April 5, 1932. H. D. MARTINDALE 1,852,177

PAPER MAKING MACHINERY

Filed July 16, 1930 2 Sheets-Sheet 1

Fig. 1.

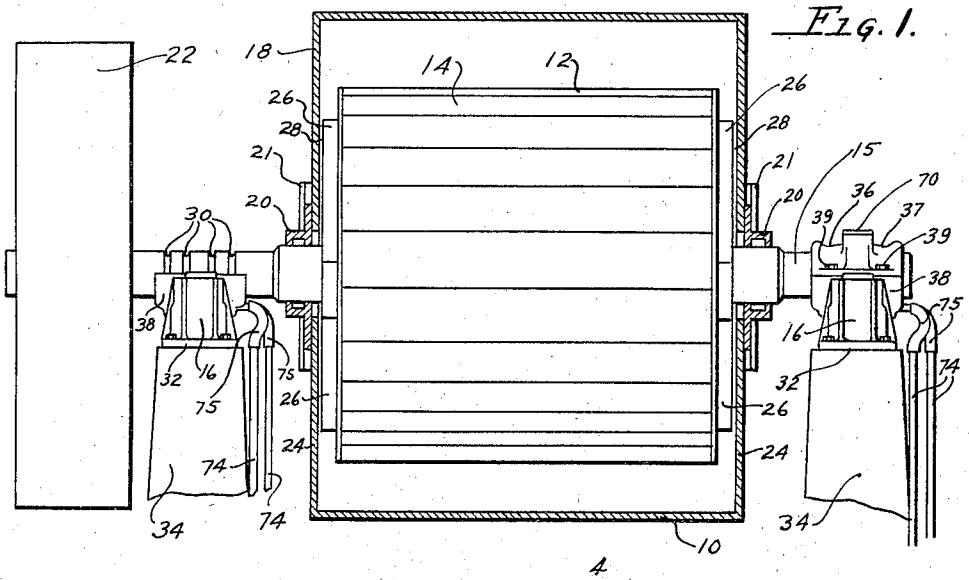


Fig. 2.

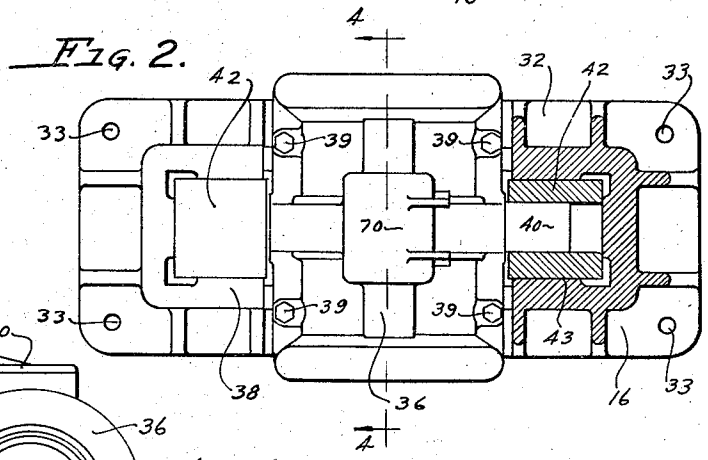
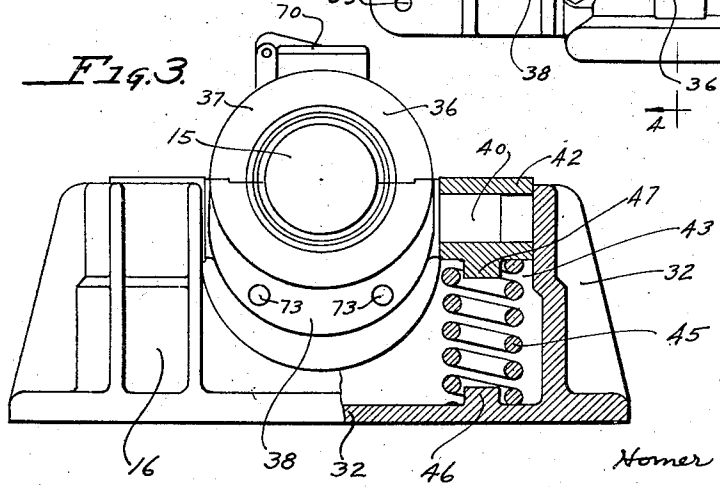


Fig. 3.



