Aug. 4, 1936. F. P. DAHLSTROM 2,050,166

SEAL FOR ROLLING MILL BEARINGS

Filed Dec. 2, 1932 2 Sheets-Sheet 1

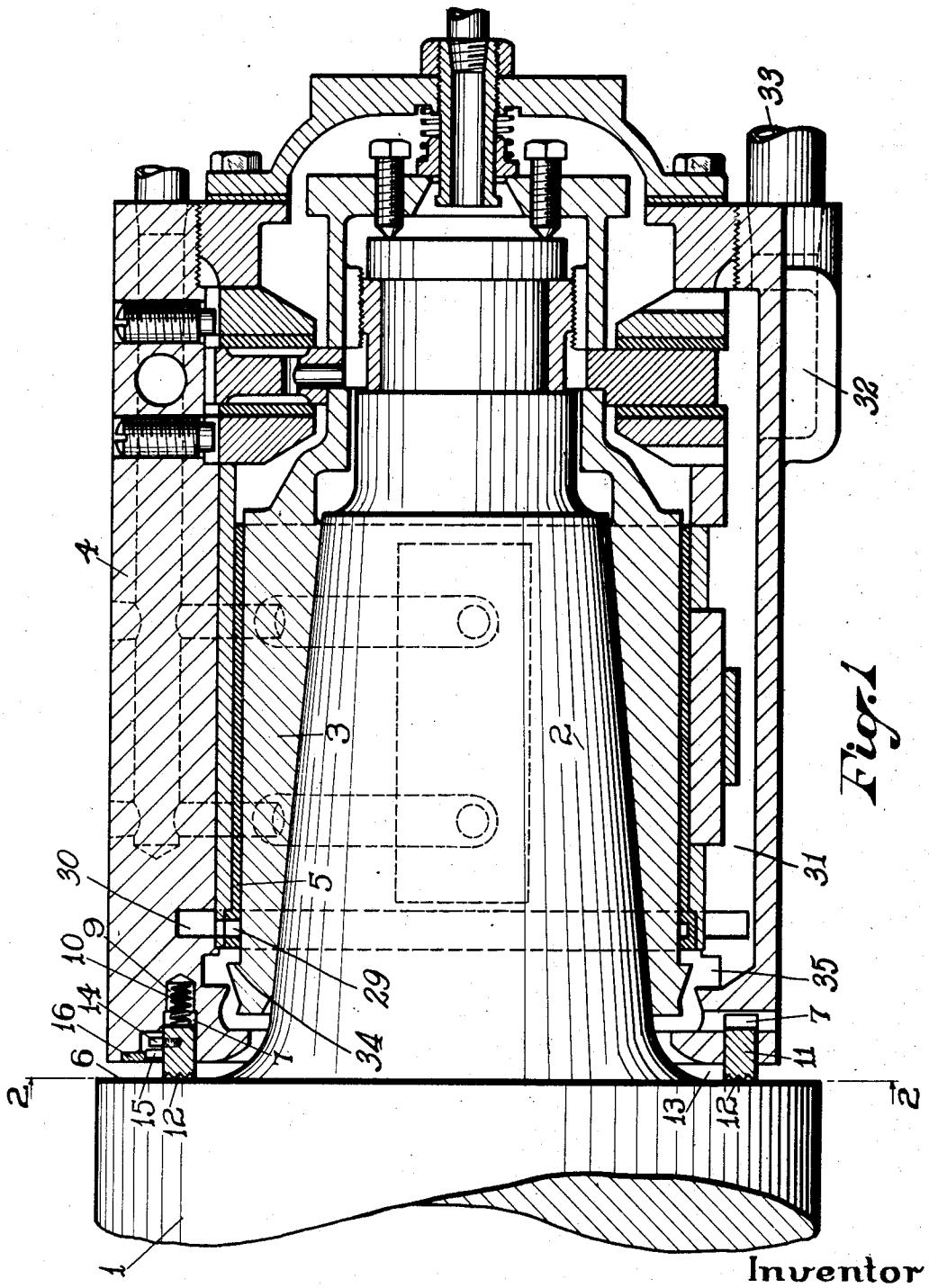

Fig. 1

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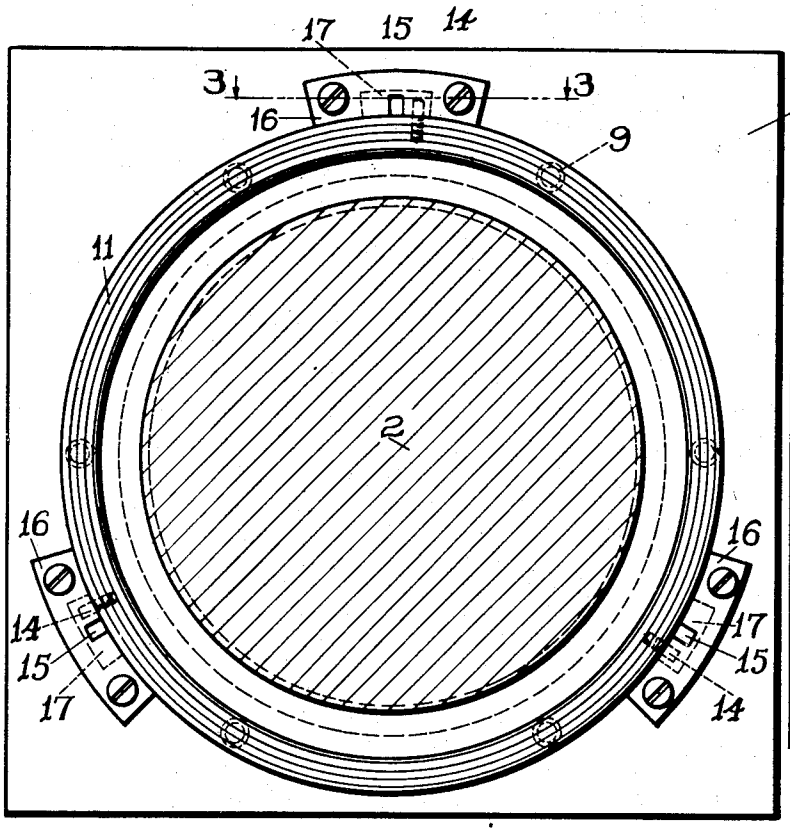

