

July 14, 1925.

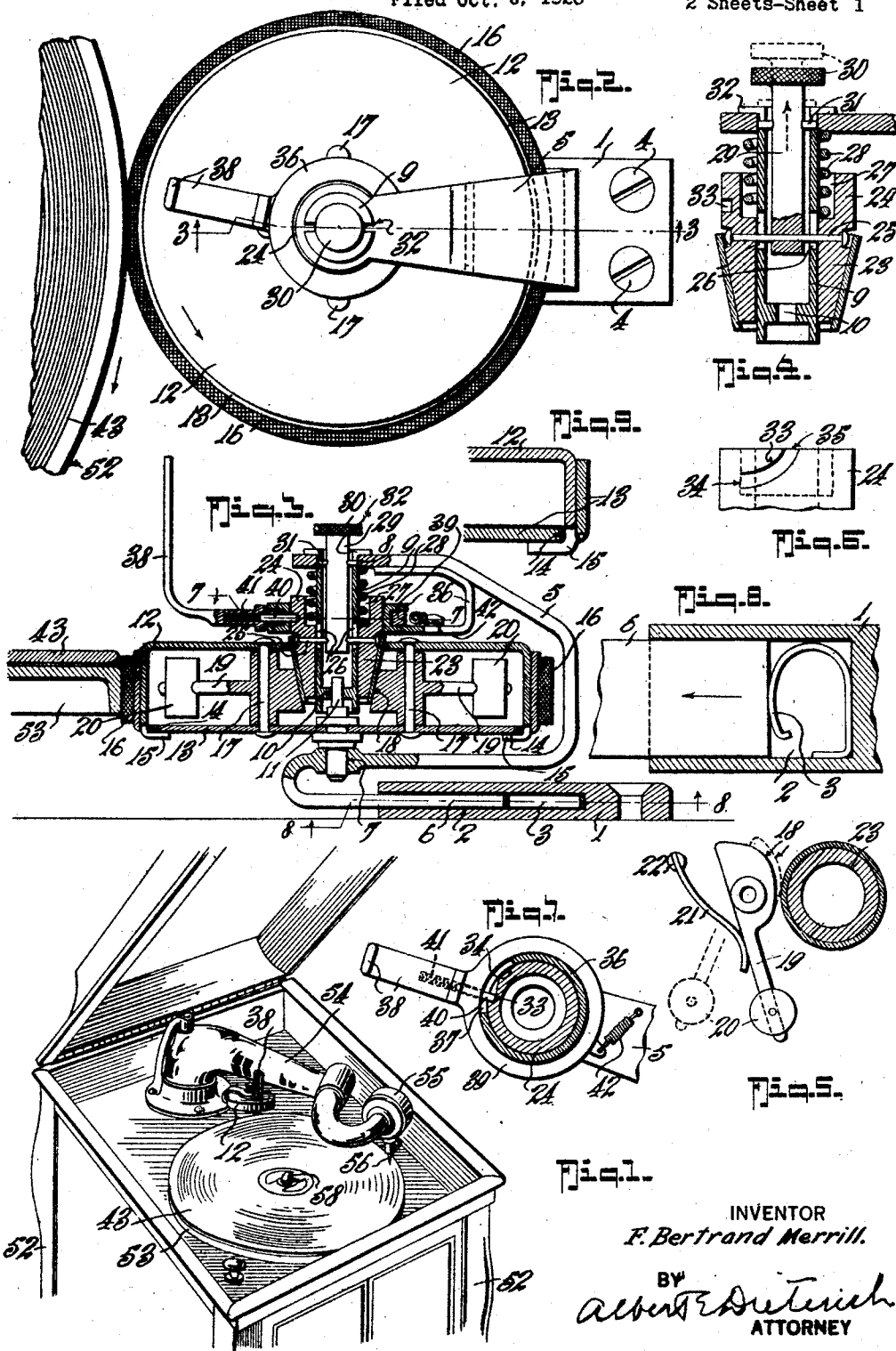
F. B. MERRILL

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SPEED CONTROLLING DEVICE FOR PHONOGRAPHS

Filed Oct. 8, 1923

2 Sheets-Sheet 1