Inventor

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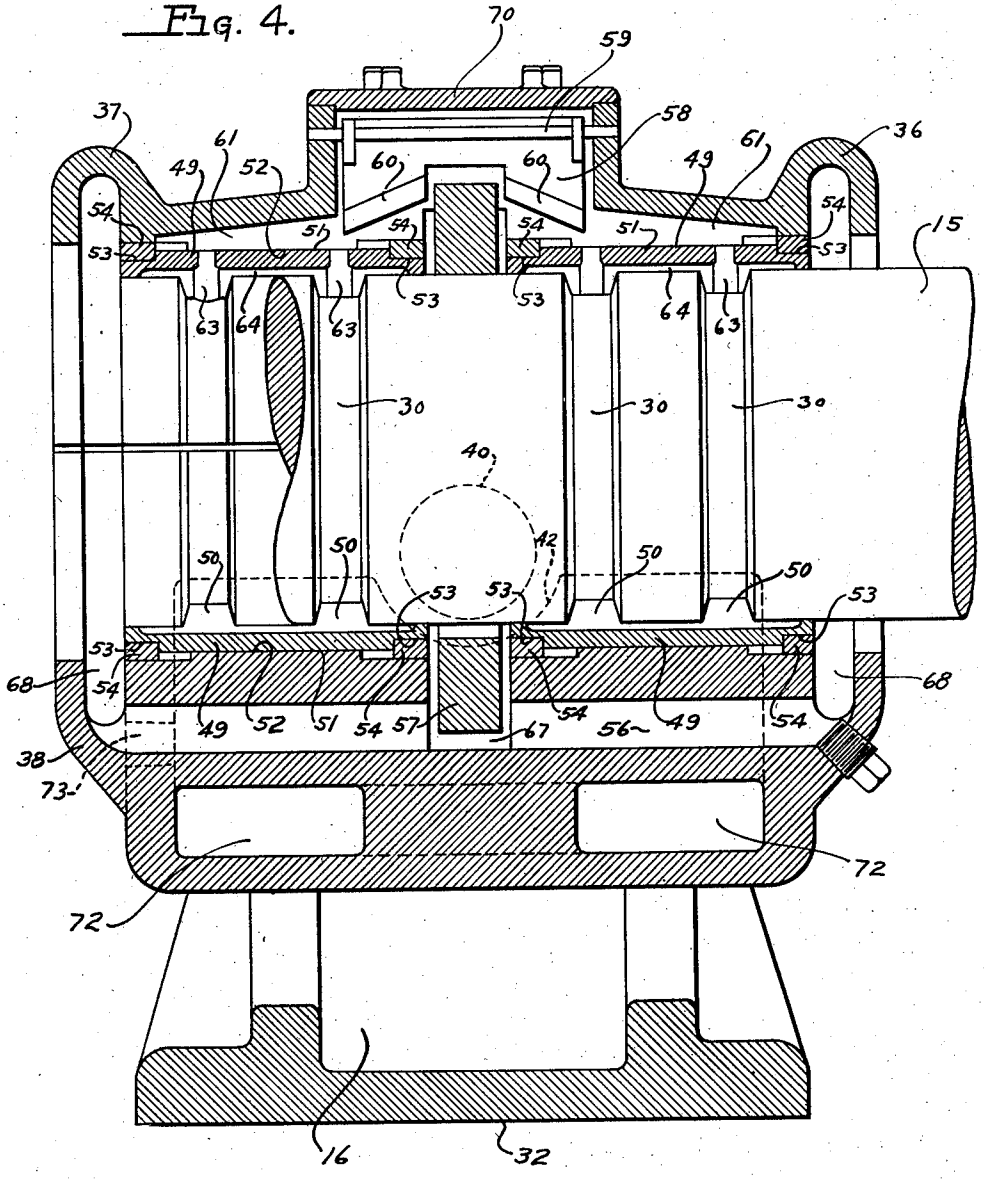
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Fig. 4.



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UNITED STATES PATENT OFFICE

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PAPER MAKING MACHINERY

Application filed July 16, 1930. Serial No. 468,247.

This invention relates to beaters such as are used in the manufacture of paper pulp, and machinery of like character.

One of the principal objects of the invention is the provision of a breaker beater having a rotatable roll with provisions for maintaining the roll in proper operating relationship with respect to the beater tub.

Another object of the invention is the provision of a breaker beater having a roll and a supporting bearing cooperating to prevent roll movement in an axial direction.

Other objects and advantages of the invention will be apparent from the following description, the accompanying drawings and the appended claims.

In the drawings, which illustrate a preferred embodiment of the invention—

Fig. 1 is a vertical sectional view through a breaker constructed in accordance with the present invention;

Fig. 2 is a plan view of a breaker roll bearing; some of the parts being broken away for clearness of illustration;

Fig. 3 is an end elevational view of the bearing in which several parts are broken away; and

Fig. 4 is an enlarged sectional view taken on the plane of the line 4—4 of Fig. 2; a portion of the roll shaft being shown.

