so that the used roll assembly **20** when withdrawn, can be wheeled directly to the roll shop or other location by means of the elevatable mill rails **30**, the intermediate track section **36*a***, the side shifting car rail segments **32*a***, the external track section **36*b***, all of which are then aligned therewith as illustrated in FIG. **1**. One of the unexpected results of the invention, in addition to the use of the side shifting car **34**, is that separate carriage means do not have to be supplied for each of the roll assemblies **20**, **20*a***, as this function is provided by the inner carriage **26** which forms part of each roll assembly **20** or **20*a*** in accordance with the invention.

Owing to the unitary character of the roll assembly **20** or **20***a* or equivalent assembly made in accordance with the invention, the roll assembly can be leveled and zeroed externally of the mill stand **10**. This can be accomplished either in the roll shop or on the side shifting car **34** when the replacement roll **20***a* is located thereon as shown (FIG. **1**). The obvious advantage of this feature of this invention is the accomplishment of such leveling and/or zeroing or other adjustment of the replacement roll assembly **20***a* prior to shutting down the rolling mill including the mill stand **10**, with the admirable result that mill down time is drastically reduced.

In the case of the wide flange beam roll assembly **20***a* a typical roll leveling and zeroing procedure in accordance with the invention will now be described, as it falls into the general category of mill roll replacement procedure. Initially suitable hydraulic lines (not shown) or other source of motive power are coupled to the replacement roll assembly **20***a* in order to actuate the various hydraulic plungers described previously. The lower horizontal roll **42** is then raised by means of plungers **72** to the normal pass line (not shown) of the mill stand **10**, with the assumption that the replacement roll assembly **20***a* is supported externally at the same elevation as is maintained in the mill stand **10**, irrespective of whether the assembly is supported on the side shifting car **34** or on the external track section **36***b* at the roll shop. At this position the lower roll **42** is faced against the upper horizontal roll **40**. The vertical roll housings **52**, **54** are now moved toward the horizontal rolls **40**, **42** by means of plungers **70** until the vertical rolls **44**, **46** just touch the sides of both horizontal rolls for vertical alignment of the horizontal rolls. The vertical roll housings are consequently aligned by means of spacers **64** positioned in the lower horizontal roll chocks **60**, **62** such that the center lines of the vertical rolls **44**, **46** are aligned with the interface **41** of the engaged upper and lower horizontal rolls **40**, **42** at a predetermined material pass line **116**. The upper horizontal roll **40** likewise can be aligned as necessary by means of spacers **58** positioned in the vertical roll housings.

The horizontal and vertical rolls **40–46** are now zeroed with one another and the replacement roll assembly **20***a* is ready for traversing into the mill stand **10**. The aforedescribed zeroing is preserved owing to the unitary character of the mill roll assemblies, as described previously.

After the replacement roll assembly **20a** is thus readied for insertion into the mill stand **10**, the mill is then shut down preparatory to withdrawing the used roll assembly **20**. The upper horizontal roll balance (bracket **98**) is deactivated to permit the upper horizontal roll **40** again to face and rest on the lower horizontal roll **42**. The vertical roll screws **24** are then retracted to their outward limits. The carriage assembly clamp plates **94** and the upper horizontal roll clamp plates **96** are opened in order to permit the roll assembly **20** to be raised to its roll change position by raising the mill stand rails **30** by cylinders **84** to a position of alignment with the intermediate track section **36***a*. The bottom screw-ups **86** are then retracted to clear the inner roll assembly carriage **26**.

After raising the spindle carriers (not shown) to support the drive spindles (not shown) which are withdrawn from the horizontal roll necks **74**, **76** on the drive side, the used roll assembly **20** is withdrawn through the mill stand windows **38** by suitable traction means (not shown) across the mill rails **30**, the intermediate track section **36***a* and onto the side shifting car **34**.

The side shifting car **34** is then actuated by suitable traction means (not shown) to the position thereof as shown in FIG. **1** to remove the used roll assembly **20** from its position in front of the mill stand **10** to the position denoted by replacement roll assembly **20***a* of FIG. **1**. The used roll assembly **20** is now removed from in front of the mill stand **10** preparatory to insertion of the replacement roll assembly **20***a* into the mill along the intermediate track section **36***a*.

