

Aug. 2, 1932.

W. R. OYSTON

1,869,770

SOUND REPRODUCING APPARATUS

Filed Sept. 9, 1929

2 Sheets-Sheet 1

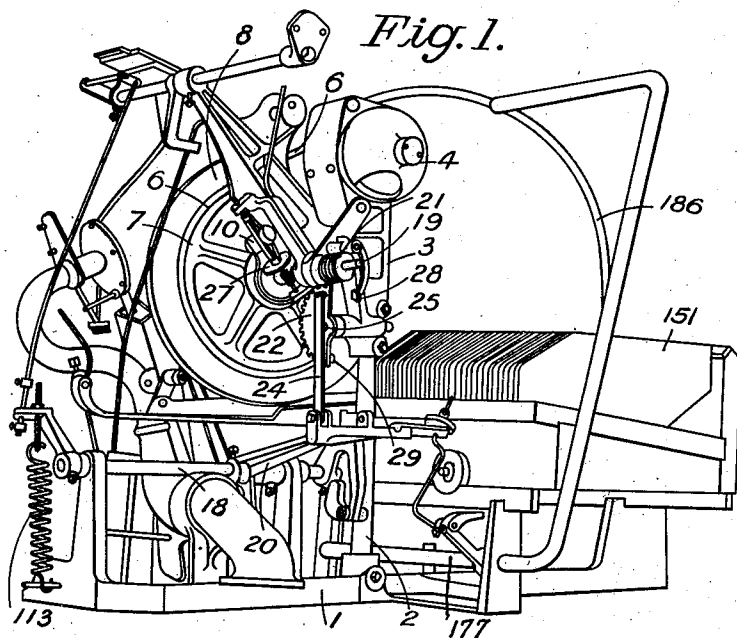


Fig. 2.

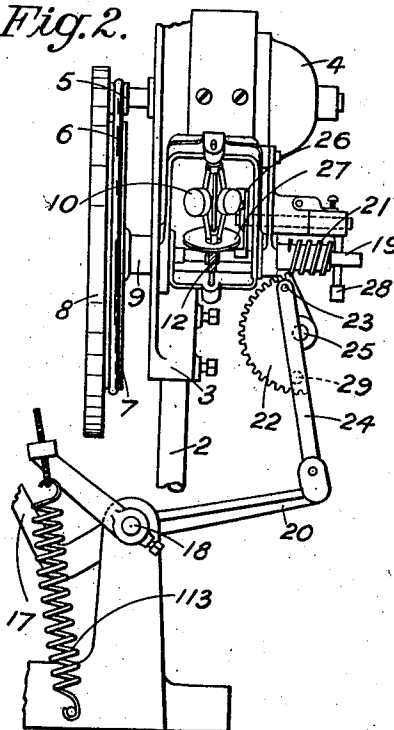
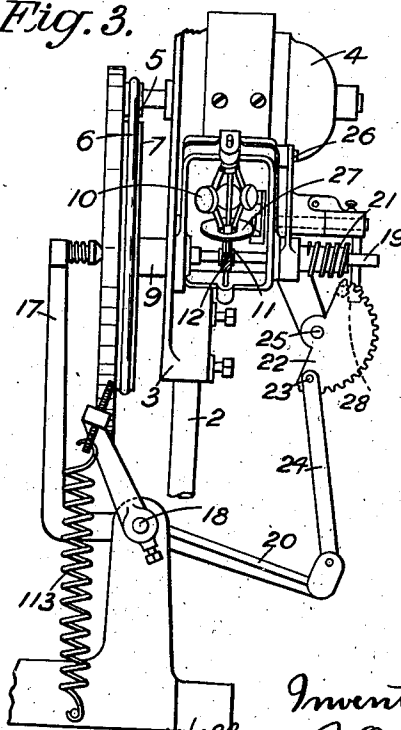


Fig. 3.



Inventor:—
 William R. Oyston,
 By:— Smith, Michael & Gardiner,
 Attorneys.

