April 18, 1939. J. IONESCO 2,154,848

PHONOGRAM AND MEANS FOR MOVING SAME WITH REFERENCE TO A STATIONARY NEEDLE

Filed July 22, 1936 2 Sheets-Sheet 1

Fig. 2.

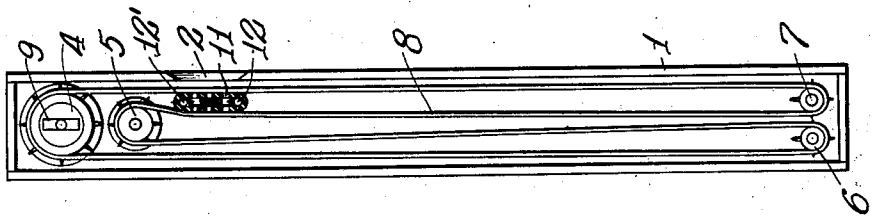


Fig. 1.

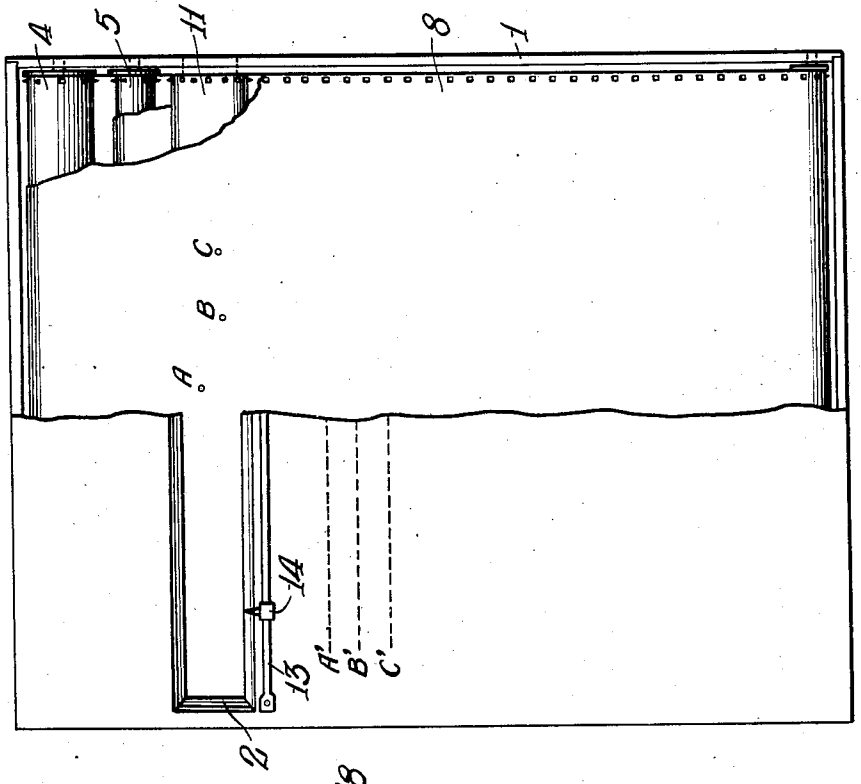
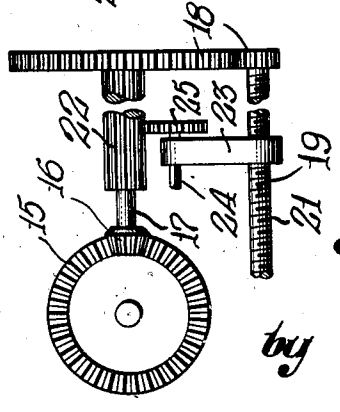


Fig. 3.



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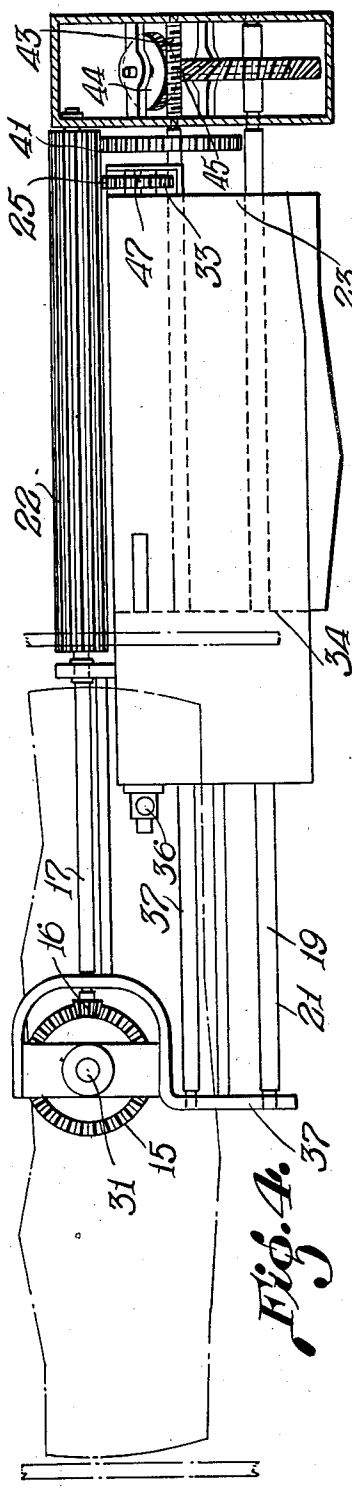


Fig. 4.

