

July 26, 1949.

E. VON BOLHAR
LADDER ROLLER MOUNTING

2,477,221

Filed April 29, 1947

2 Sheets-Sheet 1

FIG. 1.

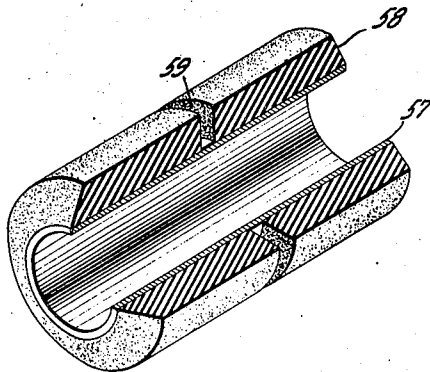
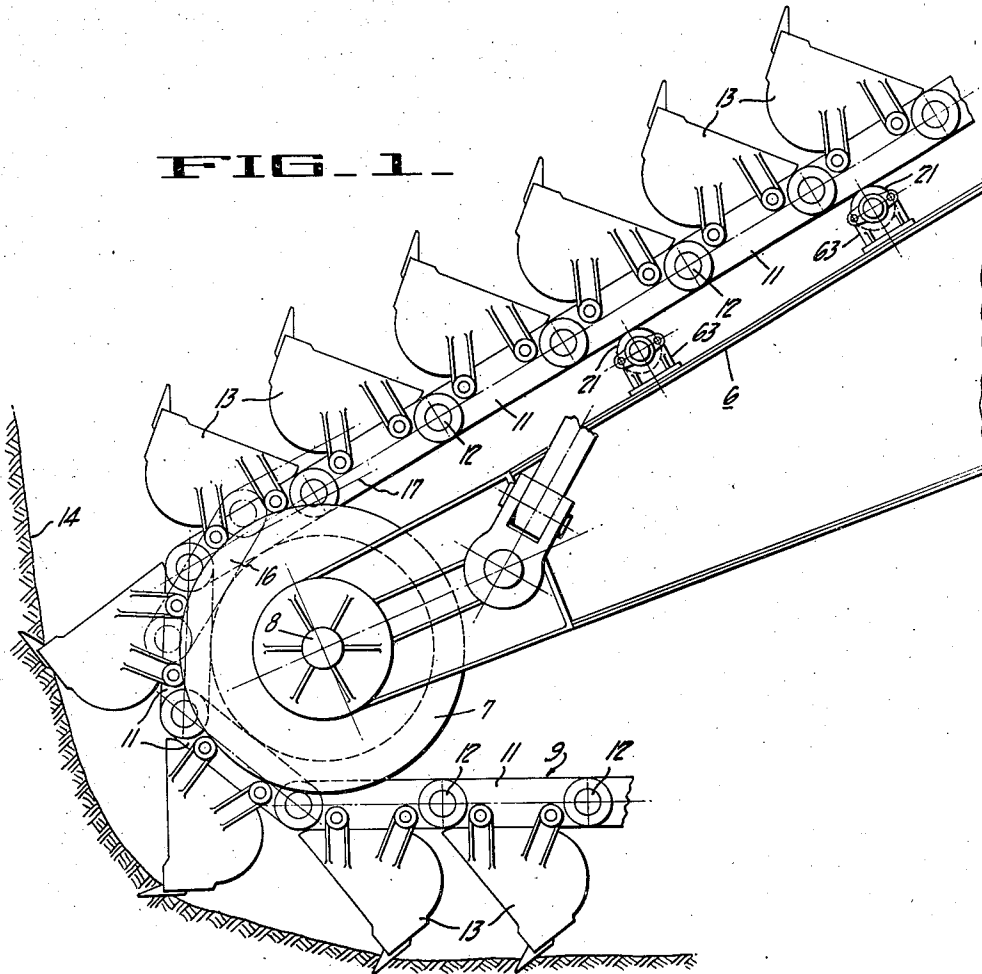


FIG. 5.

