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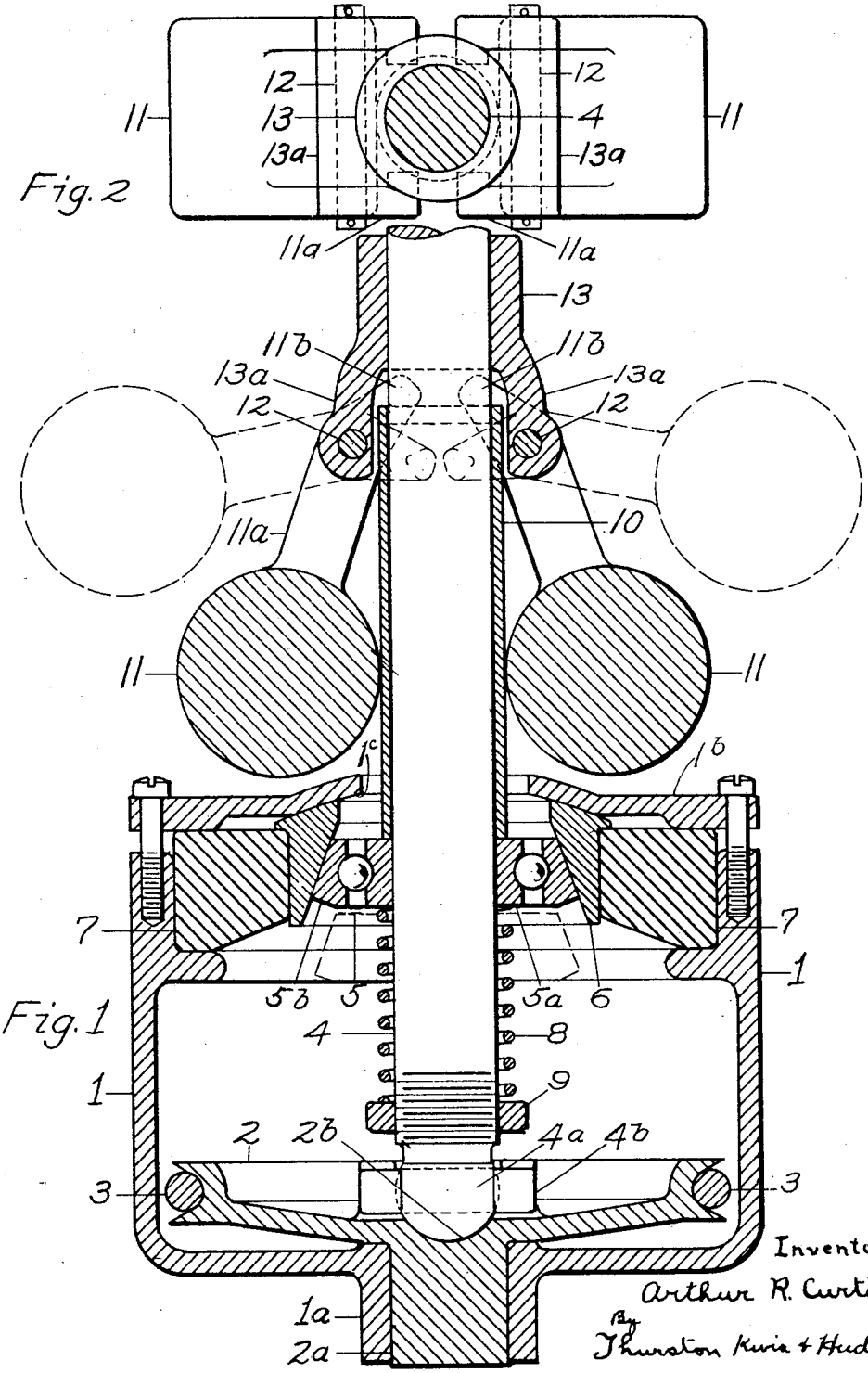


Fig. 2

Fig. 1

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MOUNTING FOR GYRATORY SHAFTS.

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This invention relates to improvements in mountings for gyratory shafts and has for its object to provide a mounting which is subjected to less wear and which will transmit less vibration than mountings heretofore employed.

In all centrifugal extractors of the spinning type, especially in extractors such as used for drying clothes in which the load may be more or less unbalanced it is essential that yielding supports be provided for the gyratory shaft which yieldingly oppose lateral movements of the shaft during rotation. Such supports are primarily necessary to guard against excessive lateral movements of the shaft in starting and during the times when the speed of rotation of the shaft is below that at which the true spinning action begins. After the shaft has attained the spinning speed the lateral movement of the shaft is very slight and considerable force would be necessary to cause the shaft to shift laterally while running at high speed. At the lower speeds, however, the shaft will have a pronounced wabble and it is to limit this wabbling movement that the yielding supports are provided. Thus below the critical speed such yielding supports are essential, but as soon as this speed is passed and a true spinning set up, the lateral supports are no longer necessary. At spinning speeds the yielding lateral supports are disadvantageous since their action increases frictional resistance to the rotation of the shaft and they tend to transmit vibrations to the frame work of the machine. The present invention is designed to avoid these disadvantages by providing means for freeing the shaft from the lateral supports so that when the shaft has attained sufficient speed to maintain itself against lateral movements, it is not subjected to the frictional drag coming from the yielding members. In addition the yielding members are subjected to very little wear since they are employed only when the machine is started into operation. Various means may be employed for freeing the shaft from the yielding members but it is considered preferable for the disengagement to be effected automatically upon attainment of a predetermined speed of rotation of the shaft.

