United States Patent

Eibe

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[54] **WORK ROLL BEARING LUBRICATION ARRANGEMENT**

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[52] **U.S. Cl.** **72/45,** 72/201, 72/236

[51] **Int. Cl.**.....**B21b 45/02,** B21b 27/06

[58] **Field of Search**.....72/41, 42, 43, 44, 45, 200, 72/201, 202, 236, 237, 238, 239

[56] **References Cited**

UNITED STATES PATENTS

836,192	11/1906	Kennedy	72/236
2,078,712	4/1937	Hudson	72/236
2,101,959	12/1937	Schulz	72/45
2,159,337	5/1939	McBain	72/236
2,243,009	5/1941	Kingsbury et al.	72/237
2,113,050	4/1938	Iverson	72/236
2,782,662	2/1957	Malone et al.	72/236
3,446,050	5/1969	O'Brien	72/239
3,406,552	10/1968	Krauss et al.	72/236
3,552,164	1/1971	Properzi	72/45
3,646,790	3/1972	Properzi	72/43

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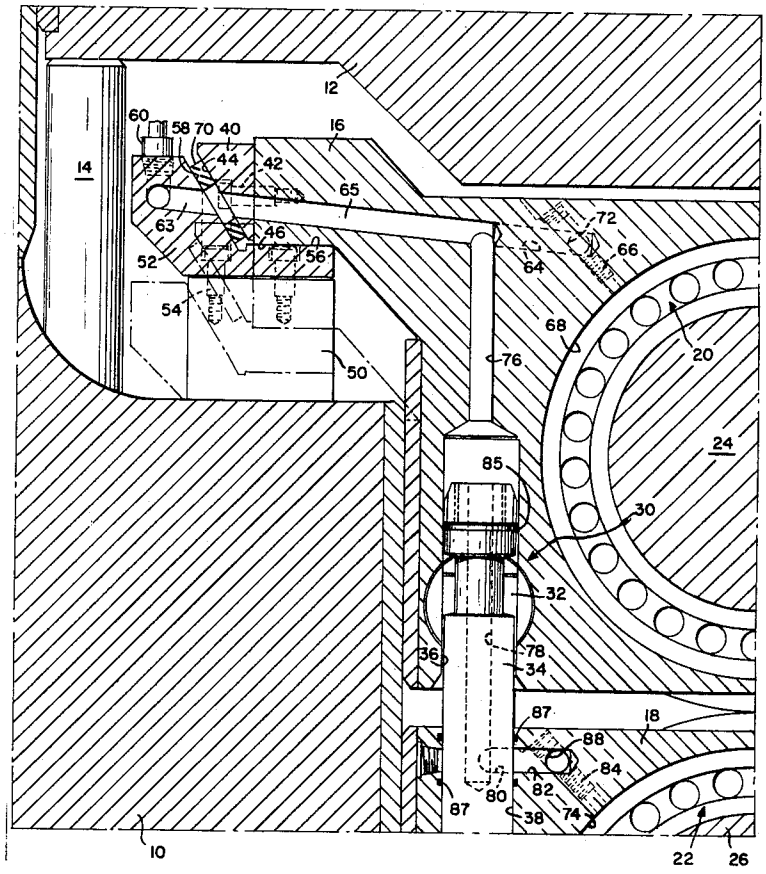
[57] **ABSTRACT**

A hoseless lubrication arrangement for the work rolls of a rolling mill including a pair of cooperating wall portions on an adapter on the balancing piston and on an adapter on the work roll chock, the wall portions being in opposed relation when the work roll chock is supported on the balancing piston within the mill housing. A lubrication passage extends from a supply fitting on the adapter on the balancing piston through the same and across the wall portions which are sealed and through the work roll chock into communication with the work roll bearing therein. The lubrication passage is automatically disconnected from the position interconnecting the fitting and the bearing when the work roll chock is removed from the mill housing and is automatically reconnected when a work roll chock is installed in the mill housing on the balancing piston.