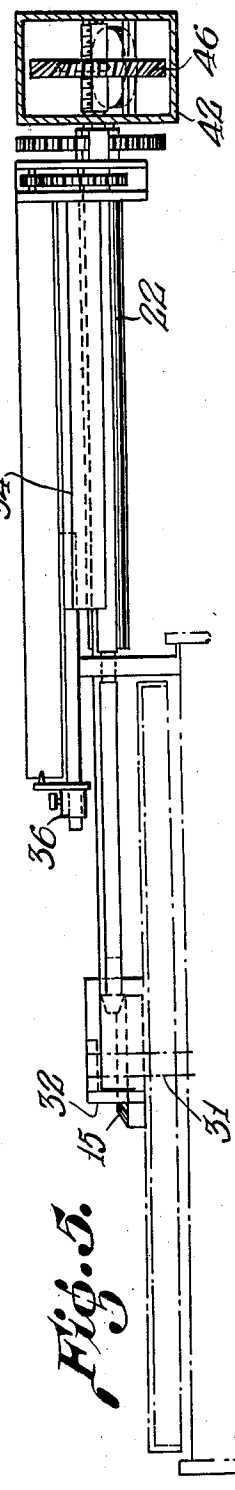


Fig. 5.

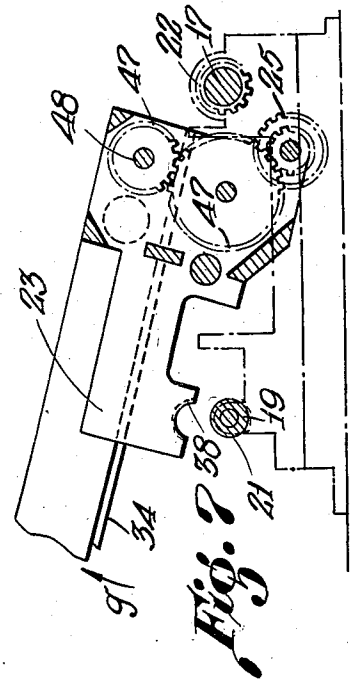


Fig. 7

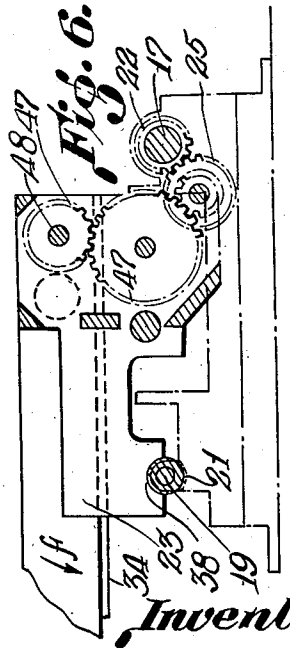


Fig. 6.

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UNITED STATES PATENT OFFICE

2,154,848

PHONOGRAM AND MEANS FOR MOVING SAME WITH REFERENCE TO A STATIONARY NEEDLE

Jean Ionesco, Paris, France

Application July 22, 1936, Serial No. 92,000
In France July 25, 1935

4 Claims. (Cl. 274—11)

It is well known that one of the most serious drawbacks of the most commonly used phonograph records resides in their short duration of playing. It has been attempted to extend this duration by different means. It has been proposed in particular to replace the records by endless strips wound over two rollers arranged at a short distance from each other; but heretofore the use of such an endless band required the use of apparatuses wherein the diaphragm and the needle were given, as in the old cylinder record machines, a transverse motion with respect to the record or phonogram.

My invention has for its object, an endless strip record the duration of playing of which is considerable and the size very small and, means for giving this record both a longitudinal and a transverse movement with reference to a stationary needle.

The endless strip record has an outer portion for which it moves in a given direction and one or more inner loops for which it moves in the opposite direction. This provides a considerable duration of play. The whole arrangement of the strip with its reels is enclosed in a flat box provided with an aperture through which the needle comes into contact with the strip.