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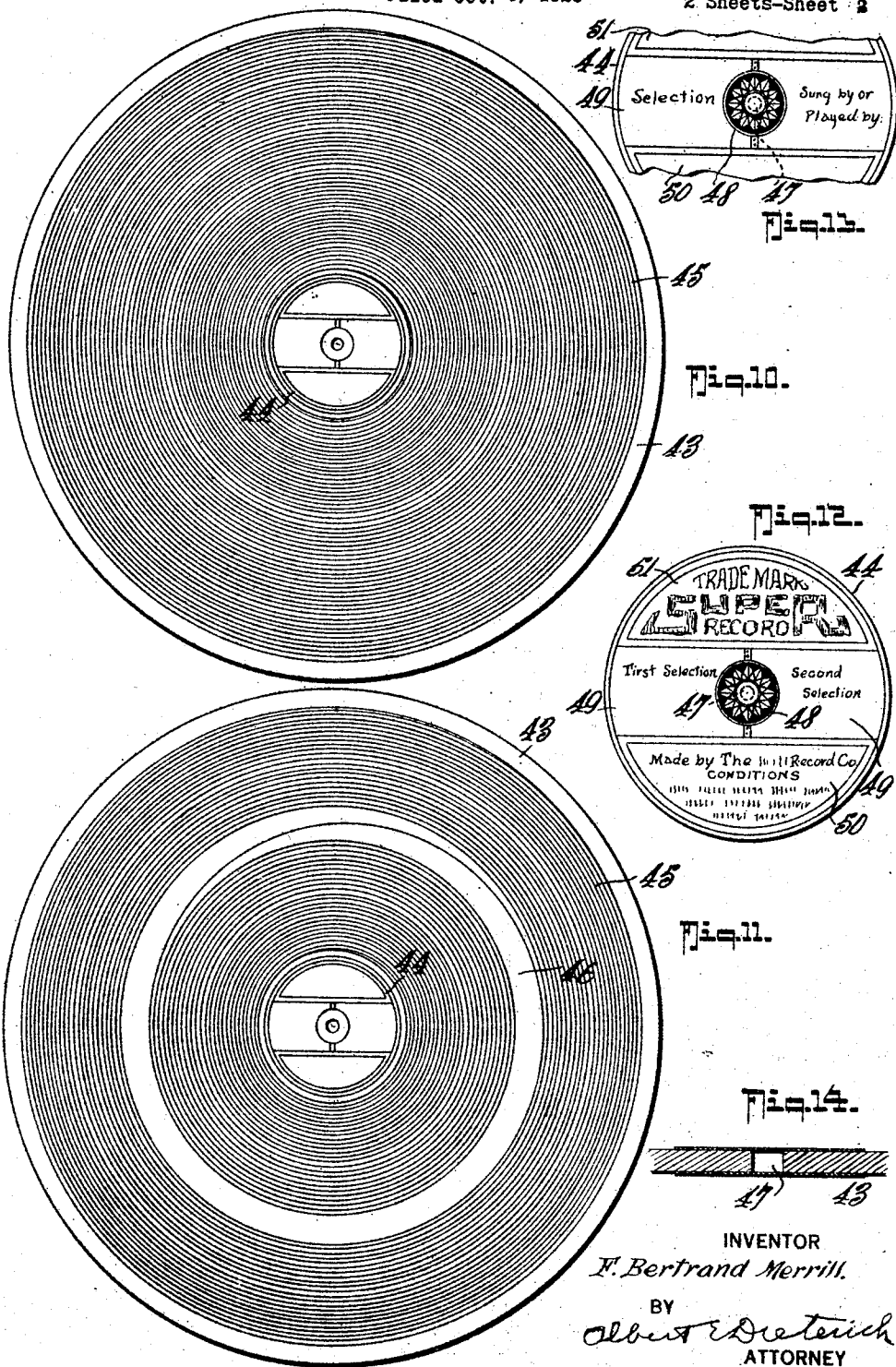
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SPEED-CONTROLLING DEVICE FOR PHONOGRAPHS.