With the above and other objects in view, the invention may be said to comprise the mechanism illustrated in the accompanying drawings hereinafter described and particularly set forth in the appended claims, together with such variations and modification thereof as will be apparent to those skilled in the art to which the invention appertains.

Reference should be had to the accompanying drawings forming a part of this specification in which Fig. 1 is a vertical section passing through the center-line of the gyratory shaft; Fig. 2 is a sectional plan view showing the governor mechanism only.

Referring to the accompanying drawings, a suitable fixed support for the shaft and its supporting members is provided in the form of a housing 1 which may be cylindrical in form and provided with a bearing 1^a in its bottom at the center thereof. Within the lower portion of the housing 1 there is rotatably mounted a driving member 2 which has a hub extension 2^a journaled in the bearing extension 1^a of the housing, the driving member 2 being in the form of a pulley which is driven by a belt 3 from a suitable source of power. On the upper face of the pulley 2 at the center thereof there is formed a slotted ball socket 2^b in which the gyratory shaft 4 is supported, the shaft 4 having a lower ball end 4^a fitting in the socket 2^b. To provide a driving connection between the pulley 2 and shaft 4 the ball end 4^a has a cross pin 4^b extending diametrically therethrough and extending into the slots of the ball socket. The ball and socket support for the shaft 4 permits the shaft to gyrate about the center of curvature of the spherical seat and the cross-pin 4^b provides a driving engagement between the pulley 2 and shaft located substantially in the plane of the center of gyration.

In the upper portion of the housing 1 the shaft is provided with a ball bearing 5 which has its inner race ring 5^a slidably mounted on the shaft, and its outer race ring 5^b provided with a conical outer face adapted to fit within a cone ring 6 which surrounds the shaft and is supported within a rubber buffer ring 7 which is clamped upon an inwardly projecting circumferential flange of the housing by the cover plate 1^b. The cover plate 1^b has a central opening through which the shaft 4 extends, this

opening being of sufficient size to permit the necessary lateral movements of the shaft. Adjacent the central opening therein the cover plate is provided with a spherical seat 1^c, the center of curvature of which is substantially at the center of oscillation of the shaft and the cone ring 6 at the top thereof is provided with a spherical bearing surface to fit the bearing surface 1^c. The ball bearing 5 is pressed upwardly to hold the outer race ring 5^b in firm engagement with the cone ring 6 by means of a coiled spring 8 surrounding the shaft 4 beneath the bearing and held between the bearing and a nut 9 screwed upon the shaft above the ball end thereof. With this mounting it will be apparent that lateral movements of the shaft will be yieldingly opposed by the buffer ring 7, and it will also be apparent that if means be provided to shift the bearing 5 downwardly in opposition to the spring 8 out of engagement with the cone ring 6, the shaft may be freed from its lateral yielding support. This shifting of the bearing may be accomplished automatically by means of a governor mounted to rotate at a speed proportional to the speed of the gyratory shaft. A simple mounting for such a governor is directly upon the gyrating shaft and such mounting is herein shown. For actuating the bearing 5 in opposition to the spring 8, a sleeve 10 is slidably mounted upon the shaft and is supported upon the top of the inner race ring of the bearing. This sleeve 10 is adapted to be actuated by centrifugal governor weights 11 which have arms 11^a provided with lugs 11^b at their inner ends which bear upon the upper end of the sleeve. The arms 11^a are pivotally connected to the shaft by transverse pins 12 which pass through the arms 11^a and downwardly projecting ears 13^a of a collar 13 which is fixed to the shaft 4. As the shaft starts its rotation and as the speed of rotation thereof gradually increases, the weights 11 will be raised by centrifugal force exerting a pressure upon the upper end of the sleeve 10 which gradually increases as the speed of rotation increases. Whenever the pressure exerted by the governor upon the sleeve 10 is sufficient to overcome the tension of the spring 8, the bearing 5 will be shifted downwardly out of engagement with the cone ring 6, thereby freeing the shaft from its cushioning support. By adjusting the nut 9 the tension of the spring 8 may be increased or decreased so that the speed at which the shaft is freed may be regulated as desired.

Having described my invention, I claim:

1. The combination with a vertical shaft having supporting and driving means which permit the shaft to gyrate, of holding means for the shaft adapted to yieldingly oppose lateral movements thereof, and means operable during rotation of the shaft for releasing said shaft from said holding means to permit the same to gyrate freely.