It may be of advantage to provide on the strip suitable marks for beginning the playing at the desired point. To these marks may correspond, on the box, a sort of "contents table" whereby the phonogram may be compared to a book of which any chapter may be listened to at will.

As to the arrangement providing the displacement of the box carrying the tape record with reference to a stationary needle, it will allow the box to be used on a phonograph of the disc record type of the usual kind sold to-day, the diaphragm-carrying arm remaining stationary. To this end I make use of the turntable as a source of motion. The rotation of the turntable axis is transmitted to two parallel shafts of which one is threaded and carries a nut forming a slide which ensures the transverse motion of the box while the motion of the strip is provided by a gear carried by the slide and engaging an elongated gear carried by the second parallel shaft. The slide may be disengaged with reference to the two shafts so as to allow the speedy displacement by hand of the box.

Different other features of the invention will appear from the following description and accompanying drawings which show a form of execution chosen by way of example.

Fig. 1 is a view from above of the box carrying the tape record, certain parts of which have been broken away.

Fig. 2 is a side view thereof, partly cross-sectional, after removal of one of the walls of the box so as to make the inner parts appear to light.

Fig. 3 is a simplified plan view of the box-controlling means 11, certain parts being omitted for the sake of clearness.

Fig. 4 is a plan view of a practical form of execution of these means, as applied to a disc record phonograph.

Fig. 5 shows the same arrangement in side cross-sectional view.

Fig. 6 is an end view of the slide when in engagement.

Fig. 7 is a similar view of the slide when disengaged.

The device shown in Figs. 1 and 2 is constituted by a box 1 provided with a lateral aperture 2. This box carries four toothed rollers 4, 5, 6, 7 engaging the endless strip 8 carrying a sound record the playing track of which forms a spiral line substantially parallel to the longitudinal direction of the strip. The driving roller 4 the diameter of which is greater than that of the rollers 5, 6, 7 is provided on the outside of the box with a suitable conventional part 9 adapted to connect it with a suitable driving device. This part may be by example an elongated recess engaging a corresponding flattened end of a driving shaft 48. It is apparent that the strip 8 is wound over the rollers 4, 5, 6, 7 so as to form two loops, an inner loop and an outer loop. Obviously when the driving roller 4 rotates, the strip moves through a given direction in the outer loop and through the opposite direction in the inner loop. It is possible to provide several inner loops, for instance by suitably increasing the diameter of the roller 4. In order to avoid disengagement of the strip and the wall 1 in the vicinity of the aperture 2, I provide a small endless rubber band 11 passing over the rollers 12, 12' mounted in the box, adapted to rotate freely and engaging preferably said endless band. When the strip 8 moves, the rubber band is frictionally carried away with it and the resistance thus opposed to the displacement of the strip is negligible. The needle carried by the diaphragm passes through the aperture 2 and bears against the strip 8 which passes in front of said aperture. The strip may carry marks such as A, B, C, defining the origin of each of the parts of the sound record.

These marks may correspond to indications A', B', C' inscribed on the outside of the box

and forming a sort of table of contents of the record. Thus the user may begin the playing of the strip at the point or chapter which he desires. A small rod 13 (Fig. 1) provided at the edge of the aperture 2 carries a slide 14 which allows the marking, for instance, of the point where the playing has stopped, whereby it is possible to resume it at the same point.

I will now disclose in a purely diagrammatical manner the manner of moving this device. Obviously it is necessary on one hand to cause the strip to advance under the action of the rotation of the driving roller 4 and on the other hand to make the whole box move transversely with a very slow motion.

For instance (Fig. 3) a driving wheel 15, provided preferably with a bevel toothwork meshing with a bevel wheel 16 keyed to the shaft 17 drives through the agency of suitable gearwheels 18, a shaft 19 parallel to the shaft 17. The shaft 19 is provided with a screw thread 21 and the shaft 17 carries an elongated gear 22. A slide 23 is provided with a part forming a nut which cooperates with the screw 21. This slide carries a spindle 24 carrying a gearwheel 25 meshing with the elongated gear 22. Obviously if the slide 23 is secured to the box and the spindle 24 is connected through suitable intermediary parts to the driving roller 4 of the tape record, the driving wheel 15 will provide the two desired motions of the device, to wit the transverse motion of the box and the rotation of the roller 4 which causes the strip 8 to advance in front of the aperture 2.

In the practical form of execution of Figs. 4 and 5 the driving wheel 15 rotates integrally with the turntable shaft 31 of a disc record phonograph. The wheel 15 and the shafts 17—22 and 19—21 are carried in a suitable stationary frame 32 suitably secured to the phonograph.