Application filed October 8, 1923. Serial No. 667,281.

To all whom it may concern:

Be it known that I, FLOYD BERTRAND MERRILL, a citizen of the United States, residing at Marquette, in the county of Marquette and State of Michigan, have invented certain new and useful Improvements in Speed-Controlling Devices for Phonographs, of which the following is a specification.

This invention relates to the art of preparing and playing phonograph records of the disk type. Under the present common practice the blank to receive and record the selection is rotated at a uniform speed of a given number of revolutions per unit period of time, so that the speed of that portion of the surface of the record passing beneath the needle is variable, decreasing from the outer edge of the record toward the center, if the record is one commencing at the periphery, or increasing from the center outward if the record is one commencing adjacent to the center. This entails a waste of the available recording surface on the disks due to the various different circumferences of the impulse grooves of the records when made in the style and form of a flat disk.

The average circumference of the outer groove of a ten inch record is 29 inches and of the inner groove 13 inches. As at present a revolution is made by the outer groove in the same period of time as one is completed by the inner groove, and it is evident that no greater number of sound vibrations are recorded in the outer groove than in the inner groove, yet the outer groove is over twice the length and presents over twice the recording surface of the inner groove.

The primary object of this invention is to provide a means whereby the speed of the record surface passing under the recording or reproducing needle is always uniform or constant, instead of the record itself being revolved at a uniform number of revolutions per minute. By the use of my invention it should require over twice the time to play the outer groove as is now required, and a correspondingly longer time to play each subsequent groove in accord with its greater length or diameter as compared with the inner groove. The result of this practi-

cal means of control is that twice or more than twice the amount of sound vibrations can be recorded on a record of a given size than can be recorded under the present practice of revolving the record at a uniform speed or number of revolutions per minute. A record of a given size made according to my invention and controlled in the manner herein described will play over twice the time it would play if revolved at a uniform speed of rotation.

Another object of my invention is to provide a governor device possessing means which will cause the automatic stopping of the machine when the end of the record has been reached or when the end of the piece being played is reached.

Generically the present invention provides a governor device, controlled by the movement of the needle over the face of the record, in such manner as to cause the speed of the record beneath the needle to be constant or substantially so during the entire time the record is traveling beneath the needle and to accomplish this result by progressively varying the angular speed of rotation of the record as the needle moves across the face of the same.

The invention also includes means for effecting an automatic stoppage of the record when the piece being played has terminated regardless of whether the record being played is one having one or more pieces recorded on the same face.

More specifically the invention has for its object to provide a simple, effective, inexpensive and self-contained governor unit which can be readily attached to any of the standard types of disk phonographs now in use, without marring or disfiguring the same, and to provide means whereby the device may be used to play uniform surface speed records or to play records of the common uniform angular speed type now in general use.

In its more subordinate nature the invention furthermore resides in those novel features of construction, combination and arrangement of parts, all of which will be first fully described, then be specifically

pointed out in the appended claims, reference being had to the accompanying drawings, in which

Figure 1 is a perspective view of a portion of a phonograph embodying the invention.

Figure 2 is an enlarged plan view of the governor unit.

Figure 3 is a vertical section on the line 3—3 of Figure 2.

Figure 4 is an enlarged detail section of a portion of the device showing how it may be rendered inoperative when desired.

Figure 5 is a detail view of one of the governor arms and its immediately cooperating parts.

Figure 6 is an enlarged detail elevation showing the control grooves or keyways.

Figure 7 is a horizontal section on the line 7—7 of Figure 3 showing the tapering release portions of the control grooves.