Fig. 2

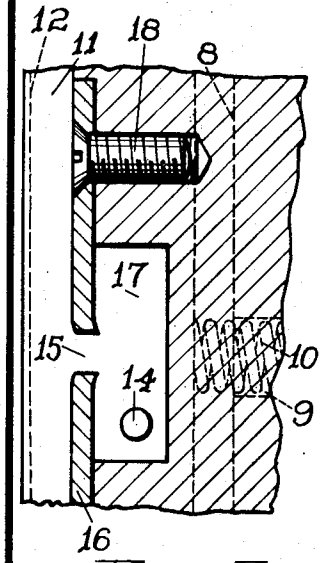

Fig. 3

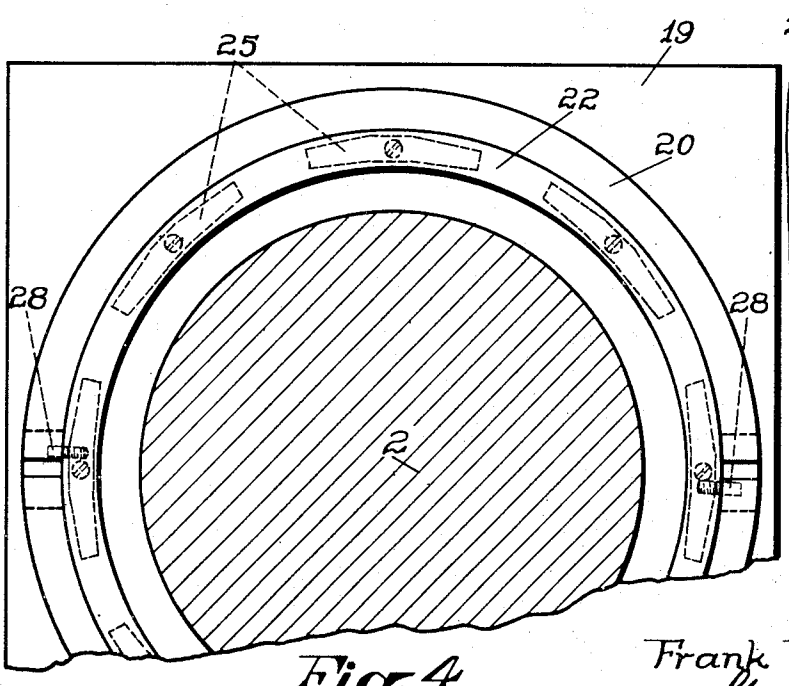

Fig. 4

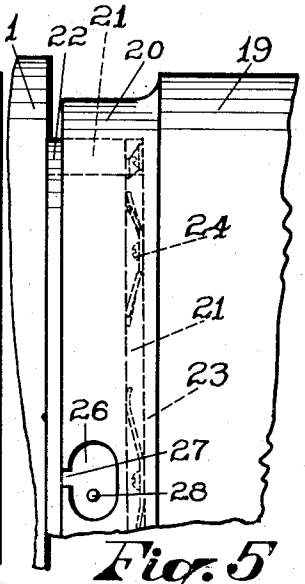

Fig. 5

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2,050,166

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SEAL FOR ROLLING MILL BEARINGS

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Application December 2, 1932, Serial No. 645,450

2 Claims. (Cl. 286—7)

The present invention relates in general to bearings, and more particularly to improvements in bearing constructions for rolling mills and the like, of the type shown and described in United States Letters Patent No. 2,018,055, dated October 22, 1935.

The present invention contemplates, among other things, an improved construction and mounting of the means employed in the aforesaid patented bearing construction to prevent the access to the bearing surfaces of water and scale from the rolling operation; other and further objects and advantages of the invention will be made apparent by the following detailed description thereof, taken in connection with the accompanying drawings, in which—

Fig. 1 is a sectional view illustrating the application of the invention to the bearing construction of the aforesaid type.

Fig. 2 is a transverse sectional view on the line 2—2 of Fig. 1.

Fig. 3 is a fragmentary sectional view on the line 3—3 of Fig. 2.

Fig. 4 is a sectional view similar to Fig. 2, illustrating a modified form of the invention.

Fig. 5 is a fragmentary view in side elevation of the construction shown in Fig. 4.

Like reference characters refer to like parts in the different figures.

Referring first to Fig. 1, I have illustrated a bearing construction of the same general type as that disclosed in the aforesaid Letters Patent, namely a plain bearing, comprising relatively rotatable inner and outer members in wholly inclosed cylindrical surface contact, said bearing being applicable as a unit assembly to the neck or reduced portion of a rolling mill roll or the like. In Fig. 1, the roll body or barrel shown at 1 has a reduced neck 2 of taper form, and the plain bearing assembly, applicable as a unit to this roll neck, consists essentially of inner and outer members 3 and 4, respectively, the outer member being in the form of a hollow block which is fixed in the usual opening or window, not shown, of the roll housing, and the inner member being a sleeve having a running fit in the bore of said block 4 (or in a babbitted liner 5 for said bore), and having an internal taper corresponding to the external taper of neck 2, whereby the application of endwise pressure, even in the absence of a key or the like between neck and sleeve, procures a substantially fixed telescopic union between said parts, insuring rotation of said sleeve in unison with said roll neck.

