

Nov. 7, 1939.

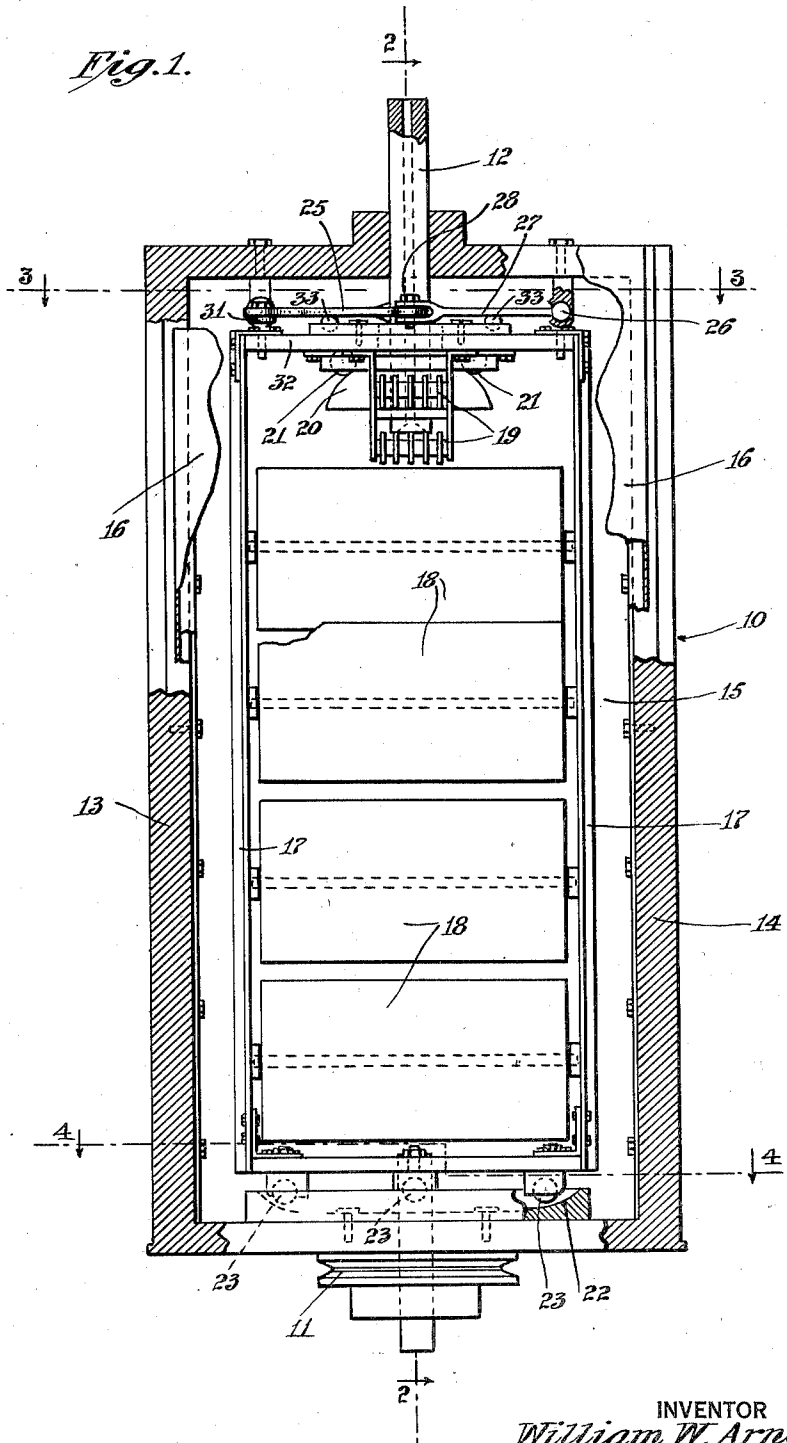
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2,179.247