10 Claims, 3 Drawing Figures



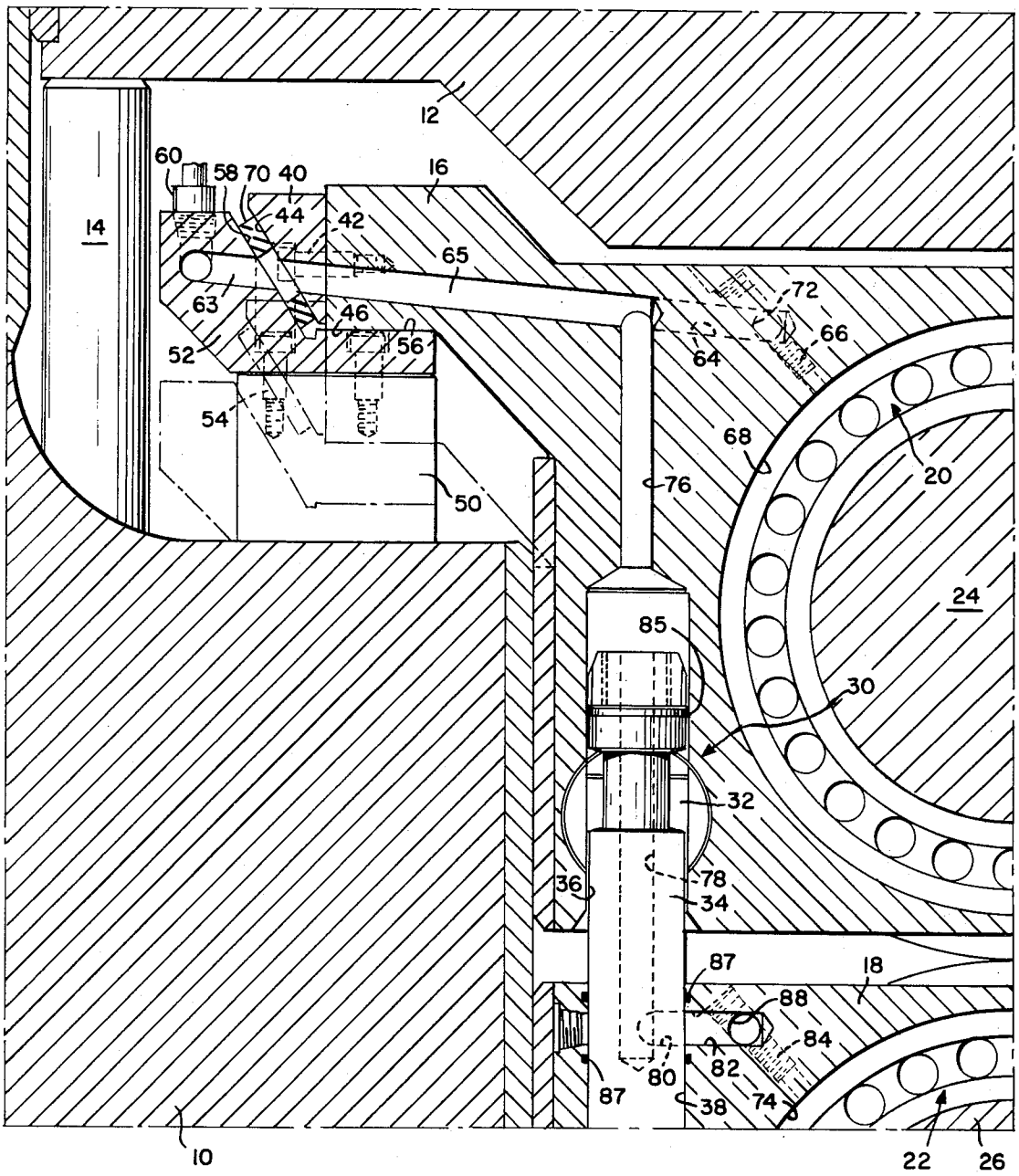


FIG. 1.