The drawings, in which like characters of reference designate like parts throughout the several views thereof, illustrate a breaker beater such as is adapted for use in the disintegration of paper making stock. The breaker comprises generally a tub 10 which provides a container or tank within which paper making stock or like material may be circulated while being acted upon by a rotatable breaker roll 12. The roll 12 comprises a suitable structure for the support of the usual fly bars 14 and is mounted on a horizontal axially extending shaft 15 which is carried upon bearings 16. The tub 10 is shown provided with an enclosing casing or hood 18 which covers the tub adjacent the position occupied by the roll. Suitable packing boxes 20 are provided on the tub 10 through which the ends of the shaft 15 are adapted to project; the packing boxes 20 being preferably supported for movement within guideways 21, as shown, so that the packing boxes may shift to accommodate aligning movement in the roll shaft. Suitable driving means are provided for the roll such as the pulley 22 which is fixed to the shaft 15 and is adapted to be connected, as by means of a belt, to a suitable source of power for rotation of the roll.

In operation the roll 12 is rotated by the pulley 22 to provide a disintegrating action on the contents of the tub. Suitable banger irons 26 are attached to the end faces of the roll and aid in keeping the clearance space between the roll ends and the side walls 24 of the tub free of material which might tend to gather within this space upon the rotation of the roll, and which might create a jamming action which would displace the roll from its normal position of clearance. The banger irons, which are well known in the art, comprise curved metallic members fixed to the end faces of the roll. They extend from the hub portion of the roll outwardly toward the periphery thereof and present a curved face which tends to prevent the collection of material between the roll and the tub sides 24. A small clearance space, indicated at 28, is provided between the banger irons and the adjacent side walls 24 and is an amount, generally $\frac{1}{8}$ to $\frac{1}{4}$ inch, sufficient to permit free rotational movement of the roll within the tub. As the process of disintegration continues the material under treatment is reduced to such size that it may collect within the small clearance space 28 which exists between the banger irons and the side walls 24 and, upon collection there, may tend to move the roll and its associated parts in an axial

direction to thereby create friction between the roll ends and the tub walls.

Suitable means are provided within the bearings 16 to maintain the roll in fixed axial position and comprise means for effectively sustaining the thrust loads created on the shaft 15 by the banger irons in clearing the spaces 28 of collected material. As shown, a plurality of spaced peripheral grooves 30 are provided on the shaft 15 within the confines of the bearings 16. The bearings 16 are provided with annular ridges of such size to interengage the grooves 30 and thereby prevent axial movement of the shaft and its roll. The bearings 16 are shown substantially similar although only one need be provided with means for sustaining the roll thrust. As shown, a bearing 16 comprises a base portion 32 having attaching holes 33 for anchorage by bolts or the like to a suitable supporting foundation 34. The base portion 32 has a housing 36 mounted in it, preferably resiliently, which surrounds and provides a bearing for the shaft 15. The housing 36 comprises a detachable top portion 37 which is adapted to be held to a bottom portion 38 as by means of suitable attaching bolts 39. The bottom portion is provided with oppositely positioned cylindrical bearing studs 40 extending on a common axis in a horizontal plane and substantially perpendicular to the axis of the roll. The studs 40 are mounted for rotational movement within trunnions 42 which are carried within close fitting three sided guideways 43 formed in the base portion 32 of the bearing. The guideways, as shown, are proportioned to permit free vertical movement of the enclosed trunnions but prevent any laterial movement of the trunnion or supported bearing 36. Resilient means, such as the coil springs 45, preferably support the trunnions 42 and bearing housing 36 within the base structure 32; suitable spring aligning studs 46 and 47 being provided in the base and trunnions respectively for alignment of the supporting springs. The resilient support provided by the springs 45 and the pivotal joint provided through the trunnions 42 permit a freedom of movement between the bearing 36 and the base 32 for the proper alignment of the roll 12. However, any tendency toward axial movement in the bearing housing 36 is prevented by contact of the trunnions 42 with the walls of the guides or grooves 43.

The bearing portions 37 and 38 are each provided with lining members 49 which are made of suitable bearing material and are provided with spaced annular ridges 50 for engagement with the grooves 30 of the shaft. The liners 50 have substantially cylindrical exterior surfaces 51 which engage similarly shaped surfaces 52 on the interior of the bearing housing and are provided with depressed peripheral portions 53 for engagement with annular ridges 54 provided in the bearing portions 37 and 38 to securely maintain the liners 50 against axial movement. Suitable lugs are provided on the liners 50 for engagement with the bearing housing 36 to prevent rotational movement of the liners 50 within the bearing housing.