SELF-BALANCING CREEL

Filed Dec. 28, 1938

3 Sheets-Sheet 1



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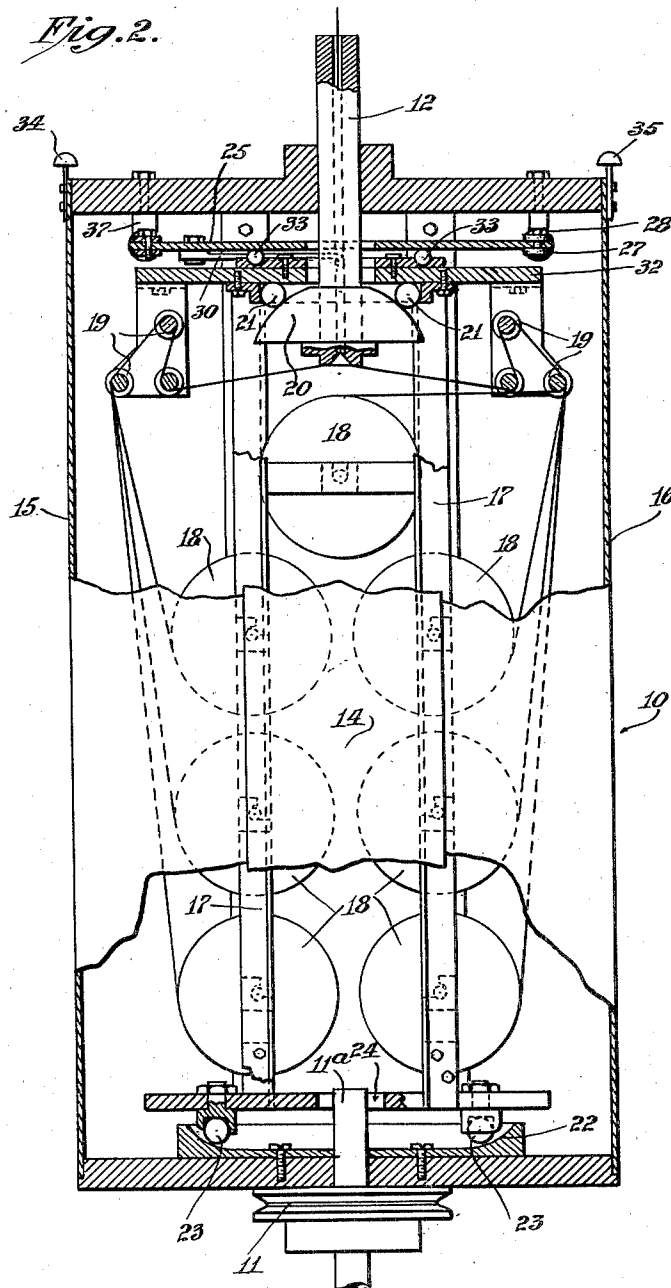
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Fig. 2.



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Fig. 3.

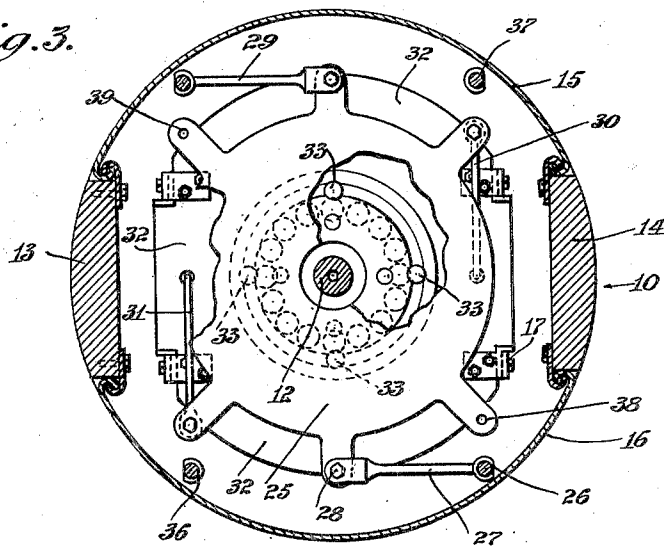
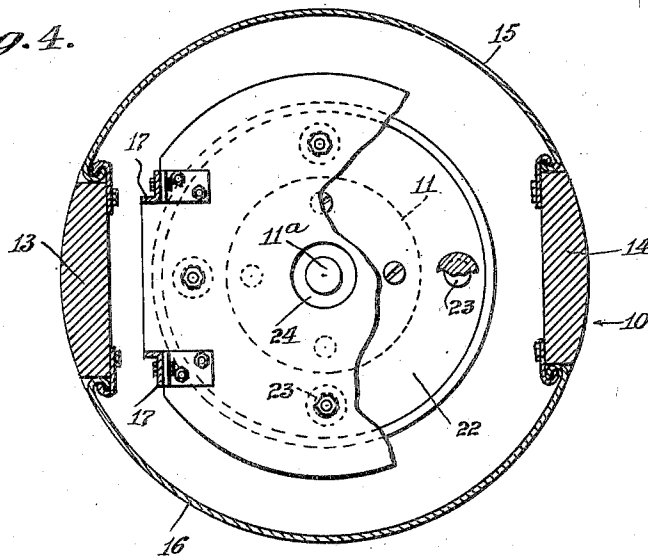


Fig. 4.