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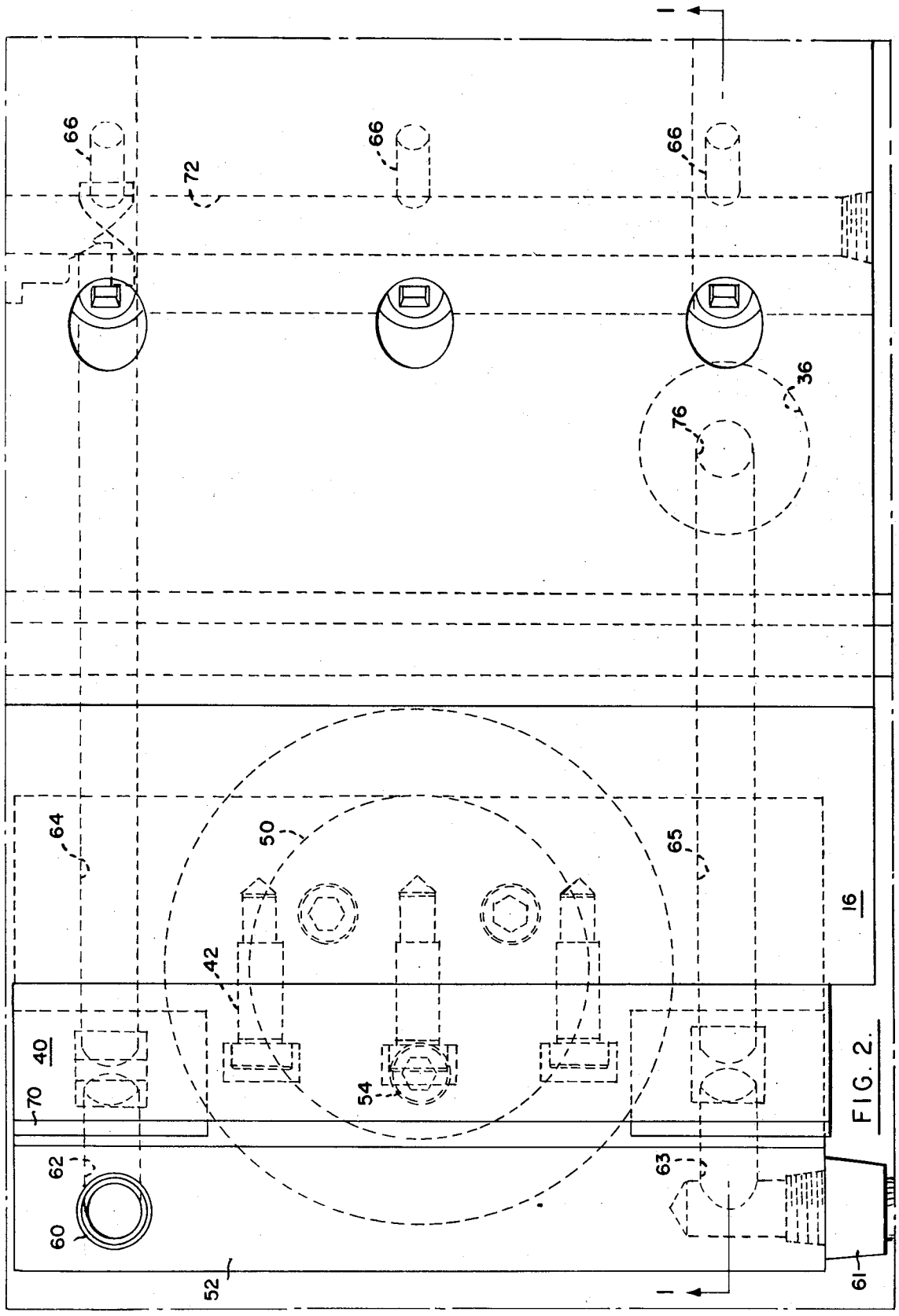

FIG. 2.

