July 6, 1943. B. W. CARRINGTON 2,323,791

CENTRIFUGAL GOVERNOR

Filed April 30, 1942 2 Sheets-Sheet 1

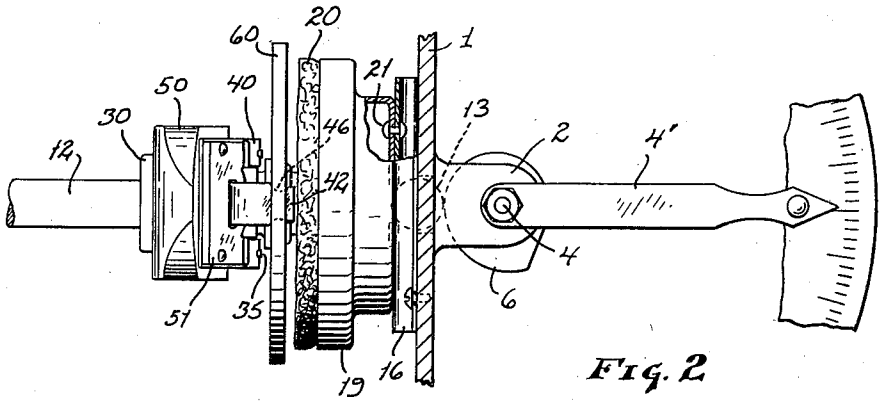


Fig. 2

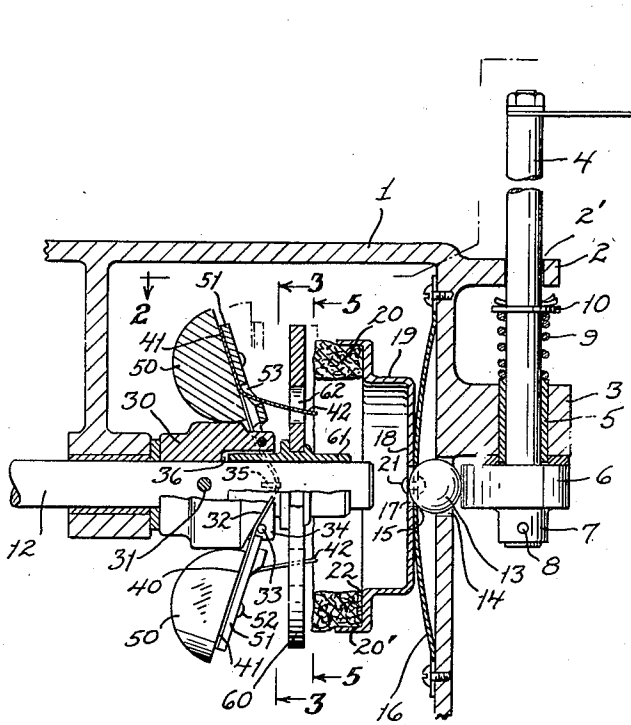


Fig. 1

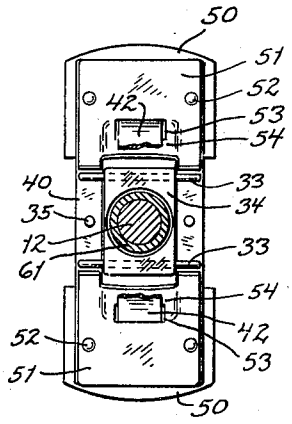


Fig. 3

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CENTRIFUGAL GOVERNOR

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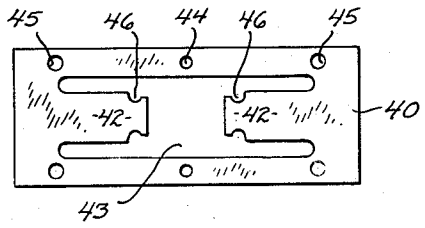


FIG. 4

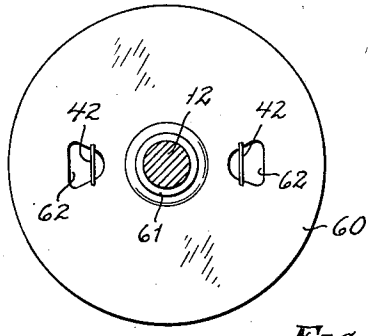


FIG. 5

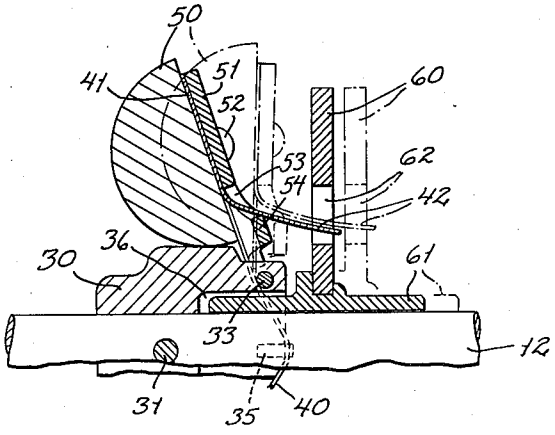


FIG. 6

INVENTOR.