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SELF-BALANCING CREEL

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12 Claims. (Cl. 57—59)

This invention relates to creels and other rotatable devices and has for an object to provide a simple means for compensating for any unequal distribution of weight during rotation.

Specifically this invention relates to rotatable creels and has for an object to provide a self-balancing creel of improved construction.

Another object is to provide an inner frame containing the spools, which frame may be tilted at each end during rotation in order to balance any centrifugally unbalanced forces.

When the creel is rotated in forming a cord of strands twisted together there is less danger of the strands being applied under non-uniform tension than when the creel does not rotate.

Referring to the drawings,

Fig. 1 is a longitudinal view partly in section of a creel embodying this invention.

Fig. 2 is a longitudinal view also partly in section of the device of Fig. 1, taken on the line 2—2 of Fig. 1.

Fig. 3 is a section on the line 3—3 of Fig. 1.

Fig. 4 is a section on the line 4—4 of Fig. 1.

The outer frame 10 is rotated by means of a flexible belt or other mechanism for driving the pulley 11 so that the several strands being pulled out through the central stem 12 are rapidly rotated or twisted. The outer frame includes side members 13 and 14 which may be cast integrally with the top and bottom portions of the outer frame. Between these side members are mounted removable cover portions 15 and 16 shown more clearly in Figs. 3 and 4. Within the outer frame is an inner frame 17 in which are rotatably supported a plurality of spools or reels on which the several strands are mounted.

Fig. 2 shows how the strands from the several spools pass over tensioning and guiding pulleys 19 and then out through the central stem 12. The central stem is carried by the top portion of the outer frame, and secured to the lower part of the stem 12 and a convex ball race 20 about which the balls 21 rotate as the inner frame may be tilted.

It should be understood the inner frame 17 is normally supported by the convex ball race 20 or, in other words, hung from the top portion of the outer frame. At the lower part of the outer frame is a concave ball race 22 with which the balls 23 carried by the inner frame are adapted to cooperate. Normally the inner frame hangs with the inner balls 23 out of contact with the concave ball race 22. During rapid rotation of the creel, in event one of the spools 18 might be unevenly loaded or if, for any other reason,

weight should not be uniformly distributed, centrifugal force tends to tilt the inner frame, the heavier side being forced radially outward. In such case one or more of the balls 23 carried by the bottom of the inner frame engage the sides of the concave race 22. The concave race 22 is curved more steeply than is the convex race 20 so that as the inner frame swings outward the balls 23 tend to ride up the steeper curve and raise that portion of the inner frame. This raising of a portion of the inner frame at the bottom permits tilting of the upper portion of the inner frame by the balls 21 rolling on the convex race 20. In this way the creel may be made self-balancing so as to substantially reduce vibrations during rotation. The lower part of the inner frame is shown in Fig. 2 as being spaced from the shaft 11a as indicated at 24 in order to permit substantial tilting of the inner frame. The shaft 11a of the outer frame may thus act as a stop to limit excessive tilting of the inner frame at the bottom. At the top the central stem 12 is likewise spaced from the inner frame to limit tilting.

The space 24 at the bottom is for convenience made about one-half inch, while that at the top about five-eighths of an inch.

As shown in Figs. 1, 2 and 3 an intermediate plate 25 is driven by means of rods or links 27 and 29 which have a ball and socket connection 26 with an extension secured to the top portion of the outer casing. These rods 27 and 29 are pivotally connected to the plate 25 by the bifurcated ends through which is passed a bolt or screw. In order that the inner frame 17 may be free to tilt in any direction at the top, the plate 25 is connected with the top of the inner frame by means of the rods 30 and 31 arranged substantially normally to the rods 27 and 29. At one end these rods are connected to the intermediate plate 25 and at their other ends universally connected or loosely swiveled to the top plate 32 of the inner frame 17. Balls 33 are arranged between the plate 25 and the top plate 32 to provide means enabling the plate 25 to be tilted to some extent with top plate 32.

Handles 34 and 35 are provided on the removable cover portions 15 and 16 respectively to enable these covers to be quickly removed to facilitate access to the spools mounted on the inner frame. The connection shown in Fig. 3 between the outer frame and the inner frame shows that the inner frame is being pulled in a counter-clockwise direction.

In event it should be desired to reverse the

direction of rotation of the outer frame, it will then be found desirable to disconnect the rods 27 and 29 and connect them in the same universal manner to the top portion of the outer plate at 36 and 37. The rods 30 and 31 may be likewise reversed and connected to the intermediate plate 25 at 38 and 39 respectively.