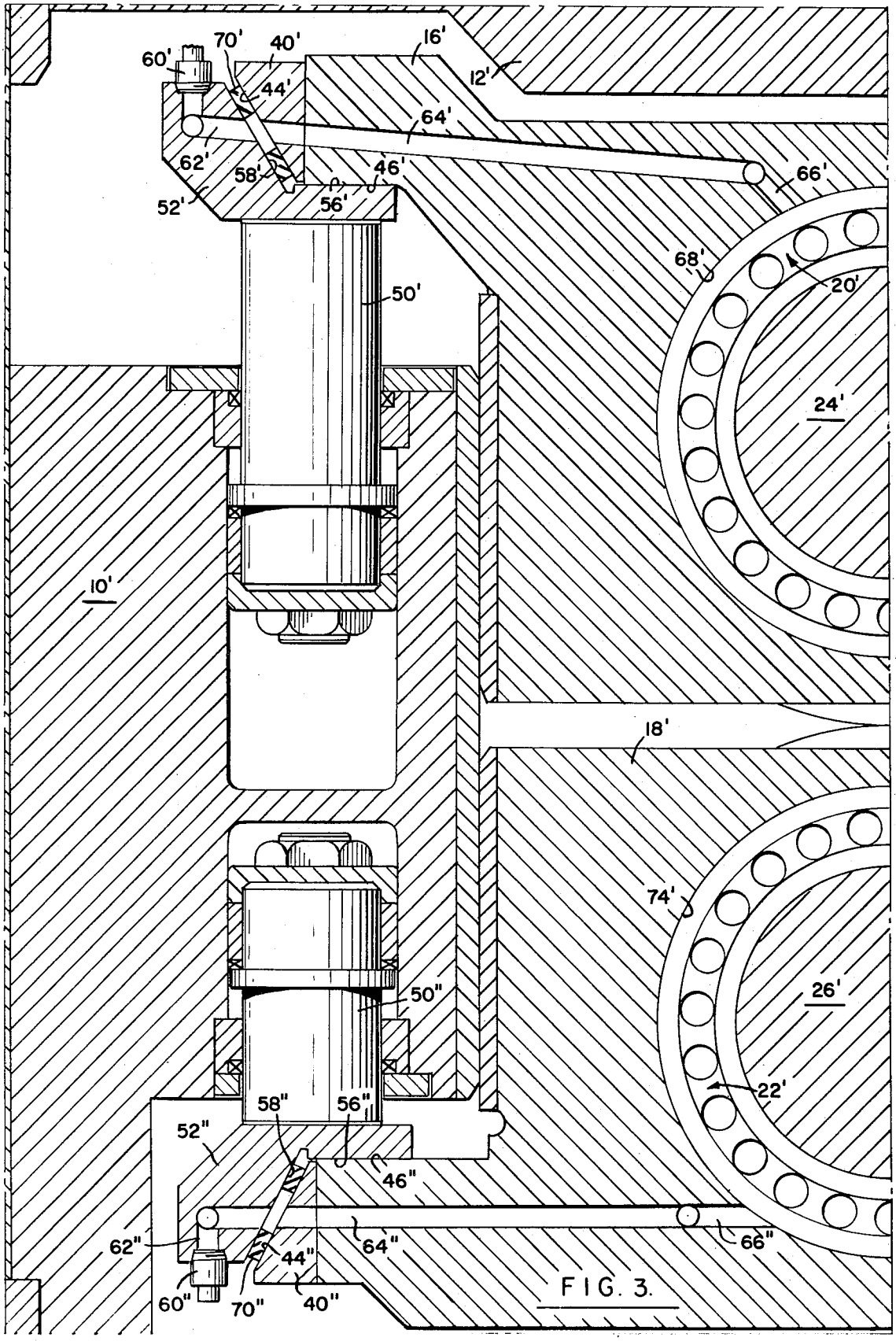
60'
70'
40'
16'
12'
44'
64'
62'
58'
46'
66'
52'
56'
68'
20'
50'
24'
10'
18'
74'
50"
26'
22'
58"
56"
52"
46"
62"
64"
66"
44"
60"
70"
40"

FIG. 3.