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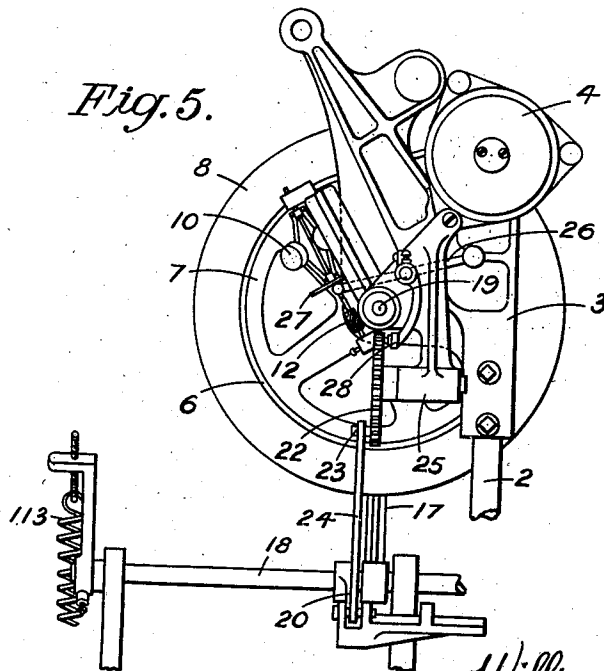
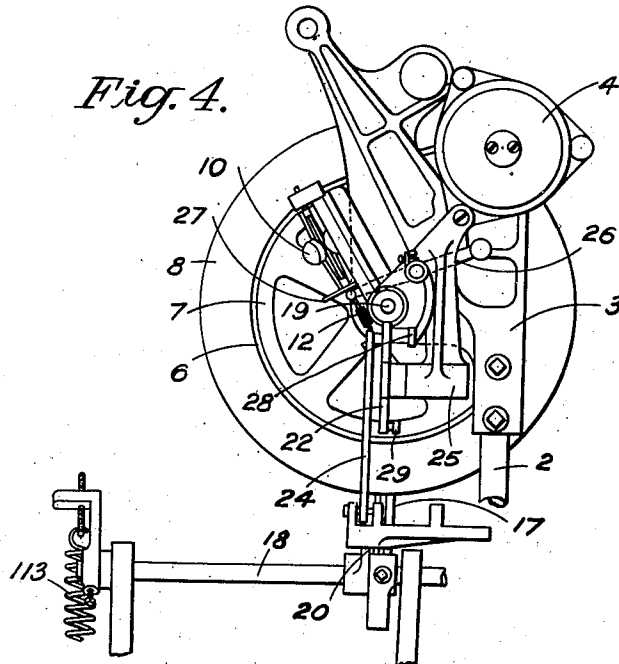
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Inventor: William R. Oyston,
By: Smith, Michael & Gardiner,
Attorneys.

UNITED STATES PATENT OFFICE

WILLIAM ROBERT OYSTON, OF PARKVILLE, VICTORIA, AUSTRALIA, ASSIGNOR TO CONTINUOUS GRAMOPHONES LIMITED, OF LONDON, ENGLAND

SOUND REPRODUCING APPARATUS

Application filed September 9, 1929, Serial No. 391,219, and in Australia September 10, 1928.

This invention relates to sound reproducing apparatus such as gramophones and more particularly to machines of the automatic type, that is to say, in which all the movements of the associated mechanism are under the control of means such as an electric circuit, by the energizing of which a motor is started and a controlling shaft given a movement of partial rotation, initiating substantially all of the movements of the associated mechanism.

One such machine, by way of example, is described in the specification of my pending patent application Serial No. 260,378 filed March 9th, 1928, wherein the controlling shaft (referred to as an oscillating horizontal shaft 18) and a subsidiary shaft (referred to as the horizontal shaft 177) were adapted to be partially rotated by means of a crank arm (referred to as a bell crank lever 20), which was actuated by means of a governor-like mechanism (referred to as the governor 13) which was additional to and separate from the ordinary speed-controlling governor.