In hot rolling, the reducing rolls and their housings are kept continuously drenched with water, and this water, carrying with it all the scale and other foreign matter from the stock undergoing reduction, flows freely and in large quantities over the ends of the rolls and onto the bearings of the roll necks. Such water and scale is the principal factor in the inevitable early destruction of the ordinary plain bearings of open type heretofore used extensively for the journaling of roll necks, because its free and copious access to the bearing surfaces absolutely nullifies any attempt to maintain a lubricant film between said surfaces. Also to roll neck bearings of the inclosed type, i. e., anti-friction ball or roller bearings as well as oil-flooded plain bearings of the construction herein shown and typified by the aforesaid Letters Patent, the presence of this water and scale is a very grave menace, because neither the close running fit nor the lubricant film, both so essential to the operation of such an inclosed bearing, can be maintained if such water and scale is allowed to reach the interior bearing surfaces.

My invention provides a seal which effectually excludes from the interior of such an inclosed bearing the water, scale and other foreign matter which flows over the bearings in the usual hot rolling operation. This seal is established between the end of the roll barrel and the adjacent relatively stationary part of the inclosed roll neck bearing, which part, in the present instance, is the outer member or block 4 whose bore receives the rotary sleeve 3. As shown in Figs. 1, 2 and 3, the inner end of block 4, facing the shoulder 6 at the end of the roll barrel, is provided with a circular recess 7, and from the bottom 8 of this recess, a plurality of holes 9, 9 (here shown as six in number) are bored for the reception in each of a coiled spring 10. The ends of said springs project beyond the bottom or floor 8 of recess 7, and against said projecting ends bears a ring 11 of suitable wear-resistant substance, such as phenolic impregnated material. This ring 11, as received in the recess 7 and seated against the springs 10, 10, projects beyond the end of block 4 and contacts on its exterior face with the shoulder or end 6 of the roll barrel 1. Such exterior face, as shown at 12, is preferably grooved to provide a plurality of concentric circular ridges for contact with said shoulder, thus in effect to increase the unit pressure exerted by the springs 10, 10 in maintaining the seal that prevents the entrance of water and scale to the space 13, inwardly of said ring 11, which communicates with the interior of the inclosed bearing.

For retaining the ring 11 within its recess, and to prevent it being pushed completely out by the springs 9, 9 when withdrawn from contact with the roll barrel by dismounting of the bearing, said ring has projecting from its outer periphery a plurality of pins 14, 14, here shown as three in number. These pins, in the act of positioning the ring 11 in its recess 7, are lined up with correspondingly located slots 15, 15 provided by the

inner edges of plates 16, 16,—said edges conforming to the outer wall of the recess 7. These plates 16, 16, preferably set in shallow depressions of the end surface of the bearing block 4, so as to be flush with said surface, constitute the covers or inclosures for three radial extensions 17, 17 of the circular ring-receiving recess 7,—said plates being secured in position by any suitable means, as by the screws 18. Each of the recesses 17, extending radially upward from the circular ring-receiving recess 7, and of less depth than the latter, thus has on the end face of bearing block 4 a restricted substantially central entrance by the slot 15 of its cover plate 16, and these slots 15, 15 are so positioned circumferentially as to enable the three pins 14, 14 of ring 11 to be registered therewith, when said ring is inserted in the recess 7.

By pressing inwardly on the so-inserted ring 11, to compress momentarily the springs 10, 10, the pins 14, 14 of said ring are pushed through the slots 15, 15 into the recesses 17, 17; thereupon, the ring 11 is slightly shifted angularly in the recess 7 to dispose its pins 14, 14 out of registry with the slots 15, 15. This serves to lock the ring 11 in place; that is to say, each pin 14, in its respective recess 17, occupies a position behind the cover plate 16 of said recess, so that notwithstanding the expansive force of the springs 10, 10, the ring 11 cannot be forced out of place. When the bearing, having the ring 11 thus detachably locked in its stationary element 4, is applied to the roll neck 2, as shown in Fig. 1, the contact of the ridged surface 12 of said ring with the shoulder 6 of the roll, causes said ring to occupy substantially the position illustrated in Fig. 3, with its pins 14, 14 so disposed in their recesses 17, 17 as not to interfere in any way with the action of springs 10, 10 in holding the ring to its work. As the ring 11 is worn away on its ribbed surface 12 by the rubbing of the shoulder 6 of the rotating roll, the expansive force of the springs 10, 10 compensates for such wear, thus to maintain the seal, provided by said ring, against the entrance of water and scale to the space 13. Likewise, these springs 10, 10 render the ring self-adjusting, for the maintenance of such seal, regardless of endwise shifting of the roll 1 relative to the stationary bearing block 4. When the bearing is dismounted, its ring comes off with it, and such ring can readily be removed, for replacement or for renewal of its ribbed surface 12, simply by slightly shifting it angularly to register the pins 14, 14 thereof with the slots 15, 15 of the plates 16, 16.