WORK ROLL BEARING LUBRICATION ARRANGEMENT

BACKGROUND OF THE INVENTION

This invention relates to means for lubricating the work roll bearings of a rolling mill.

The most common way of lubricating the work roll bearings of a rolling mill is to provide a hose connection from a supply of lubrication to passages in the work roll chock leading to the bearings. However, this arrangement is not entirely satisfactory in rolling mills where the work rolls are changed by automatic roll changers. The disadvantage here is that it is necessary for someone to manually disconnect the lubrication hoses of the old work roll and to connect the hoses to the new work rolls during the roll changing operation. Even the use of "quick-disconnect" hoses does not obviate this problem because of the very short time in which the entire roll changing operation must be made.

SUMMARY OF THE INVENTION

It is the general object of this invention to provide a lubrication arrangement for the work rolls of a rolling mill which does not have any hose connections that must be disconnected and which is adapted for use with automatic roll changers.

Briefly stated, the general object of the invention is achieved by a construction wherein a balancing means is arranged to support a work roll chock within the mill housing by means of a balancing piston movable into bearing contact therewith. There are provided wall portions on the work roll chock and on means mounted on the balancing piston which wall portions are in opposed relation when the work roll chock is supported on the balancing piston. There is also provided a passageway for the passage of a lubricant to the journal bearings of the work roll chock including a first passage extending from a supply fitting on the balancing means to said wall means thereof and a second passage extending from said wall means of said work roll chock to the journal bearing thereof and means for providing sealed communication between the first and second passages at said opposed wall means.

By this arrangement it is possible to maintain a permanent connection from a lubricant supply to said first passage, the second passage being automatically placed into and out of communication with the first passage each time a work roll is removed from or placed on the balancing means in the mill housing. Moreover, since the balancing piston is automatically maintained in bearing contact with the work roll chock, a tight seal can always be provided at said opposed wall portions by means of a compressible gasket.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary sectional view showing a lubrication arrangement in accordance with the invention and taken on 1—1 of FIG. 2;

FIG. 2 is a plan view of the arrangement shown in FIG. 1; and

FIG. 3 is a fragmentary sectional view showing an alternate form of lubricating arrangement in accordance with the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 1, there is shown a conventional rolling mill having a mill housing **10**, an upper back-up roll chock **12** supported in the mill housing by a suitable balancing cylinder means **14**, upper and lower work roll chocks **16** and **18** provided with bearings **20** and **22** having the upper and lower work rolls **24** and **26**, respectively, journalled therein. The mill includes a conventional stool means **30** for supporting the work roll chocks in a separated condition during a roll changing operation. The stool means **30** includes a spring-loaded latch means **32** mounted in the upper chock **16** and movable into engagement with a cylindrical stool member **34** at a reduced diameter portion thereof. The stool member **34** extends vertically between aligned bores **36** and **38** in the upper and lower work roll chocks **16** and **18**, respectively. In the operation of the stool means **30** the upper chock **16** is raised from the position shown in FIG. **1** to permit the latch means **32** to move into engagement with its reduced diameter portion to thereby interconnect the upper work roll chock **16** with lower chock **18** by means of stool member **34**. The two chocks, connected with each other, are now slightly lifted off the lower back-up chock (not shown) to be pulled out of the mill housing **10** in a typical roll changing operation.

The above-described construction and arrangement is typical of a conventional rolling mill.

In accordance with the invention, the upper work roll chock **16** is provided with an adapter **40** mounted on a side wall portion by bolts **42** for a purpose to be described hereafter. Adapter **40** is provided with an inclined wall at **44** and horizontally extending wall portion **46**.