Figure 8 is a detail horizontal section on the line 8—8 of Figure 3, showing the means of applying tension to the friction band and drum.

Figure 9 is an enlarged detail section showing the manner of securing the two parts of the drum together.

Figure 10 is a face view of a two selection record as made by the use of my invention with the recording machine.

Figure 11 is a face view of a single selection record of double length.

Figure 12 is an enlarged detail face view of the "name label" centered for a two selection record such as is shown in Figure 10.

Figure 13 is an enlarged detail face view of the "name label" for a single record such as shown in Figure 11.

Figure 14 is a detail cross section showing the seals over the center hole of the record.

In the drawings in which like numerals and letters of reference indicate like parts in all the figures, 52 represents the phonograph which embodies the usual turn table 53 with center posts 58 and the mechanism for driving it (not shown), the tone arm 54, sound box 55 and needle 56, all of which may be of the usual and conventional construction.

The governor or regulator device which comprises the chief part of my present invention consists of a base plate 1 which is designed to be secured to the body of the phonograph by suitable screws 4. The base 1 is provided with a slide pocket 2 in which is located a presser spring 3 to engage the end of the slide 6 of the main support 5 for a purpose presently understood.

The main support 5 has a lower bearing 7 and an upper aperture 8. Into the aperture 8 is projected the hollow supporting shaft 9 which itself is provided with a bearing 10 for the upper end of the governor

case shaft 11, the lower end of which turns in the bearing 7 of the main support 5.

The governor case is of cylindrical form and made of upper and lower parts 12 and 13 respectively secured together by ears 15 which pass through apertures 14 and are clenched over as best shown in Figure 9 of the drawings.

A friction band 16 is held on the periphery of the governor case and is adapted to be maintained in contact with the periphery of the turn table by means of the spring 3.

Mounted within the governor case on pivots 17 are governor arms 19 having eccentric and inclined brake faces 18 to cooperate with the conical brake drum 23 hereinafter again referred to. The arms 19 are provided with adjustable weights 20 by means of which their action may be adjusted. Springs 21 on supports 22 serve to counteract the centrifugal action of the weights during rotation of the governor case and maintain the governor arms out of engagement with the brake drum 23 when the governor case is at rest as when the turn table has been stopped by the action of the ordinary brake now provided in connection with phonographs of the usual type.

The brake drum 23 is provided with a neck 24 which carries a fastening pin 25 which passes through slots 26 in the hollow support shaft 9 and through the lift shaft 29, the holes of the lift shaft 29 being horizontally elongated to permit the shaft 29 to be turned slightly for a purpose presently explained.

The neck 24 has a recess 27 to receive the spring 28 for pushing the brake drum down.

30 is a knob on the end of the lift shaft 29 by which it may be raised and given the slight turn hereinbefore referred to to cause the pin 31 to be raised out of the cross slot 32 and be turned slightly to hold the brake drum up out of operative position when desired.

The brake drum is provided with a cam groove 33 which has a tapered or throw-out portion 34 and an entrance 35, the latter opening through the top of the neck. 36 is the control arm support which is slotted at 37 for the guide pin 40 to travel in. The control arm is designated by the reference numeral 38 and it has a ring 39 by which it is mounted on the support 36. 40 is the guide pin and 41 the guide pin spring which maintains the guide pin in light contact with the cam groove 33.

42 designates the control arm return spring, the function of which is to return the control arm to the initial or starting position as the tone arm is returned to the beginning of the record.

43 designates the record disk which cooperates with the governor device and it con-

sists of a central or name plate or label portion 44 and a record groove 45. When two or more pieces are played on one record side a wide spiral separation groove 46 may be provided to indicate the dividing place between the two recorded selections.

The center hole 47 of the record disk is provided with seals 48 which, after broken, indicate that the record has been placed upon a machine and played.

49 designates that portion of the name label 44 on which the record title or titles are placed and 50 indicates the place where the manufacturer's name and license conditions may be put, while the trade mark may be located in the space 51. When a record is made, with two selections on one face each space 49 may be utilized for one record title as indicated in Figure 12.