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Patented July 6, 1943

2,323,791

UNITED STATES PATENT OFFICE

2,323,791

CENTRIFUGAL GOVERNOR

Blake W. Carrington, Elyria, Ohio, assignor to The General Industries Company, Elyria, Ohio, a corporation of Ohio

Application April 30, 1942, Serial No. 441,241

6 Claims. (Cl. 188—187)

My invention relates to centrifugal governors and relates more particularly to governors of the type employed in controlling the speed of phonograph motors or the like which operate by either electric motor or spring motor power.

Centrifugal governors have long been employed in controlling and maintaining a predetermined rotational speed of motor mechanisms employed for driving phonograph turntables and said centrifugal governors have been of various types. One of said governors is illustrated and described in Letters Patent No. 1,936,924 granted November 28, 1933, to F. VanderWoude and the governor of the present invention is an improvement over such type governors.

An object of my invention is to provide an improved centrifugal governor of the type described adapted to effect a graduated but uniform braking effort upon the motor shaft commensurable with increased speed of the said shaft.

Another object of my invention is to provide an improved governor of the class described adapted to be economically manufactured, composed of but few parts and yet highly efficient and durable in use.

Other objects of my invention and the invention itself will become apparent from the following description of an embodiment of said invention, in which description reference will be had to the accompanying drawings illustrating the said embodiment.

In the drawings:

Fig. 1 is a longitudinal central section of the centrifugal governor of my invention applied to a rotatable shaft of a phonograph motor, the speed of said motor to be controlled thereby;

Fig. 2 is a plan view partly in section taken from the plane 2—2 of Fig. 1;

Fig. 3 is a sectional view taken from the line 3—3 of Fig. 1 illustrating the governor of my invention in end elevation;

Fig. 4 is a top plan view of the spring plate employed in the governor mechanism of my invention before assembly in such mechanism, which plate is illustrated in Figs. 1 to 3 inclusive;

Fig. 5 is a sectional view taken from the line 5—5 of Fig. 1; and

Fig. 6 is a side elevational view of a portion of the centrifugal governor of my invention illustrating different operative positions of said governor, as shown briefly in dotted lines in Fig. 1, and in this figure developed more thoroughly.

Referring now to the figures of drawings, in all of which like parts are designated by like reference characters, in Fig. 1 at 1 I show a portion of a governor frame having a pair of spaced parallel lugs 2 and 3 projecting outwardly from one side of said frame. An adjusting rod 4 is disposed through a perforation 2' and a bearing bushing 5 in the lugs 2 and 3 respectively and is adapted to have rotation therein. The rod 4 carries a rotatable cam 6 which is rigidly affixed by a tubular collar 7 to the end of the rod 4, a pin 8 being projected through said tubular projection and the end of said rod. The handle 4' secured to the upper end of the rod 4 is adapted to be manually operated to move the cam 6 into different operative positions for purposes to be described.

A spring 9 disposed between the lug 3 and a collar 10 axially fixed on the rod is adapted to maintain the cam 6 in axial alignment with the motor shaft 12 and to produce sufficient friction to maintain the cam in adjusted rotative position.

A thrust bearing ball 13 is disposed within an aperture 14 of the end wall of the frame 1 carrying the lugs 2 and 3, said ball extending laterally into engagement with the cam face of the cam 6 in one direction and in the opposite direction seated within aligned openings 15 and 17 of a leaf spring 16 and the end wall 18 of a friction pad supporting cup 19 respectively. Said cup element 19 is adapted to receive a substantially stationary friction pad 20 within a recessed portion 20' thereof and said friction pad is confined by the ends of the walls of said cup element within said portion, being seated upon the shoulder 22 within the cup 19. The cup element 19 is medially riveted to said leaf spring 16 by means of rivets 21 and, due to the resilience of the spring, is allowed some degree of freedom to accommodate itself to the coacting member of the improved centrifugal governor of my invention.

The centrifugal governor of my invention is respectively composed of four parts, namely, a body portion or bushing 30, a flexible spring plate 40 secured to the bushing and extending laterally from it on two sides, a pair of governor balls 50 carried by the spring plate extensions, and an axially slideable disc 60 adapted to be moved by tongue portions of the spring plate into frictional engagement with the pad 20 in accordance with the radial movement of the governor balls.