Balancing means are provided for supporting the upper work roll chock **16** within the mill housing **10**, such means comprising a conventional hydraulically actuated balancing piston **50** mounted for vertical movement within the mill housing, and an adapter **52** mounted on the upper end of piston **50** by bolts **54**. The adapter **52** is provided with a horizontal wall portion **56** adapted for movement into bearing contact with the wall portion **46** on the upper chock **16** when the balancing piston **50** is moved upwardly to support the upper chock **16** within the housing **10**. The adapter **52** is also provided with an inclined wall portion **58** adapted to be positioned in spaced opposed relation with the inclined wall portion **44** on the upper chock **16** when the upper chock **16** is supported on the balancing piston **50** within the mill housing.

There are provided means defining a passageway for the passage of a lubricant to the journal bearings of the work roll chocks. Such means comprises a pair of fittings **60** and **61** threadedly mounted on the adapter **52**, each fitting being adapted to have a supply conduit from a suitable lubricant supply connected thereto. There are preferably two supply conduits, one serving the upper chock bearing (and supplied from fitting **60**) and another serving the lower chock bearing (and supplied from fitting **61**). Passages **62** and **63** are provided in the adapter **52** to provide communication from the fittings **60** and **61** to the wall portion **58**. A passage **64** extends from the wall portion **44** on the upper chock **16**

at a location aligned with the passages 62 through the adapter 40 and the upper chock 16 to a horizontally extending bore 72 which communicates with the upper end of three downwardly directed passages 66, each of which communicates at its lower end with the bore 68 in the upper chock at a location for lubricating each row of rollers in a bearing 20 for the upper work roll 24. Another passage 65 extends from wall portion 44 in alignment with passage 63 through adapter 40 into chock 16. A pair of compressible gaskets 70 are positioned in contact between the wall portions 44 and 58 to enclose opposed ends of the aligned passages 62 and 64 and aligned passages 63 and 65 to seal the same. Each gasket 70 is bonded to the wall portion 44 for movement with the upper chock 16. The thickness of each gasket 70 is larger than the space between the wall portions 44 and 58 so that they will be in a compressed condition when the chock 16 is in the position shown in FIG. 1 wherein the upper chock 16 is supported on the balancing piston 50 within the mill housing 10.

Passage means are provided for delivering lubricant to the bore 74 containing the bearings 22 of the lower work roll chock 18. Such means comprises a vertical passage 76 extending downwardly from passage 65 to the upper end of bore 36, a vertical passage 78 in stool member 34 extending downwardly from the upper end thereof and a horizontally extending passage 80 extending from passage 78 to the exterior of stool member 34. This passage means also includes a horizontal passage 82 in lower chock 18 extending from bore 38 to a downwardly directed passage 84 which, at its lower end, communicates with the bore 74 containing bearings 22. With the parts in the position shown in FIG. 1, the bores 80 and 82 are in alignment, it being apparent that lubricant is supplied to the bearings 22 from fitting 61 by way of passages 63 and 65 through associated gasket 70 and interconnecting passages 76, 36, 78, 80, 82 and 84.

A suitable seal 85 is mounted in the periphery of stool member 34 and serves to seal bore 36 and member 34. A pair of O-ring seals 87 are mounted in chock 18 for sealing the bore 38 and member 34 at locations above and below bore 82.

Desirably, the lubricant is supplied to bearings 22 at a plurality of locations for lubricating each row of the rollers of bearings 22. To this end, a horizontal passage 88 extends along bore 74 and a plurality of spaced downwardly directed passages 84 are provided to extend between passage 88 and bore 74.

A lubrication arrangement as shown in FIG. 1 could also be provided on the other sides of chocks 16 and 18 and a similar arrangement will be provided on the chocks for the other ends of the rolls 24 and 26.

It will be noted that various of the passages and bores described above are formed by drilling wherefore various of these passages are provided with plugs at appropriate locations as is conventional in the art.