The object of the present invention is to provide a simplified mechanism by which the movement of partial rotation may be given to the controlling shaft, and for this purpose it is to be understood that the invention is not necessarily confined to being an improvement upon the particular kind of machine described in the above mentioned specification, but that it can be applied to all sound-reproducing apparatus such as gramophones, in which a power-driven element is employed to produce the partial rotation or oscillation of a controlling shaft.

According to the present invention, a spindle driven in connection with the turntable is fitted with a worm adapted to engage a toothed segment connected to a lever by which the movement of partial rotation is imparted to the controlling shaft of the machine, the rotation of the worm when the turntable is set in motion causing the segment to turn through an angle for imparting the necessary movement through said lever to the controlling shaft. At the completion of the movement of the controlling shaft, whereby

the movements of the associated mechanism are initiated for the placing of a record disk in position on the turntable and the movement of the sound box or the like into cooperation with the rotating disk, the parts of the mechanism are retained in position by means of a stop brought into the path of a lug or projection upon the segment.

The rotation of the worm causes the segment to turn through an angle of about 180 degrees, and slightly past the dead center point of a crank-connection to the lever of the controlling shaft, the latter being adapted to tension one or more springs for its return movement which is delayed until the removal of said stop from the lug or projection.

Preferably the normal movement of the ordinary speed-governor during rotation of the turntable is utilized for bringing said stop into the path of the lug or projection in order to retain the parts in position and for removing said stop in order to permit the segment to turn through the remainder of its revolution when the turntable slows down at the end of the playing of the record.

The invention is hereafter described with reference to the accompanying drawings, in which:—

Figure 1 is a perspective view as seen from the rear flank of the turntable of a gramophone of the kind described in the specification of pending application Serial No. 260,378, this figure corresponding to Figure 3 of the drawings accompanying that specification.

Figure 2 is a side elevation of the improved mechanism in the position ready to operate.

Figure 3 is a similar view in the position with the toothed segment retained by the stop.

Figures 4 and 5 are rear views corresponding to Figures 2 and 3 respectively.

As in that prior specification, the bed plate 1 of the apparatus supports a pillar 2 carrying a bracket 3 bearing the electric motor 4 which has a driving pulley 5 connected by an endless resilient belt 6 to a pulley 7 rigidly secured to the record turntable 8. The spindle 9 of the turntable is controlled by a speed

governor 10 of the usual centrifugal type driven by a gear wheel 11 and worm 12.

The controlling shaft 18, in conjunction with the subsidiary shaft 177, is adapted to receive a movement of partial rotation or oscillation for initiating the movements of the associated mechanism, viz. the ejector arms 186 for transferring the disks in turn from the magazine 151 to playing position in front of the turntable 8, the arm 17 for centering the record disk upon the turntable, and so on, as in the prior specification Serial 260,378, by way of the lever 20.

The alternate oscillations of the controlling shaft 18 for initiating and determining the movements of the apparatus were produced in the apparatus described in my said prior specification by a governor-like mechanism rotated by the motion of the turntable; this governor-like mechanism brought about the depression of the lever or crank arm 20 so as to rock the controlling shaft 18 and the subsidiary shaft 177 against the action of spring 113 in order to transfer the record to playing position, to center it upon the turntable, and to engage the sound box needle with the disk, and at the conclusion of the playing the said mechanism released the lever 20 so that the spring 113 could rock the two controlling shafts 18, 177 in the opposite direction to free the record disk and return it to the magazine.

For the purpose of operating the lever 20, I now provide the turntable spindle 9 with an extension 19 fitted with a worm 21 with which there is adapted to engage a toothed segment 22 connected by a crank pin 23 and connecting rod 24 or equivalent mechanism to the crank arm or lever 20 by which the movement of partial rotation is imparted to the controlling shaft 18 of the machine.