The bushing 30 is pinned to the motor shaft 12, as at 31, and is formed with two slanting faces 32 which intersect on a diameter of the bushing, as best seen in Figs. 1 and 6. The spring plate 40 is clamped upon these faces by means of pins 33 which extend through transverse openings in a central boss 34 of the bushing, Fig. 3, and is

accurately located by means of studs 35 at the intersection of the faces. The laterally extending wings 41 of the spring plate are thus predispised to lie at an angle to a plane normal to the axis and thereby to furnish the restoring force necessary to oppose the centrifugal force on the governor balls which are carried by them.

The governor balls 50 of the present embodiment are preferably semi-cylindrical in form and are composed of brass or other similar material. The flat faces of the balls are clamped upon the spring plate extensions by means of retainer plates 51 and rivets 52.

The slidable disc 60, which coacts with the friction pad 20 to produce the governing, retarding effect on the motor shaft 12, is carried by a hub or bushing 61 which is free to slide and to rotate on the shaft. The bushing 30, previously described, is counterbored as at 36 to receive the end of this hub 61 and to prevent interference therewith. The disc 60 is provided with two generally triangular openings 62, best seen in Fig. 5, for a purpose to be later described.

The spring plate 40, shown in Fig. 4 before assembly, is rectangular in form and provided with a generally H-shaped opening which defines two tongue portions 42 and a central opening 43 which allows the plate to clear the boss 34 of the bushing 30. Suitable apertures 44 and 45 are further provided to accommodate the locating studs 33 and rivets 52 previously mentioned, respectively. When the spring plate is riveted between the governor balls 50 and the retainer plates 51, the tongues 42 are projected through apertures 53 in these plates and are caused, by the lower deformed margins 54 of the apertures, to assume a nearly horizontal position. The tongues are notched near their free ends, as at 46 in Fig. 4.

The tongues 42, just described, furnish the connection between the governor balls and the disc 60, whereby the latter is positioned axially in accordance with the speed of rotation of the motor shaft, and also furnish the drive for the disc. The tongues are adapted to be inserted through the larger end of the openings 62 in the disc, whereupon their inherent resilience causes them to assume the position indicated in Fig. 5. In such position, the notches 46 engage both the front and rear faces of the disc, as shown in Fig. 2, the disc may therefore be projected toward the friction pad or retracted therefrom, as may be needed to provide the proper speed regulation.

In Fig. 6, the parts are indicated by full lines in their normal or rest position and by broken lines in an operating position wherein the center of gravity of the governor ball assembly has nearly reached its maximum outward position. It will be noted that this outward movement of the ball is resisted both by the resilience of the spring plate in its bending about the crosspin 33 and by the resilience of the tongue in its deformation still further from its unstressed position in the plane of the plate. It will also be noted that the disc 60, in its broken line position, has been moved to the right to a position in which it would be in firmer contact with the stationary friction pad.

In the well known manner of governors of the general type, a substantially constant speed of the motor shaft is produced in which the governor balls are caused to travel outwardly just far enough to cause a sufficiently firm contact between the disc and pad to produce the needed braking effect on the motor. By adjustment of the handle 4' and thus of the thrust bearing ball 13, previously described, the pad 20 is positioned a greater or less distance from the governor and the shaft correspondingly assumes a faster or slower rate necessary to move the disc the new distance.

It is to be understood that the improved governor of my invention is adapted to be associated with any braking mechanism whether the same be in the form illustrated herein wherein a cup formed element having a friction pad seated therein is used or whether any other preferred pad or braking mechanism is used and various other changes and departures may be made in the embodiment herein illustrated and described without however departing from the spirit of my invention and the scope of the appended claims.

I claim:

1. In a governor mechanism, in combination a driven shaft, centrifugal means operable by the rotation of said shaft, an annular floating disc loosely telescoped over the shaft, said centrifugal means comprising a tubular body telescoped over and secured to the driven shaft, said disc and said body being in relatively longitudinally axially aligned spaced relation, said body being formed with a pair of slanting faces intersecting on a diameter of the body facing said annular disc, a leaf spring clamped upon the slanting faces of said body by clamping means, said leaf spring being telescoped over the apex of said faces facing said annular disc and the shaft telescoped through said body, a pair of governor balls secured to the outwardly extending arms of said leaf spring, link means secured to said clamping means adapted to engage said annular disc whereby said disc is driven by said link means responsive to axial thrust of said centrifugal means, said disc being rotatable on the shaft and movable axially thereto.