2. The combination with a vertical shaft having supporting and driving means which permit the shaft to gyrate, of cushioning means adapted to yieldingly oppose lateral movements of the shaft, and means operating automatically when the shaft attains a predetermined speed of rotation for rendering said holding means inoperative to permit the shaft to gyrate freely.

3. The combination with a vertical shaft having supporting and driving means which permit the shaft to gyrate, of means adapted to yieldingly oppose lateral movements at low speeds, and means controlled by the shaft in its rotation for disengaging the same from the cushioning means, to permit the shaft to gyrate freely when the shaft attains a predetermined speed of rotation.

4. The combination with a vertical shaft having supporting and driving means which permit the shaft to gyrate, of a cushioning member surrounding the shaft, a bearing on the shaft normally engaging with the cushioning member, and means operable during rotation of the shaft for disengaging the bearing and cushioning member.

5. The combination with a vertical shaft having supporting and driving means which permit the shaft to gyrate, of means adapted to yieldingly oppose lateral movements of the shaft at low speeds, means controlled by the shaft in its rotation for releasing the same from the cushioning means when the shaft attains a predetermined speed of rotation, and means for adjusting said releasing means to operate at different speeds.

6. The combination with a vertical shaft having supporting and driving means which permit the shaft to gyrate, of means adapted to yieldingly oppose lateral movements of the shaft at low speeds, and a centrifugal governor for rendering said cushioning means inoperative, whereby the shaft is permitted to gyrate freely at high speeds.

7. The combination with a shaft having supporting and driving means which permit the shaft to gyrate, of a cushioning member surrounding the shaft, a bearing mounted on the shaft and adapted to engage with said member, and means governed by the speed of rotation of the shaft for disengaging the bearing and cushioning member.

8. The combination with a shaft having supporting and driving means which permit the shaft to gyrate, of a cushioning device comprising two relatively movable members surrounding the shaft, one carried by the shaft and the other by a fixed support, one of said members being movable

into and out of engagement with the other and one of said members being yieldably mounted to yieldingly oppose lateral movements of the shaft, and means governed by the speed of rotation of the shaft for disengaging said members.

9. The combination with a shaft having supporting and driving means which permit the shaft to gyrate, of a cushioning device comprising relatively movable members surrounding the shaft, one carried by the shaft and the other by a fixed support, one of said members being yieldably mounted to yieldingly oppose lateral movements of the shaft and one of said members being movable into and out of engagement with the other, a spring engaging said movable member for normally holding the same in engagement with the other member, means for adjusting the tension of the spring, and a centrifugal governor for shifting the movable member in opposition to the spring.

10. The combination with a shaft having supporting and driving means which permit the shaft to gyrate, of a cushioning member surrounding the shaft, a bearing slidably mounted on the shaft, a spring interposed between the shaft and bearing for normally holding said bearing in engagement with the cushioning member, and means governed by the speed of rotation of the shaft for shifting the bearing in opposition to said spring.

11. The combination with a shaft having supporting and driving means which permit the shaft to gyrate, of a cushioning member surrounding the shaft, a bearing mounted on the shaft and adapted to be moved into and out of engagement with said member, a spring interposed between the shaft and bearing for normally holding said bearing in engagement with the cushioning member, means for adjusting the tension of the spring, and a centrifugal governor for shifting the bearing in opposition to the spring to release the shaft from the cushioning member.

12. A mounting for a gyratory shaft comprising means for supporting and driving said shaft, said supporting and driving means permitting said shaft to gyrate, a cushioning member mounted on a fixed support and surrounding the shaft, a ball bearing slidably mounted on the shaft and having an outer race ring adapted to engage said cushioning member, means for yieldingly holding said bearing in engagement with said cushioning member, and means for shifting said bearing out of engagement with said cushioning member.

13. A mounting for a gyratory shaft comprising a fixed casing, means for supporting and driving said shaft, said supporting and driving means permitting said shaft to gyrate, a cushioning device comprising a ring of elastic material secured in said casing and surrounding said shaft and a rigid ring fitting within said elastic ring, said rigid ring having a conical inner face, a ball bearing slidably mounted on the shaft and having an outer race ring which has a conical face adapted to engage the inner face of said rigid ring, and means for shifting said bearing into and out of engagement with the cushioning device.

14. A mounting for a gyratory shaft comprising a fixed casing, means for supporting said shaft in said casing and for driving the same, said supporting and driving means permitting the shaft to gyrate about a fixed center, a cushioning device secured in said casing and surrounding the shaft, said cushioning device comprising an outer ring of elastic material and an inner rigid ring, a cover for said casing having a central aperture for the shaft and adapted to be secured in clamping engagement with the elastic ring, said cover and rigid ring having engaging faces lying substantially in the surface of a sphere having its center at the center of gyration of the shaft, and a ball bearing interposed between the rigid ring and shaft.

In testimony whereof, I hereunto affix my signature.

ARTHUR R. CURTIS