The rotation is transmitted from the shaft 17—22 to the shaft 19—21, by the following means instead of the conventional gear wheels 18 of Fig. 3; the elongated gear 22 drives a pinion 41 carried by the stationary casing 42. The spindle of the pinion 41 carries a worm 43 which drives a helically toothed wheel 44 the suitably slanting spindle of which carries in its turn a worm 45 driving the toothed wheel 46 keyed to the shaft 19. I obtain thus the desired reduction of speed between the shafts 17—22 and 19—21.

The slide or plate 23 is provided with a flange 33 and a system of toothed wheels 47 is arranged between the slide 23 and its flange 33 for reducing the speed of the rotation transmitted by the elongated gear 22 and the wheel 25 meshing therewith to the driving roller 4 through the agency of the connecting means 9 (Figs. 2 and 5). The slide 23 carries a small plate 34 which serves for supporting in an overhung manner the box. A blade 35 forms an extension 36 and carries a sliding projection adapted to hold the box between itself and the slide plate 23. The slide 23 is fitted over a shaft 37 carried by the frame 32 and is adapted to rock round same. This shaft 37 may carry the pinion 41 meshing with the teeth 22 as disclosed hereinabove. Thus the shaft 37 rotates with the shafts 17 and 19 which makes the sliding of the slide 23 and plate 34 easier.

Figs. 6 and 7 illustrate the construction of the slide. This slide 23 carries on its underside and in engagement with the screw 21 a semi-circular nut gear. It also carries the wheel 25 and the transmission 47 which causes the rotation of the shaft 48 alined with the driving roller or cylinder 4 of the phonogram and adapted to be operatively connected therewith through the connecting means 9. As the wheel 25 meshes with the underside of the elongated gear 22, it is apparent (Fig. 6) that the weight of the overhung box acting in the direction of the arrow *f* on the plate 34, provides for the engagement of the semi-circular nut gear 38 with the screw 21 and the engagement of the wheel 25 with the elongated toothwork 22. The parts being thus in engagement, the phonograph may be started so that the box will move in the desired manner in front of the needle, supposed to remain stationary, which comes into contact with the strip 8 through the aperture 2.

It may be possible to disengage the box so as to allow its rapid displacement, for instance with a view to bringing under the needle one of the marks A, B, C. To this end (Fig. 7) it is sufficient to raise the box in the direction of the arrow *g* and the slide will then rock round the shaft 37. Under these conditions the semi-circular gear 38 will disengage the shaft 19—21 and the wheel 25 will disengage the elongated gear 22 so that it is then easy to make the released slide move over the shaft 37. Obviously instead of driving the parts through a phonograph turntable spindle, the drive may be performed through any other suitable part of the phonograph.

What I claim is:

1. In a phonographic arrangement, a self contained unit including a flat box having an aperture in one of its sides, rollers mounted in said box, an endless record strip engaged by said rollers and adapted to pass in front of said aperture, two secondary rollers mounted in said box on either side of the aperture and parallel with said first rollers and a small endless band engaged on said secondary rollers and in frictional contacting relation with the said strip, a support for carrying the said flat box, a source of motive power independent of said box and disconnectable means for drivingly connecting said source with at least one of said first rollers.

2. In a phonographic arrangement, a self contained unit including a flat box having an aperture in one of its sides, rollers mounted in said box, an endless record strip engaged by said rollers and adapted to pass in front of said aperture, a frame, a support for carrying the said flat box and movable on the frame in a direction perpendicular to the longitudinal direction of said strip, a source of motive power independent of said box, disconnectible means for drivingly connecting said source with at least one of said rollers, and means connecting said source of power with the support to control movement thereof on the frame.

3. In a phonographic arrangement, a self contained unit including a flat box having an aperture in one of its sides, rollers mounted in said box, an endless second strip engaged by said rollers and adapted to pass in front of said aperture, a frame, a rotating spindle mounted in said frame, two parallel shafts mounted in said frame and driven by said rotating spindle, one of said shafts being a screw shaft and the other a gear shaft, a slide operatively connected with said first screw shaft for displacement along said shaft and carrying said flat box, a gear mounted in said slide and cooperating with said second gear shaft, and means drivingly connecting said gear with at least one of said rollers.

4. In a phonographic arrangement, a self con-

tained unit including a flat box having an aperture in one of its sides, rollers mounted in said box, an endless record strip engaged by said rollers and adapted to pass in front of said aperture, a frame, a rotating spindle mounted in said frame, two parallel shafts mounted in said frame and driven by said rotating spindle, one of said shafts being a screw shaft and the other a gear shaft, a third stationary shaft parallel to said shafts, a slide operatively and disengageably connected with said first shaft for displacement along said shaft and adapted to rock around said third shaft, said slide carrying the said flat box, a gear mounted in said slide and cooperating with said second gear shaft and means drivingly connecting said gear with at least one of said rollers.

JEAN IONESCO.