2. In a governor mechanism, in combination a driven shaft, centrifugal means operable by the rotation of said shaft, an annular floating disc loosely telescoped over the shaft, said centrifugal means comprising a tubular body telescoped over and secured to the driven shaft, said disc and said body being in relatively longitudinally axially aligned spaced relation, said body being formed with a pair of slanting faces intersecting on a diameter of the body facing said annular disc, a leaf spring clamped upon the slanting faces of said body by clamping means, said leaf spring being telescoped over the apex of said faces facing said annular disc and the shaft telescoped through said body, a pair of governor balls secured to the outwardly extending arms of said leaf spring, link means secured to said clamping means adapted to engage said annular disc whereby said disc is driven by said link means responsive to axial thrust of said centrifugal means, said disc being rotatable on the shaft and movable axially thereto, said link means adapted further to project said disc towards friction means aligned with said annular disc whereby a braking effort is effected.

3. In a governor mechanism, in combination a driven shaft, centrifugal means operable by the rotation of said shaft, an annular floating disc loosely telescoped over the shaft, said centrifugal means comprising a tubular body telescoped over and secured to the driven shaft, said disc and said body being in relatively longitudinally spaced axially aligned relation, said centrifugal means comprising a pair of governor balls secured adjacent said tubular body by means of a substantially rectangular leaf spring secured thereto, said

leaf spring having an approximately H-shaped aperture disposed longitudinally thereof, said leaf spring adapted to be disposed over said tubular body and to be secured thereto, means secured to said leaf spring adjacent its connection with said governor balls through which tongues formed by the perforation disposed in the leaf spring are adapted to project, said tongues adapted to engage said annular disc and to drive said disc responsive to axial thrust of said centrifugal means.

4. In a governor mechanism, in combination a driven shaft, centrifugal means operable by the rotation of said shaft, an annular floating disc loosely telescoped over the shaft, said centrifugal means comprising a tubular body telescoped over and secured to the driven shaft, said disc and said body being in relatively longitudinally spaced axially aligned relation, said centrifugal means comprising a pair of governor balls secured adjacent said tubular body by means of a substantially rectangular leaf spring secured thereto, said leaf spring having an approximately H-shaped aperture forming a pair of oppositely disposed tongue members, said tongues being notched adjacent their inmost ends, said leaf spring adapted to be disposed over said tubular body and to be secured thereto, means secured to said leaf spring adjacent its connection with said governor balls through which said tongues formed by the perforation disposed in the leaf spring are adapted to project, a pair of substantially V-shaped perforations disposed in said disc, the inmost ends of said tongues adapted to be projected through said perforations and to be retained in locking engagement therewith whereby said disc is driven responsive to axial thrust of said centrifugal means.

5. In a governor mechanism, in combination a driven shaft, centrifugal means operable by the rotation of said shaft, an annular floating disc loosely telescoped over the shaft, said centrifugal means comprising a tubular body telescoped over and secured to the driven shaft, said disc and said body being in relatively longitudinally spaced axially aligned relation, said centrifugal means comprising a pair of governor balls secured adjacent said tubular body by means of a substantially rectangular leaf spring secured thereto, said leaf spring having an approximately H-shaped aperture disposed longitudinally thereof, said body being formed with a pair of slanting faces intersecting on a diameter of the body confronting said annular disc, said leaf spring adapted to be disposed upon the slanting faces of said tubular body and to be secured thereto, a pair of substantially flat metallic clamping members each provided with a perforation adjacent its inmost end portion, each of said members being secured to said leaf spring and to said governor balls, tongues formed by the perforation disposed in the leaf spring being projected through said perforations and said clamping means, said tongues adapted to engage said annular disc and to drive said disc responsive to axial thrust of said centrifugal means.

6. In a governor mechanism, the combination with a driven shaft, centrifugal means operable by rotation thereof, an annular floating disc element loosely telescoped thereover, said means comprising a tubular rotatable support secured to and rotatable with the shaft, a plurality of governor ball elements, leaf spring supporting means for each ball element each secured by one portion to a forward portion of the support and having its free end secured to its associated ball element, the portion of each said spring means between the support and its associated ball element normally extending outwardly and rearwardly of the support at a substantially acute angle to the axis of the shaft, a plurality of leaf spring thrust connectors, each interlockingly interconnecting its associated ball element with said disc element, each said connector making a swivelable connection with at least one of said interconnected elements, and the connections at a set of corresponding ends of the connectors being disposed radially inward of the connections at the opposite ends thereof, said ball elements when said shaft is rotated, being shifted by centrifugal force to a more advanced radially outward and axially forward orbit, meanwhile decreasing the acuity of said spring angle, said connector elements translating such change of ball element to proportionally move it axially forwardly, and friction means positioned forwardly beyond said disc element, and engageable thereby with varying pressure, according to the degree of axial movement communicated to said disc by said connectors.

BLAKE W. CARRINGTON.