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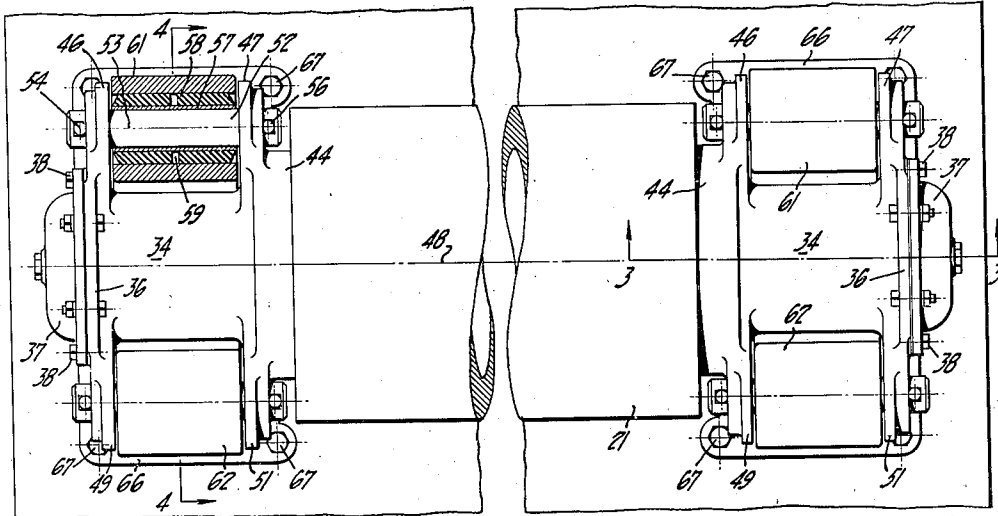


FIG. 2

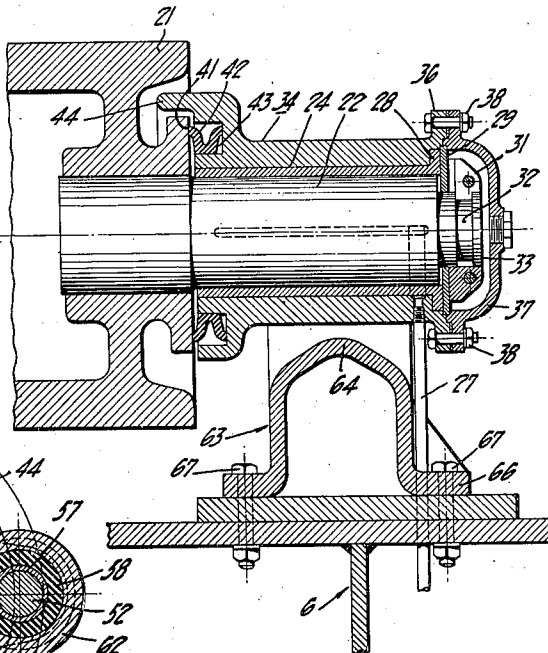


FIG. 3

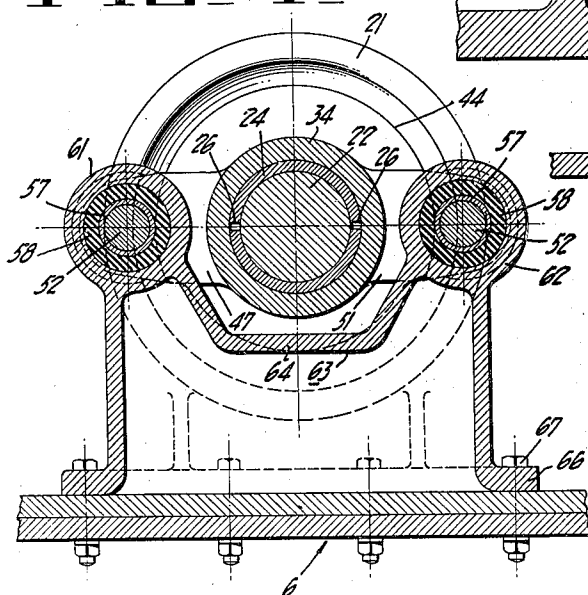


FIG. 4

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LADDER ROLLER MOUNTING

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5 Claims. (Cl. 308—26)