The records may be either single face or double face as under the present practice and they may contain a plurality of selections on each face as indicated in Figure 11 or a single long selection on each face as indicated in Figure 10.

In carrying out my invention either for recording or reproducing purposes, the regulating device is attached to the phonograph to which it is to be applied so that the friction band 16 rides against the edge of the turn table 53 of the machine, the tension spring 3 keeping the friction band in contact with the turn table. The regulator or speed controlling device is set so that the control arm 38 rests against the tone arm 54 when the recording or reproducing needle 56 is in the outer groove of a ten inch record or the ten inch point of a larger record. The regulator, being properly applied to the machine, the following action will take place: When the machine is started, the governor case, by reason of the friction band 16, revolves with the turn table causing the weighted governor balls 20 to be thrown out in accordance with the speed of the governor case as derived from the speed of the turn table. With the regulator in the starting position the governor of the regulator does not act to control the turn table speed until the speed is greater than that for the proper starting of the record. When the speed exceeds the proper rate, the brake faces of the governor ball arms will come into contact with the friction cone 23 and thereby cause a retardation of the speed due to the friction produced on these contact surfaces. Through the contact of the friction band 16 of the governor case 12 with the turn table, the speed of the turn table and consequently that of the record will be controlled. As the recording or reproducing needle travels in the record grooves toward the center of the record, thus swinging the tone arm toward the center also, the control arm 38 will be moved in accord-

ance with the movement of the tone arm due to the travel of the recording or reproducing needle in the record. The movement of the tone arm moves the control arm 38 around its support 37 and by reason of the lifting pin 40 being engaged in the slanting slot 33 of the friction cone 23, the friction cone is gradually raised in exact accordance with the movement of the tone arm. This raising of the friction cone, by reason of its tapered shape, allows the governor of the regulator to open farther without the brake faces of the governor ball arms coming in contact with the friction cone; therefore as the tone arm moves the control arm 38 the control arm gradually raises the friction cone thereby allowing a gradual increase of speed to be attained by the regulator, the turn table and the record because of their relation one to the other. The ultimate result of this action is that as the record is being recorded or played it is started at a given speed and as the recording or reproducing needle follows the threads of the record grooves toward the center of the record, or the tone arm moves toward the center of the record the speed is gradually increased in exact accordance with the change in the circumference of the grooves of the record so as to give a uniform speed to that portion of the record immediately beneath the recording or reproducing needle regardless of where the needle may be on the face of the record.

When the tone arm has travelled to the center grooves of the record the lifting pin 40 will have been pushed out of engagement with the lifting slot or keyway 33 by reason of the tapering depth 34 given to this keyway; the spring 28 will then push the friction cone completely down, thereby causing the governor to close and automatically stop the machine. The taper given to the friction cone will be such that will keep a proper but uniform speed of the record surface passing under the needle at all positions or places of the needle on the face of the record.

After recording or playing a record and the needle is raised from it and the tone arm swung back the spring 42 will turn the control arm 38 to its starting position and the lifting pin 40 will then be again engaged in the entrance 35 of the lifting slot 33. Thus the regulator is automatically made ready to repeat these operations.

When it is desired to play records of the present type, namely, those requiring a uniform angular speed of rotation or uniform number of revolutions per minute, all that is necessary is for the operator to raise the knob 30 so that the pin 31 clears the slot 32 in the support shaft 9 and then turn the knob slightly and allow the pin to rest on top of the turned lip of the support shaft 9. When this is done the friction cone or

brake drum 23 is raised up out of the way of the regulator governor brakes and in this position the device does not in any way interfere with the operation of the phonograph to which it has been attached for the playing of the present type of uniform revolution records. When it is desired to again play records requiring the uniform speed under the needle, the knob 30 is turned back so that the pin 31 again engages in the slot in the support shaft and thus the friction cone is again brought into position for controlling the record speed.