The crank pin 23 is thus coupled with the lever 20 by means of a link connection 24. The segment 22 is toothed around its periphery for about 180 degrees and is supported in a rotatable manner upon a suitable fixed axis 25, so that as soon as the worm 21 commences to rotate, the segment 22 is caused to turn slowly from the position shown in Figure 2 to that shown in Figure 3, through an angle of about or rather more than 180 degrees, and slightly past the dead center point of its crank pin 23, whereby the connecting rod 24 is given the necessary stroke to actuate the controlling shaft.

This movement of the controlling shaft 18 is adapted simultaneously to tension one or more springs 113 in readiness for the return movement of the shaft; in order then to maintain the parts in position until the moment comes for such return movement, at the completion of the playing of a record disk, there is utilized as a further feature of the invention, the normal movement of the ordinary speed governor 10 during rotation of the

turntable in order to retain the toothed segment 22 in the position shown in Figure 3 until the slowing down of the turntable at the end of the record.

The retaining mechanism illustrated comprises a counterweighted lever 26 or the like, which bears or rests against the usual slidable collar 27 of the speed governor 10 and serves to adjust the position of a stop 28, the effect being that so long as the governor collar 27 remains drawn along its spindle by the rotating centrifugal weights as seen in Figures 3 and 5, the stop 28 lies in the path of a lug 29 secured upon the toothed segment. The lug comes into engagement with the stop when the segment has been turned round by its driving worm for somewhat more than 180 degrees as seen in Figure 3, the last tooth of the segment 22 being then free from engagement with the worm 21 but the further rotation of the segment by the effect of the tension spring 113 is prevented by the lug thus caught against the stop.

By such an arrangement, the parts will therefore be maintained in this position to allow the playing of the record to continue to the end, after which the parts may then return to their normal inoperative position under the action of the tension spring 113. In order to allow this, the governor collar 27, which slides back along its spindle as the turntable slows down and comes to rest, is employed to actuate the counterweighted lever 26 so as to remove the stop 28 from engagement with the lug 29 on the toothed segment; since the crank pin 23 of the latter has already assumed the position of being somewhat past the dead center, the tension spring 113 will now cause the segment 22 to turn through the remainder of its revolution, bringing the leading tooth into position for engagement with the commencing end of the worm, as seen in Figure 2 and ready for a new cycle of operations.

It is to be understood from the foregoing that such a system of actuating a controlling shaft may be modified in constructional detail without departing from the general inventive idea described above, such changes being dependent upon the type of machine to which the device is to be applied or otherwise. If desired, the ends of the connecting rod 24 may be slotted to provide for small differences in adjustment and so forth which may be occasioned by applying the device to more than one type of machine.

What I claim is:—

1. In a sound-reproducing apparatus, a controlling shaft, a power-driven member adapted to effect partial rotation of said shaft, a turntable for a record disk, means operated by the controlling shaft for center-pinning the record disk upon the turntable, a spindle secured to and rotatable with said turntable, a worm rotated by said spindle, a crank lever fixed at one end to said controlling

shaft and pivotally secured at its other end to one end of a connecting rod, and a toothed segment pivotally carrying the other end of said connecting rod and pivoted upon a fixed support, said segment being adapted to be engaged by said worm and to be rotated by the rotation of said worm through an angle of about 180°.

2. In a sound-reproducing apparatus, a controlling mechanism comprising an oscillating shaft, power-driven means for actuating said shaft, a vertically-positioned turntable for a record disk, a pin-provided lever arm mounted on said shaft for centering said disk upon said turntable, said lever arm being operated by the oscillation of said shaft, a spindle rotatable with said turntable, a worm rotated by said spindle, a crank-arm fixedly secured at one end to said shaft and a connecting rod having its bottom end pivotally secured to the other end of said crank arm, and a toothed segment rotatably mounted on a fixed support, said segment pivotally carrying the upper end of said connecting rod and being adapted to be engaged and rotated by the rotation of said worm so as to depress said connecting rod longitudinally.