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My invention relates generally to the construction of alluvial dredges which incorporate a digging ladder amounting in effect to a boom having a lower tumbler at one end, and an upper driving tumbler at the other end. Trained around the tumblers and driven by the upper one, is an endless chain comprised primarily of dredging buckets effective to dislodge the earth and to carry it along the ladder to ultimate discharge. To support the upper run of digging buckets between the lower and upper tumblers, a number of transverse cylindrical rollers are disposed on the ladder in positions to support the chainlike bucket portions contacting them. The rollers carry the weight of the buckets and of their load in greater or less degree depending upon the angularity of the ladder. As this changes during a dredging operation the load upon the rollers likewise changes. In addition, the length of the links included in the bucket chain is relatively great with regard to the diameter of the cylindrical lower tumbler. Due to the tangent angularity of the links as they pass around the lower tumbler, the lower portion of the bucket chain especially on the upper, conveying side is alternately lifted and lowered. This produces an undulatory or slapping action of the lower portion of the bucket chain so that the rollers most nearly adjacent the lower tumbler are subjected to pounding forces due to this cause.

It is therefore an object of my invention to provide a ladder roller mounting effective to withstand the various loads and intermittent shocks imposed upon it during dredging operations.

Another object of my invention is to provide a ladder roller mounting of improved construction for longer life and more satisfactory service.

A further object of the invention is to provide a ladder roller mounting effective to absorb or cushion some of the shocks imposed upon it without transmitting them to the supporting ladder and appurtenant mechanisms.

An additional object of the invention is to provide a ladder roller mounting which is virtually interchangeable with mountings of the present standard design, and, in addition, is effective to absorb shocks.

An additional object of the invention is to provide a ladder roller mounting capable of absorbing shocks yet effective to maintain satisfactorily the alignment and position of the ladder roller.

Other objects, together with the foregoing, are attained in the embodiment of the invention described in the following description and illustrated in the accompanying drawings, in which

Figure 1 is a side elevation of a portion of the lower end of a digging ladder and attendant dredge bucket chain, showing the parts in position for dredging operation and illustrating the

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use of the ladder roller mounting of my invention.

Figure 2 is a plan of a ladder roller mounting constructed in accordance with my invention, the central section of the structure being broken away to reduce the extent of the figure, and a portion of a bushing and boss for a pin being shown in cross section.

Figure 3 is a cross section, the plane of which is indicated by the line 3—3 of Figure 2.

Figure 4 is a cross section the plane of which is indicated by the line 4—4 of Figure 2.

Figure 5 is an isometric perspective of a bushing utilized in connection with my ladder roller mounting certain portions of the bushing being shown in section, the planes of section being both horizontal and vertical and extending longitudinally of the bushing.

In its preferred form the ladder roller mounting of my invention is for use on a dredging ladder, and in connection with a standard ladder roller having bearings on its opposite ends. Each roller end is provided with one of the mountings. The mounting includes a base, or saddle, adapted to be secured to the ladder and is formed with a pair of bosses, arranged with their axes parallel to the axis of the ladder roller, and encompassing cylindrical deformable bushings, for example metal lined rubber bushings. Piercing the pair of bushings so mounted is a pair of pins projecting on opposite sides of the bosses and at their ends engaging arms extending laterally from the sides of a journal capable of receiving the bearing end of the roller. The journal and the arms together constitute a cradle in part fitting within a depressed central portion in the saddle.