My invention can be used on machines playing records of either the "Hill and dale" or the "lateral cut" type or any type or kind of disk records.

By providing the record with a spiral cut groove 46 of greater width than the regular grooves employed for sound recording the end of one selection on the record and the beginning of another can easily be seen, thereby making it possible to lower the reproducing needle into the leading grooves of the second selection for its playing if desired.

By having the paper name disk or label 44 cover the turn table post hole in the record, the seal 47 forming a part of the label 44, protection against playing the record before it reaches the hands of the ultimate purchaser may be had, for if the record is played the paper covering the center post hole will be broken by the center post when the record is placed on the turn table for playing.

While I have shown and described the preferred embodiment of my invention it is obvious that modifications of the same can be made and changes in the details of construction without departing from the spirit of the invention or the scope of the appended claims.

What I claim is:

1. In combination with a phonograph having a turn table, means to drive it, and a tone arm with sound box and needle; of a device controlled by the movement of the needle across the record for causing said turn table to rotate with that portion of the record beneath the needle at a constant speed, and including means to stop the machine when the piece is finished.

2. In combination with a phonograph having a turn table, means to drive it, and a tone arm with sound box and needle; of a device relatively fixed as to location and engaging the periphery of the turn table to progressively vary the speed of rotation of the turn table as the needle travels across the record, said device including means to stop the turn table when the record is finished.

3. In phonographs wherein is provided a turn table, driving means for the same, a

tone arm supported to swing above the turn table, and a sound box and needle; a speed controlling device for progressively varying the speed of rotation of the turn table as the sound box traverses the record, said speed controlling device comprising a governor case rotatable with and by the turn table, centrifugal governor arms in the case, variable brake surfaces with which said arms cooperate, and means to vary the brake surface with regard to said arms, thereby to vary the speed of rotation of the turn table.

4. In phonographs wherein is provided a turn table, driving means for the same, a tone arm supported to swing above the turn table, and a sound box and needle; a speed controlling device for progressively varying the speed of rotation of the turn table as the sound box traverses the record, said speed controlling device comprising a governor case rotatable with and by the turn table, centrifugal governor arms in the case, variable brake surfaces with which said arms cooperate, and means cooperative with the movement of the needle across the record to vary the brake surface with regard to said arms, thereby to vary the speed of rotation of the turn table.

5. An automatic record speed control for the making and reproduction of phonograph records of the disk type, which comprises a speed governor mechanism with provision for progressively varying the speed of rotation of the record as the needle travels across the face of the record, and means constituting a part of said governor mechanism for automatically bringing the record to a stop at its end.

6. A device of the character described, comprising a support, a governor case rotatably mounted on said support, and having provisions for rotating with the turn table of a phonograph, centrifugal brake arms pivoted in said case and having brake surfaces, a shiftable brake drum, means for holding said drum against rotation and in cooperative position with respect to said brake arms, means to shift said drum to vary the speed of rotation of said case and hence vary the speed of rotation of the turn table to maintain a substantially constant speed of the moving sound groove beneath the needle.

7. A device of the character described, comprising a support, a governor case rotatably mounted on said support, and having provisions for rotating with the turn table of a phonograph, centrifugal brake arms pivoted in said case and having brake surfaces, a shiftable brake drum, means for holding said drum against rotation and in cooperative position with respect to said brake arms, means to shift said drum according to the position of the needle on the

record to vary the speed of rotation of said case and hence vary the speed of rotation of the turn table to maintain a substantially constant speed of the moving sound groove beneath the needle.

8. A device of the character described, comprising a support, a governor case rotatably mounted on said support, and having provisions for rotating with the turn table of a phonograph, centrifugal brake arms pivoted in said case and having brake surfaces, a shiftable brake drum, means for holding said drum against rotation and in cooperative position with respect to said brake arms, means to shift said drum to vary the speed of rotation of said case and hence vary the speed of rotation of the turn table to maintain a substantially constant speed of the moving sound groove beneath the needle, and means to control said shifting means by the movement of the tone arm.