3. In a sound-reproducing apparatus of the automatic, selective type provided with a magazine of record disks, and having a shaft-controlled mechanism for transferring record disks from the magazine to a turntable and for holding a disk positioned on said turntable, driving means for the controlling shaft which incorporates a toothed segment having a crank-pin, a worm meshing with said segment, an operating lever on the controlling shaft, and a link connection between said crank pin and said operating lever said worm being rotated by the rotation of said turntable.

4. In a sound reproducing apparatus having a turntable for disk records and a controlling shaft, driving means for producing a partial rotation of said controlling shaft in one direction against a returning force, comprising a worm driven in connection with the turntable, a toothed segment adapted to mesh with said worm, a crank pin on said segment, a lever secured to said controlling shaft, a link connecting said crank pin to said lever, the rotation of said worm when the turntable is set in motion causing said segment to rotate through an angle which carries said crank-pin over its dead center, and means for preventing the further rotation of said segment due to said returning force.

5. In a sound reproducing apparatus having a turntable for disk records and a controlling shaft, driving means for producing a partial rotation of said controlling shaft in one direction against a returning force, comprising a worm driven in connection with the turntable, a toothed segment adapted to

mesh with said worm, a crank pin on said segment, a lever secured to said controlling shaft, a link connecting said crank-pin to said lever, a projection upon said segment, a stop adapted to engage said projection, means for advancing said stop into the path of said projection during the playing of the record, the rotation of said worm when the turntable is set in motion causing said segment to rotate through an angle which carries said crank pin over its dead center, and said stop delaying the further rotation of said segment due to said returning force until the withdrawal of the stop at the end of the playing of the record.

6. In a sound reproducing apparatus having a turntable for disk records and a controlling shaft, driving means for producing a partial rotation of said controlling shaft in one direction against a returning force, comprising a worm driven in connection with the turntable, a toothed segment adapted to mesh with said worm, a crank pin on said segment, a lever secured to said controlling shaft, a link connecting said crank pin to said lever, the rotation of said worm when the turntable is set in motion causing said segment to rotate through an angle of about 180 degrees, which carries said crank pin over its dead center, and means for delaying the further rotation of said segment due to said returning force after the last tooth of said segment has come out of mesh with said worm.

7. In a sound reproducing apparatus having a turntable for disk records, a speed governor driven in connection with said turntable, and a spring-operated controlling shaft, driving means for producing a partial rotation of said controlling shaft in opposition to its operating spring, comprising a worm driven in connection with the turntable, a toothed segment adapted to mesh with said worm over more than 180 degrees of said segment, a crank pin upon said segment, a lever secured to said controlling shaft, a link connecting said crank pin to said lever, the rotation of said worm when the turntable is set in motion causing said segment to rotate through an angle which carries said crank pin from one dead center position over the opposite dead center, and means for delaying the further rotation of said segment due to the action of the shaft operating spring, said delaying means including a projection upon said segment, a counterweighted lever controlled by said speed governor and a stop member operated by said counterweighted lever to block the movement of said projection so long as said governor is driven at full speed whereby the opposite partial rotation of said controlling shaft due to the action of the shaft operating spring takes place upon the

slowing down of the turntable at the conclusion of the record.

8. In automatic sound reproducing apparatus of the specific type referred to herein, the combination of a controlling shaft for the apparatus a centrifugal governor continuously driven by the motor drive to the turntable, a bell crank lever actuated by the slidable disk of the governor, a catch operated by said bell crank lever, a rotatable toothed segment, a stop upon said segment engageable by said catch in one position of said bell crank lever, a crank operated by said segment, a link connecting said crank to said controlling shaft, spring means adapted to produce oscillation of said controlling shaft in one direction and a partial revolution of said segment linked thereto, and a worm upon the turntable spindle, said worm meshing with said segment to provide the remaining part of the revolution of said segment and the return oscillation of said controlling shaft, and said catch then engaging said stop to prevent further rotation of said segment until the slowing down of the motor drive at the conclusion of a record.

In testimony whereof I hereunto affix my signature.

WILLIAM ROBERT OYSTON.

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