In operation, it will be apparent that the lubrication arrangement shown in FIG. 1 provides a hoseless connection between the fittings 60 and 61 and the various passages communicating with the bores 68 and 74 for the work bearings 20 and 22 and that this passageway involves a separable portion at wall portions 44 and 58. During a roll changing operation the upper chock 16 is raised from the position shown in FIG. 1 by means of the stool means 30 in preparation for the pulling of the work roll chocks 16 and 18 from the mill housing 10. This movement will separate the adapters 50 and 52 and break the flow communication between passages 62 and 64, it being noted that this is done automatically and also involves the lowering of piston 50. Also, when new work roll chocks are reinstalled in the mill housing, the upper chock will be engaged with the piston 50 and moved to the position shown in FIG. 1 with wall portions 46 and 56 being in contact and wall portions 44 and 58 being in opposed relation with the gasket 70 being in a compressed condition therebetween. This serves to automatically reconnect the lubrication passages without the need for any manipulation of hoses or the like. The dashed line showing in FIG. 1 illustrates a typical disengaged position of the parts.

While the construction shown in FIG. 1 is particularly adapted for a lubricant of oil mist, which is blown through the passage means under a low pressure, it will be apparent that the construction is useable with various other lubricants such as oil or grease.

In FIG. 3 there is shown a form of lubrication arrangement in accordance with the invention in which the lubricant is supplied to the lower work roll chock by way of a balancing means therefor instead of by way of a stool means as is shown in FIG. 1. This arrangement is adapted for use with rolling mills which do not employ a stool means as is shown in FIG. 1.

Since the parts shown in FIG. 3 are very similar to that shown in FIG. 1, corresponding parts have the same reference numerals applied with primes added. Thus, the conventional parts of a rolling mill comprise a mill housing 10', an upper back-up roll chock 12', upper and lower chocks 16' and 18' provided with bearings 20' and 22' having the upper and lower work rolls 24' and 26', respectively, journalled therein. The balancing means for the upper work roll chocks comprises a balancing piston 50' having an adapter 52' mounted thereon and having wall portions 58' and 56' cooperating with wall portions 44' and 46' of an adapter 40' on chock 16' in a manner described above with respect to FIG. 1. The upper back-up roll chock 16' is provided with an annular gasket bonded to its wall portion 44'.

The lubrication supply for the upper work roll bearings 20' comprises a fitting 60' and passages 62', 64' and 66' which are the same as that described with respect to FIG. 1.

Means are provided for supplying lubricant to the lower work roll chock 18, this means being essentially the same as the means provided for the upper back-up roll chock 16. Accordingly, corresponding parts will be designated by the same reference numerals with double primes added.

The lower chock is provided with an adapter 40'' which carries a gasket 70'' and provides an inclined wall 44'' and a horizontally extending wall 46''.

Balancing means are provided for supporting the lower chock within the mill housing, such means comprising a hydraulically actuated balancing piston 50'' having an adapter 52'' mounted thereon. The adapter 52'' provides a wall portion 56'' which is adapted for moving into contact with wall portion 46'' and an inclined wall portion 58'' adapted to be positioned in spaced opposed relation with the inclined wall portion

44'' on the lower chock 18'' when this chock is supported by the balancing piston 50'' within the mill housing.

There are provided means defining a passageway for the passage of a lubricant to the journal bearings 22' of the lower work roll chocks. Such means comprises a fitting 60'' mounted on adapter 52'', the fitting being adapted to have a supply conduit from a suitable lubricant connected permanently thereto. There is provided a passage 62'' in adapter 52'' providing communication between the fitting 60'' and the wall portion 58'' at a location enclosed by the gasket 70''. A passage 64'' extends from wall portion 44'' at a location communicating with the interior of the gasket 70' to a downwardly directed passage 66'' which communicates with the bore 74'' containing bearings 22'.