As an initial step in the re-insertion procedure, the drive spindles (not shown) are adjusted radially, if required, to receive the replacement roll assembly **20***a*. At the same time the drive spindles are raised to receive the roll necks **74**, **76** of the replacement roll assembly **20***a*. The replacement roll assembly **20***a* including its inner carriage **26** is then traversed into the mill stand **10** where it is positioned within housing windows **38**. The clamp plates **94** and **96** are closed, thus properly containing the replacement roll assembly **20***a* within the mill stand. The spindle carriers are then retracted, whereupon the elevatable mill stand rails **30** are lowered to permit the replacement roll assembly **20***a* to rest on the mill housing stops **80**. The housing screw-downs **100** are then lowered to engage the upper horizontal roll chocks **48**, **50**, after which the screw-downs **100** are leveled for proper alignment of the replacement roll assembly **20***a*. The bottom screw-ups **86** at this time are raised for insertion through the inner carriage **26** into engagement with the lower horizontal roll chocks **60**, **62** respectively. After leveling the screw-ups **86**, the bottom lift cylinders or plungers **72** of the inner carriage **26** are retracted from the lower roll chocks **60**, **62**. The vertical roll screws **24** of each mill housing **14** or **16** are run in to touch the vertical roll housings **52**, **54** and then leveled. The vertical roll positioning cylinders or plungers **70** are deactivated followed by energization of the vertical roll balance cylinders. The upper horizontal roll balance bracket **98** is then engaged to complete the installation procedure.

Prior to insertion into the mill stand, the replacement roll assembly **20***a* can be prepared in the roll shop. The inner carriage **26** is placed on the external track section **36***b*. The thickness of the spacers **64** is established in proportion to the roll radius of the lower horizontal roll **42** in order to face the roll on a pass line of the roll assembly **20***a* which can thereafter be aligned to coincide with the material pass line **116** of the mill stand. The vertical roll assemblies including their housings **52**, **54** are then added to the roll assembly **20***a* as shown in FIGS. **2** and **4**, with the vertical roll housings engaging the spacers **64** and the vertical roll adjusting cylinders **70**. The upper horizontal roll spacers **58** are likewise adjusted in proportion to the roll radius of the upper horizontal roll **40** such that the roll is faced approximately against the lower horizontal roll **42** at the material pass line **116**. The roll assembly is then transferred to the side shifting car **34** as outlined above.

After the replacement roll assembly **20***a* is zeroed as described above externally of the mill stands **14**, **16** the assembly is inserted into the mill stand through the housing windows **38**. With all the rolls at the zero position, and with the roll assembly aligned such that its pass-line coincides with a predetermined material pass line **116** of the mill stand, the entire roll assembly **20***a* is preloaded within the mill stand by means of the horizontal and vertical screws to establish a positive reference at the zero position. This is made possible by applying sufficient preloading forces to subject the roll assembly to the anticipated elastic deformations encountered during the rolling operation. The preload force therefore should be at least equal to the maximum anticipated rolling force. The preload forces are then relieved and the mill controls are operated to back off the vertical and horizontal rolls to openings therebetween which are less than the rolling dimensions by predetermined values. The roll openings then are expanded to the precise rolling dimensions by insertion of a work piece.

From the foregoing it will be apparent that novel and efficient forms of Mill Roll Changing Arrangement have been described herein. While I have shown and described certain presently preferred embodiments of the invention and have illustrated presently preferred methods of practicing the same it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied and practiced within the spirit and scope of the invention.

I claim:

1. A method for setting roll openings in a roll assembly for a mill stand, said assembly having upper and lower horizontal rolls and a pair of vertical rolls juxtaposed thereto, said method comprising the steps of aligning said vertical rolls with a roll assembly pass line, elevating one of said horizontal rolls to face on said pass line, elevating the other of said horizontal rolls to face against said one horizontal roll at said pass line to establish a zero roll position, and thereafter applying preloading forces to said roll assembly within said mill stand sufficient to induce substantially maximum deformations in said assembly and associated components and in said mill stand in order to establish a reference roll position.

2. The method according to claim **1** including the additional steps of relieving said preloading forces and withdrawing said rolls from one another to establish roll gaps correspondingly less then predetermined rolling dimensions, and inserting a work piece among said rolls to expand said rolls precisely to said rolling dimensions.

3. The method according to claim **1** wherein said preloading forces are at least equal to maximum anticipated rolling forces.

4. The method according to claim **1** including the modified steps of performing said aligning and elevating steps prior to inserting said roll assembly into said mill.

5. The method according to claim **1** including the additional step of coinciding said roll assembly pass-line with a predetermined material pass-line of said mill stand prior to application of said preloading forces.

6. The method according to claim **1** wherein motive means are provided on said roll assembly for elevating said horizontal rolls and for aligning said vertical rolls, and said elevating and lining steps are accomplished by actuation of said motive means respectively.

7. A method for setting roll openings in a roll assembly for a mill stand, said assembly having a pair of lower horizontal rolls and a pair of vertical rolls juxtaposed thereto, said method comprising the steps performed on said roll assembly outside of said mill stand of aligning said vertical rolls with a roll assembly pass-line, elevating one of said horizontal rolls to face on said pass-line, elevating the other of said horizontal rolls to face against said one horizontal roll at said pass-line, and bringing each of said vertical rolls into engagement with both of said horizontal rolls to establish a zero roll position.

8. The method according to claim **7** including the additional steps of inserting said roll assembly into said mill stand, and coinciding the pass-line of said roll assembly with a predetermined material pass-line of said mill stand.

9. The method according to claim **8** including the additional step of preloading said roll assembly within said mill stand to establish a reference roll position.

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