Among the advantages of this invention may be mentioned the ease, facility and rapidity with which the inner frame is made self-balancing under high speed operation. If it were not so self-balancing, there would be considerable vibration as speeds of 1500 to 2500 R. P. M., are contemplated. The driving connections between the outer and inner frames enable the inner frame to float and tilt at both the top and bottom and likewise the plate 25 to have a limited floating character. Fig. 3 shows how four balls 33 are sufficient while a much larger number of balls 21 is found desirable for supporting the inner frame and spools.

The reason for allowing more clearance for tilting of the inner frame at the top than is allowed at the bottom is so that an unbalanced condition of the loaded frame 17 enables the support of this frame to be at least partially shifted from the top to the bottom during rapid rotation. Reducing the clearance at the bottom helps to create the effect of a top spinning at a speed not sufficient to make it stand in a vertical position and the reduced clearance at the bottom helps the inner frame 17 to find its center of gravity more readily in case of extreme movement caused by any unbalance.

I claim:

1. A rotatable creel for twisting strands in the formation of cord, said creel comprising a plurality of spaced spools of strand material, means enabling said creel to tilt in response to any centrifugal unbalance, said means including a support and guide for said creel at the top and bottom arranged to facilitate tilting of the creel at both the top and bottom.

2. A rotatable creel comprising a supporting frame for a plurality of spools, means for supporting said frame near the top thereof and enabling the frame to tilt in any direction, guides adjacent the bottom of said frame for raising an outward swung portion of the frame and changing the location of said top supporting means when a lower portion of said frame has been swung outward by any centrifugal unbalance of substantial amount.

3. A rotatable creel comprising a supporting frame for a plurality of spools, means for supporting said frame near the top thereof and enabling the frame to tilt in any direction, said means including a convex ball race on which the frame is supported by balls, a concave ball race adjacent the bottom with which balls carried by the lower end of the frame may engage in tilting, the tilting of the bottom part of the frame being effective to tilt the upper portion of said frame.

4. A revolving self balancing creel comprising an outer rotarily fixed frame, means for rotating said frame, an inner frame containing spools, a driving connection between said frames, said connection including a universal joint, and means responsive to any unbalanced centrifugal force for tilting the inner frame with respect to the outer about a point adjacent the center of said inner frame.

5. A centrifugally self-balancing rotatable de-

vice including an outer frame, means for rotating the same, an inner frame, a universal driving connection between the inner and outer frames, a convex ball race within the inner frame at one end and carried by the outer frame, balls between said race and the inner frame, a concave ball race carried by the outer frame adjacent the opposite end thereof, balls between inner frame and concave race, whereby the inner frame may be tilted by one race on the other.

6. A centrifugally self-balancing rotatable device including an outer frame, means for rotating the same, an inner frame, a driving connection between said frames for rotating the inner frame and constructed to permit the end of the inner frame adjacent said driving connection to be tilted in any direction while being driven.

7. A centrifugally self-balancing rotatable device including an outer frame, means for rotating the same, an inner frame, means for suspending the inner frame from the outer, and centrifugally responsive means for changing the location of said suspending means with respect to said inner frame.

8. A centrifugally self-balancing rotatable device including an outer frame, means for rotating the same, an inner frame, means for suspending the inner frame from the outer, and centrifugally responsive means for changing the location of said suspension means with respect to the inner frame.

9. The combination with an outer rotatable frame, of an inner rotatable self-balancing frame carried by the outer frame, a bearing at one end for the inner frame when unbalanced, said bearing being constructed to shift the opposite end of the inner frame by tilting, and a bearing at said opposite end by which the inner frame may be suspended from the outer and including a convex race with ball bearings between said race and the inner frame.

10. The combination with an outer rotatable frame, of an inner rotatable self-balancing frame carried by the outer frame, means suspending the inner frame from the outer enabling the inner to be tilted at each end with respect to the outer, and driving means between the inner and outer frames enabling the adjacent end of the inner frame to be shifted slightly in any direction with respect to the longitudinal axis of the outer frame, said driving means including a pair of ball and socket type tension links arranged substantially normally to each other in series.

11. A rotatable creel comprising an inner frame, an outer frame from which the inner frame is suspended, means responsive to any unbalance in the inner frame for tilting both the top and bottom of the inner frame on rotation, the tilting at the top and bottom being in opposite directions, and means for limiting the amount of tilting at the bottom to a less amount than that permitted at the top.

12. A rotatable creel comprising an inner frame, an outer frame from which the inner frame is suspended, means responsive to any unbalance in the inner frame for tilting both the top and bottom of the inner frame on rotation, said means including mechanism for shifting a substantial part of the support of the inner frame from adjacent its top to adjacent the bottom of the inner frame so that a substantial part of the weight of the inner frame will be supported by the outer frame adjacent the bottom of the inner frame in tilting.