9. In a speed control mechanism for phonographs, a rotatable case adapted to be cooperatively connected with the turn table of a phonograph and rotate in harmony with the same, centrifugal governor elements pivotally mounted in the case, means for rotatably sustaining the case, a brake drum cooperative with said governor elements, and means operable in harmony with the movement of the needle across the record for changing the location of the brake drum with respect to the centrifugal elements, thereby to vary the action of the same in accordance with the travel of the needle across the record.

10. An attachment for phonographs comprising a base plate, a main support slidably carried by said base plate, a governor case rotatably mounted in said main support, a friction band on the periphery of said governor case adapted to engage the periphery of the turn table and be rotated thereby, means for holding the friction band in contact with the turn table, a support shaft mounted on said main support and having a bearing, said governor case including a shaft journaled in said bearing and in a bearing on said main support, a brake drum slidably mounted on said support shaft and including a brake cone projected into said governor case, pivoted centrifugally operated governor arms mounted in said governor case and adapted to cooperate with said brake drum to retard the rotation of said governor case, and means operated for shifting said brake drum for the purposes described.

11. An attachment for phonographs comprising a base plate, a main support slidably carried by said base plate, a governor case rotatably mounted in said main support, a friction band on the periphery of said governor case adapted to engage the periphery of the turn table and be rotated thereby,

means for holding the friction band in contact with the turn table, a support shaft mounted on said main support and having a bearing, said governor case including a shaft journaled in said bearing and in a bearing on said main support, a brake drum slidably mounted on said support shaft and including a brake cone projected into said governor case, pivoted centrifugally operated governor arms mounted in said governor case and adapted to cooperate with said brake drum to retard the rotation of said governor case, said brake drum having a neck provided with a main groove, a control arm, a guide pin carried by said control arm to operate in said main groove, said control arm adapted to be moved to vary the position of said brake drum with respect to said governor arms.

12. An attachment for phonographs comprising a base plate, a main support slidably carried by said base plate, a governor case rotatably mounted in said main support, a friction band on the periphery of said governor case adapted to engage the periphery of the turn table and be rotated thereby, means for holding the friction band in contact with the turn table, a support shaft mounted on said main support and having a bearing, said governor case including a shaft journaled in said bearing and in a bearing on said main support, a brake drum slidably mounted on said support shaft and including a brake cone projected into said governor case, pivoted centrifugally operated governor arms mounted in said governor case and adapted to cooperate with said brake drum to retard the rotation of said governor case, said brake drum having a neck provided with a main groove, a control arm, a guide pin carried by said control arm to operate in said main groove, said control arm adapted to be moved to vary the position of said brake drum with respect to said governor arms, and means for disconnecting said guide pin from said groove at a predetermined place, and means for forcing said brake drum into stopping engagement with said governor arms.

13. A device of the character described, comprising a base plate, a main support including a slide operating in the pocket in said base plate, a presser spring in said pocket engaging said slide, said main support having an upper and lower bearing, a governor case provided with a shaft journaled in said lower bearing, a hollow support shaft held in said upper bearing and itself having a bearing for said governor case shaft, a friction band on the periphery of said governor case, governor arms with weights pivotally mounted in said governor case, means tending to move said arms in one direction, a hollow brake drum with a neck slidably mounted around said hollow sup-

port shaft, a spring for holding said brake drum down into operable engagement with said governor arms, a control arm support, a control arm mounted on said support, a
5 guide pin retractably mounted on said control arm, a lift shaft mounted in said hollow support shaft and pin connected with said brake drum collar, said hollow support shaft having a slot through which the pin

connection passes, and means cooperative 10 with said lift shaft to hold the same elevated with said brake drum out of operative position, said brake drum having a cam slot cooperative with said guide pin, and means tending to move said control arm to 15 an initial position.

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