Lubricant for the bearing is carried in a well or sump 56 formed in the housing portion 38 and is circulated through the bearing as by means of an oiling ring 57 which, as shown, hangs from and is rotated by the shaft 15; the ring 57 being of sufficient diameter to extend down into the sump 56 for collection of oil. Oil collected on the ring is carried upwardly upon its rotation and, through the provision of a suitable wiper, is discharged into a trough 58 which is suspended from the bearing portion 37 by means of a pin 59 carried thereby. The trough 58 is provided with oppositely extending downwardly inclined gutters 60 which direct the collected oil into spaces 61 provided in the top portion of the bearing portion 37. Oil holes 63 are shown provided in the bearing liners 50 and provide passages for the lubricant from the spaces 61 to the bearing faces of the liners; suitable communicating slots 64 being provided in the upper portion of the liners 50 adjacent the passages 63 for the proper distribution of the lubricant. Rotation of the shaft causes the ring 57, which rotates with it, to pick up oil from the sump and discharge it into the gutters for circulation throughout the bearing. Oil seeping from the liners is returned to the sump by draining through the clearance slot 67 provided for the ring 57 or by draining through channels 68 provided at the ends of the bearing and in communication with the sump. The supply of lubricant may be replenished through a hinged lid 70 provided in the bearing portion 37.

The bearing portion 38 is shown provided with a cored passage 72 through which cooling water may be circulated. As shown, the portion 38 is provided with a pair of openings 73 which communicate with the passage 72 and are threaded for the attachment of water circulating pipes 74; flexible connections 75 of rubber tubing or like material connect the pipes 74 to the resiliently mounted bearing 36.

It will now be apparent that a bearing of simple construction is provided in which is incorporated a mounting permitting complete freedom of movement for shaft alignment but preventing any movement in the shaft which would tend to displace it axially.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise form of apparatus, and that changes may be made therein without departing from the

scope of the invention which is defined in the appended claims.

What is claimed is:

1. In a breaker, a breaker roll, a shaft for said roll, and a supporting bearing for said roll shaft, said bearing comprising a base structure and a shaft enclosing housing movable relatively to said base structure, means within the confines of said shaft enclosing housing, and cooperating means on said shaft adapted to coact with said first means to prevent axial movement of said shaft relatively to said bearing base.

2. In a breaker, a roll, a shaft for said roll, a supporting bearing for said roll shaft, said bearing comprising a base structure and a shaft enclosing housing movable relatively to said base structure, and means comprising interfitting peripheral ridges and grooves in said shaft and shaft enclosing housing to prevent axial movement of said shaft.

3. In a breaker, a roll, a shaft for said roll, a supporting bearing for said roll shaft, said bearing comprising a base structure, a shaft enclosing housing resiliently mounted on said base structure and means associated with said enclosing housing to maintain said roll shaft in fixed axial position.

4. In a breaker, a roll, a shaft for said roll, a supporting bearing for said roll shaft, said bearing comprising a base structure, a shaft enclosing housing vertically guided in said base structure, a spring resiliently supporting said housing and means associated with said enclosing housing to maintain said roll shaft in fixed axial position.

5. In a breaker, a roll, a shaft for said roll, a supporting bearing for said roll shaft, said bearing comprising a base structure, a shaft enclosing housing pivotally mounted on said base structure for movement about a horizontal axis positioned perpendicularly to the axis of the roll, and means associated with said enclosing housing to maintain said roll shaft in fixed axial position.

6. In a breaker, a breaker roll, a shaft for said roll, a supporting bearing for said roll shaft, said bearing comprising a base portion and a shell portion movable relatively thereto in directions perpendicular to the shaft axis and a removable liner positioned within said shell and adapted to engage said shaft and having thrust receiving means to prevent axial movement of said shaft.

7. In a device of the class described, a roll, a shaft for said roll, a bearing for said shaft comprising a shaft enclosing housing, a base structure for said shaft enclosing housing, means for holding said shaft and shaft enclosing housing in fixed axial relationship, means for holding said shaft enclosing housing relatively to said base against movement in the directions of the shaft axis, and means associated with the bearing for resiliently supporting said shaft.

8. In a breaker, a breaker roll, a shaft for said roll, a supporting bearing for roll shaft comprising a base structure and a shaft enclosing housing resiliently mounted on said base structure, means holding said shaft enclosing housing to said base structure against movement in the directions of the shaft axis, a liner positioned in said shaft enclosing housing and providing a bearing surface for said shaft, means on said liner providing thrust receiving engagement with said shaft and shaft enclosing housing to prevent axial movement of said shaft.

In testimony whereof I hereto affix my signature.

HOMER D. MARTINDALE.