Figs. 4 and 5 show a modification of the invention, in which the stationary member 19 of the roll neck bearing has formed on its face that opposes the roll 1 a circular boss 20. Said boss 20 provides a circular recess 21, wherein is received a ring 22 that provides the scale and water seal of my invention,—the bottom or floor 23 of said recess 21 having secured thereto, in any suitable manner, as by screws 24, a plurality of leaf springs 25, 25, which press the ring 22 outwardly against the shoulder of the roll, and hold said ring to its work. On the periphery of boss 20 are cut a plurality of elongated slots 26, extending through the material of said boss to the recess 21 that receives the ring 22, and each slot 26, at substantially its central portion, has a narrow opening 27 to the face of the boss. The ring 22 carries pins 28, 28 corresponding in number and circumferential location to the openings 27 of the slots 26, 26, so that when the ring 22 is inserted in the recess 21, with said pins 28 registering with the openings 27, inward pressure of said ring against the force of springs 25, 25 will push the pins 28 through the openings 27, following which a slight turning movement of the ring secures the locking of the same in place, with its pins 28 occupying the slots 26, as shown in Fig. 5. It will be obvious that the modified construction of Figs. 4 and 5 has the same mode of operation as the construction shown in Figs. 1, 2 and 3.

In both forms of the invention, the spring-pressed ring is so located relative to the lubricated surfaces of the bearing as to be wholly removed from and independent of the means employed for maintaining and retaining the lubricant film on said surfaces. That is to say, the oil that is supplied, as described in the aforesaid Letters Patent, to the relatively-running contact surfaces of sleeve 3 and liner 5 has constant egress, in the operation of the bearing, from the ends of said surfaces. But practically none of this oil from the inner end of the bearing has to be handled by the spring-pressed ring, because the liner 5 at its inner end has a ring of apertures 29, 29 that communicate with the groove 30 of block 4, said groove connecting by space 31, beneath the liner, with a channel 32 to which is connected the return pipe 33 of the oil circulating system. Any oil from the inner end of the bearing that gets past the apertures 29 is intercepted by throw-off flange 34 of the rotary sleeve 3, and deflected into the groove 35 of the block 4, said groove communicating with said space 31. Thus practically no oil from the bearing can reach the space 13, immediately inward of the spring-pressed ring 11,—leaving the latter free to perform its function as a water excluding means, without being called upon at the same time to serve as an oil seal.

I claim:

1. A seal for a roll neck bearing, to exclude from said bearing the water and scale from the rolling operation, said seal comprising a circular groove in the end face of a stationary member of said bearing, a ring received in said groove and urged yieldingly against the opposing end of the roll barrel, recesses in said bearing member communicating with said groove at different points on its circumference, and pins on the circumference of said ring so spaced as to enter said recesses, the latter having undercut angular extensions whereby a limited turning movement of said ring carries said pins into positions where they detachably lock said ring in said groove.

2. A seal for a roll neck bearing, to exclude from said bearing the water and scale from the rolling operation, said seal comprising a circular groove in the end face of a stationary member of said bearing, a ring received in said groove and urged yieldingly against the opposing end of the roll barrel, recesses in said bearing member communicating with said groove at different points on its circumference, and pins on said ring so spaced as to enter said recesses, for the detachable locking of said ring to said bearing member, each recess having an entrance slit for one of said pins, on the end face of said bearing member.

FRANK P. DAHLSTROM.