While the ladder roller mounting of my invention can be incorporated in numerous different forms depending upon the particular type of dredge with which it is included, and depending upon the environment and engineering considerations according to which it is utilized, it has been successfully embodied as shown herein wherein it takes the place of rigid ladder roller mountings. In this environment there is provided a digging ladder 6, only the lower end of which is shown. A generally cylindrical lower tumbler 7 is mounted in a bearing structure 8 at the lower end of the ladder. Trained around the lower tumbler is a bucket chain generally designated 9 comprised of a plurality of links 11 connected by pins 12 to adjacent links for ready articulation, and carrying digging buckets 13.

As the chain 9 is advanced clockwise around the lower tumbler 7, the digging buckets 13 engage with a bank 14 to be excavated and carry a load to appropriate further handling mechanisms. The length of the links 11, that is the distance between the successive pins 12 as the buckets 13 round the lower tumbler 7 is such that they oc-

copy, instantaneously, positions as shown by the full lines in Figure 1. A few moments later they occupy instantaneously positions as illustrated by the links 16 and 17 shown in dotted lines in the figure. The effect is that the links rise and fall alternately as they round the lower tumbler. They thus approach and recede from the upper surface of the ladder 7 during the digging operation and when they are not only under tension due to the driving force, but likewise are loaded with excavated material. This produces a severe problem especially in the lower supporting ladder rollers 21 which engage with the lower faces of the links 11 and transmit the load and stresses to the ladder 6.

To avoid transmitting all of the strains, especially those due to impact and vibration, my ladder roller mounting is provided. Each roller 21, especially as shown in Figures 2, 3, and 4, is a circular cylinder substantially identical at its opposite ends. Each end of the roller 21 is provided with a shaft 22 constituting a bearing. The shaft or bearing 22 is rotatably disposed within a sleeve 24 to constitute a journal. Lubrication to lubricant grooves 26 is supplied through a conduit 27. The sleeve 24 is provided with an out turned flange 28 against which a thrust washer 29 is disposed. A split collar 31 also engages the thrust washer and is clamped into a groove 32 turned in a reduced portion 33 of the shaft 22 so that the shaft and the roller 21 are axially accurately located with respect to the thrust washer 29.

Serving as a support for the sleeve 24 and the thrust washer 29 is a cradle generally designated 34 centrally bored to receive the sleeve 24 and having an outboard flange 36 to which a flanged cap 37 is secured by fastenings 38. The thrust washer 29 is clamped between the flange 36 and the cap 37.

In order to retain the lubricant in the journal and to preclude the entrance of foreign matter and water, the end of the roller 21 is finished with a radial face 41 against which presses a packing ring 42 recessed in an annular groove 43 formed in one end of the cradle 34. A lip 44 overhangs a part of the recessed roller 21 to afford protection against falling rock or coarse gravel. The construction of the seal ring 42 and its attendant structure is included in more detail and is claimed in my co-pending application entitled "Shaft seal," filed May 27, 1947, with Serial Number 750,736, and assigned to the assignee of the present application.

With the structure as so far described all of the loads and shocks and impacts imposed upon the roller 21 are correspondingly transmitted to the cradle 34 through the journal. It is in accordance with my invention that mechanism be provided for absorbing or preventing transmission of at least some of these stresses and shocks. For that reason, the cradle 34 is integrally formed with a pair of arms 46 and 47 on one side of the central axis 48 of the roller 21, and a similar pair of arms 49 and 51 on the other side of the axis 48. The arms of each pair extend substantially in a transverse plane from the central journal portion of the cradle and are pierced by bores to receive a pin 52 arranged with its axis 53 parallel to the axis 48. The pin projects beyond the arms 46 and 47 and is removably held in position by locking pins 54 and 56.

Surrounding the pin 52 is an internal metallic liner 57 forming part of a deformable bushing 58. The liner 57 is substantially of the same

length as the space between the arms 46 and 47 so that the bushing is accurately located therebetween and is a sliding fit on the pin 52. Formed in intimate relation with the sleeve 57 is the surrounding bushing envelope of a deformable material, for example rubber. This envelope is inwardly beveled at its opposite ends and is likewise provided with a central channel 59 to afford room for displaced or deformed rubber. In many instances the central channel 59 or the end bevels, or both, can be omitted if the flow or deformation of the rubber is not great. The outside of the envelope 58 is received with a push fit within the bore of a boss 61 located between the arms 46 and 47, for example.