The arrangement shown in FIG. 3 thus provides two hoseless connections between the chock balancing means and the upper and lower work roll chocks, which connections are automatically made and broken when the chocks are changed during a work roll changing operation.

It will be apparent that various changes may be made in the construction and arrangement of parts without departing from the scope of the invention.

I claim:

1. In a rolling mill having a pair of work rolls journalled in bearings in chocks in a mill housing; balancing means for supporting a work roll chock within the mill housing including a balancing piston means, fitting means adapted to receive a supply of lubricant, and means providing a wall facing said work roll chock, said balancing piston means being movable into bearing contact with said work roll chock for supporting the same, said work roll chock having a wall means arranged in opposed relation to said wall means of said balancing means when said work roll chock is supported on said balancing piston means, means providing a passageway for the passage of a lubricant to the journal bearings of said work roll chock including a first passage extending from said fitting means of said balancing means to said wall means thereof, and a second passage extending from said wall means of said work roll chock to said journal bearing thereof, and means for providing sealed communication between said first and second passages at said opposed wall means.

2. In a rolling mill according to claim 1; means providing for the passage of lubricant to the journal bearings of the other of said work roll chocks including a member extending between said work roll chocks having an internal passage therein, third passageway means providing communication between said second passage and one end of said internal passage, and fourth passageway means providing communication between the other end of said internal passage and the bearings of said other work roll chock.

3. In a rolling mill according to claim 2; wherein said member extending between said work roll chocks comprises a stool means for supporting said work roll chocks in a separated condition.

4. In a rolling mill according to claim 1; means providing for the passage of lubricant to the journal bearings of the other of said work roll chocks including balancing means for supporting said other work roll chock within the mill housing including a balancing piston means, fitting means adapted to receive a supply of lubricant and means providing a wall facing said other work roll chock, said last-named balancing piston means being movable into bearing contact with said other work roll chock for supporting the same, said other work roll chock having a wall means arranged in opposed relation to said wall means of said last-named balancing means when said other work roll chock is supported on said last-named balancing piston means, means providing a passageway for the passage of a lubricant to the journal bearings of said other work roll chock including a passage extending from said fitting means of said last-named balancing means to said wall means thereof, and a passage extending from said wall means of said other work roll chock to said journal bearing thereof, and means for providing sealed communication between said last-named passages at said opposed wall means.

5. In a rolling mill according to claim 1; wherein said balancing means includes an adapter member mounted on the upper end of said piston means and providing said wall on said balancing means, said fitting means being fastened to said adapter member.

6. In a rolling mill according to claim 5 wherein said sealing means comprises a compressible gasket of a thickness such that it is placed in a compressed condition between said opposed wall means when said work roll chock is in a position supported on said balancing piston means.

7. In a rolling mill according to claim 6 wherein said gasket is bonded to said work roll chock for movement therewith during a work roll change.

8. In a rolling mill according to claim 1 wherein said sealing means comprises a compressible gasket of a thickness such that it is placed in a compressed condition between said opposed wall means when said work roll chock is in a position supported on said balancing piston means.

9. In a rolling mill according to claim 8 wherein said gasket is bonded to said work roll chock for movement therewith during a work roll change.

10. In a rolling mill having a pair of work rolls journalled in bearings in chocks in a mill housing; balancing means for supporting a work roll chock within the mill housing including a balancing piston means, fitting means adapted to receive a supply of lubricant and flow communication means facing said work roll chock, said balancing piston means being movable into bearing contact with said work roll chock for supporting the same, said work roll chock having a flow communication means arranged in opposed relation to said flow communication means of said balancing means when said work roll chock is supported on said balancing piston means, means providing a passageway for the passage of a lubricant to the journal bearings of said work roll chock including a first passage extending from said fitting mean of said balancing means to said flow communication means thereof, and a second passage extending from said flow communication means of said work roll chock to said journal bearing thereof, and means for providing sealed communication between said first and second passages at said opposed flow communication means.

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