The boss 61 is one of a pair, the other boss 62 being disposed on the opposite side of the axis 48. The two bosses 61 and 62 are considered as integral parts of a saddle generally designated 63. This is preferably a symmetrical casting having a depressed central portion 64 to underlie the journal 34. At either side of the depression, the bosses 61 and 62 are disposed with their axes parallel to and substantially the same transverse plane as the axes of the pins 52 and of the shaft 21.

The saddle also includes a lower peripheral flange 66 through which pass fastenings 67 for securing the saddle and correspondingly the entire mounting structure onto the upper surface of the ladder 6. The arrangement is often such that the flange 66 and fastenings 67 engage the same portions of the ladder 6 that previously were engaged by former, rigid roller mounts just as the journal 34 engages the shaft 22 in the same fashion as a rigid mount. In this way, the present mounting is entirely interchangeable with previous rigid mounts.

With the present ladder roller mounting, the saddle 63 is rigid with the ladder 6 and the cradle 34 is rigid, except for rotation, with the roller 21. But the saddle and cradle are not rigid with respect to each other. The four bushings 58 are effective to absorb shocks which normally would be transmitted between the saddle and the cradle. The mounting and location of the bushings are such that while the roller 21 is held in accurate alignment with the ladder and is held against undue end shift, yet it is capable of yielding momentarily under impacts and other stresses which would normally be productive of extreme wear. The rubber bushings are also effective to absorb numerous rapid vibrations and thus assist in precluding the general shaking and loosening of fastenings which might otherwise occur.

The rollers 21 can readily be renewed when worn since withdrawal of the pins 52 after removal of the fastenings 54 and 56 is readily accomplished, and the journals can equally well be renewed or replaced if desired. If eventually the rubber bushings are in deteriorated condition they too can readily be changed simply by withdrawing them and inserting new ones in their place.

In general there has been provided in accordance with my invention a ladder roller mounting which can be interchanged with mountings already in use, which absorbs shocks and vibrations, which does not unduly transmit the slapping of the upper run of the dredge bucket belt to the ladder, yet maintains the alignment of the bucket chain supporting rollers, and which permits the replacement of the various parts without difficulty.

I claim:

1. A ladder roller mounting comprising a saddle, a pair of bosses on said saddle, deformable bushings within said bosses, pins passing through said bushings, a cradle, arms extending from said cradle and engaging opposite ends of said pins, and a journal included in said cradle.

2. A ladder roller mounting comprising a saddle, a pair of cylindrical bosses disposed on said saddle with their axes parallel, deformable bushings within said bosses, pins passing through said bushings, a cradle, pairs of arms extending from opposite sides of said cradle, the arms of each of said pairs engaging the opposite ends of one of said pins, and a journal included in said cradle with its axis parallel to the axes of said pins.

3. A ladder roller mounting comprising a saddle having a depressed central portion, a pair of cylindrical bosses disposed at opposite sides of said central portion, deformable bushings within said bosses, pins passing through said bushings, a cradle, pairs of arms extending from opposite sides of said cradle and engaging said pins, and a journal included in said cradle and extending into the central portion of said saddle.

4. A ladder roller mounting comprising a saddle having a depressed central portion, a pair of

cylindrical bosses integral with said central portion and disposed on opposite sides thereof with their axes parallel, deformable bushings within said bosses, pins passing through said bushings, a cradle, a journal included in said cradle and extending into the central portion of said saddle with its axis parallel to the axes of said pins, and arms integral with said journal engaging the ends of said pins.

5. A ladder roller mounting comprising a base element adapted to be secured to a ladder, a journal element adapted to receive a roller, a pair of bosses on one of said elements, deformable bushings in said bosses, pins passing through said bushings, and a plurality of pairs of arms on the other of said elements, each of said pairs of arms engaging a respective one of said pins.

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