Sept. 1, 1936. W. RABALD 2,053,108

TALKING MACHINE FOR RECORDING AND REPRODUCTION

Filed March 3, 1934 2 Sheets-Sheet 1

Fig. 1.

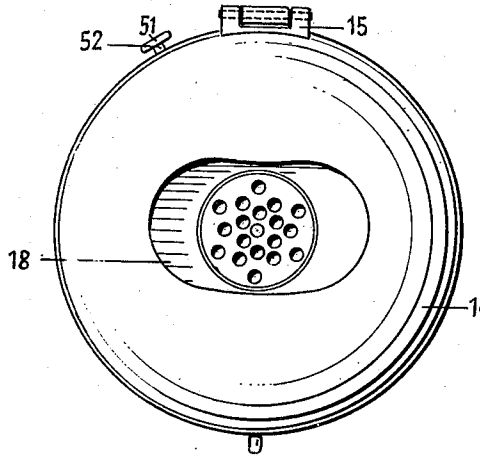


Fig. 2.

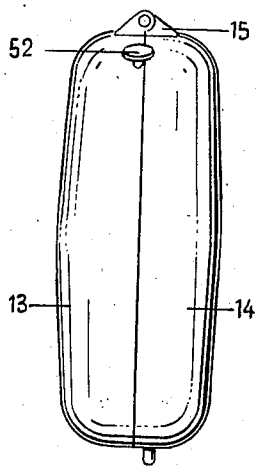


Fig. 3.

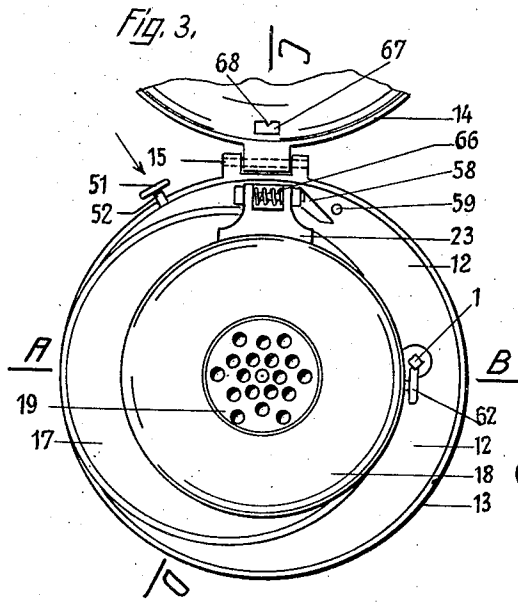
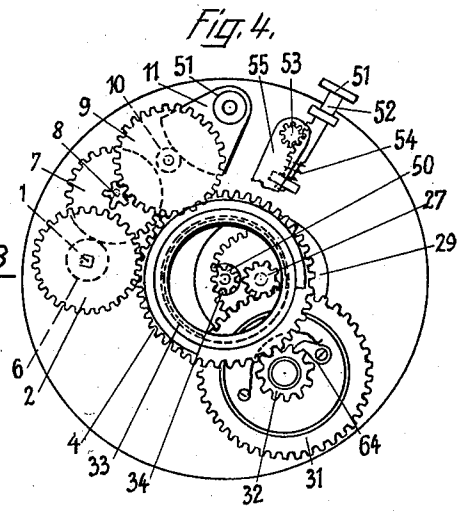


Fig. 4.



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Fig. 5.

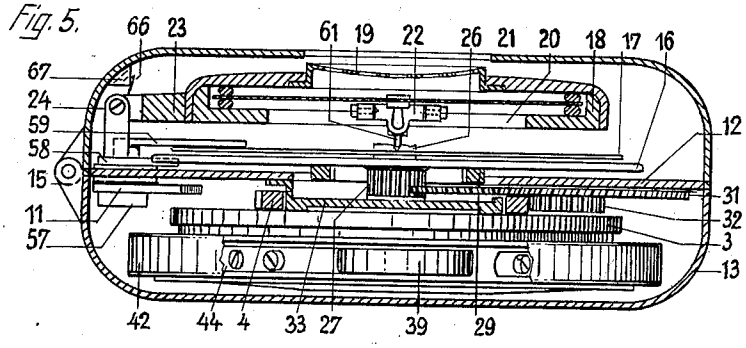


Fig. 6.

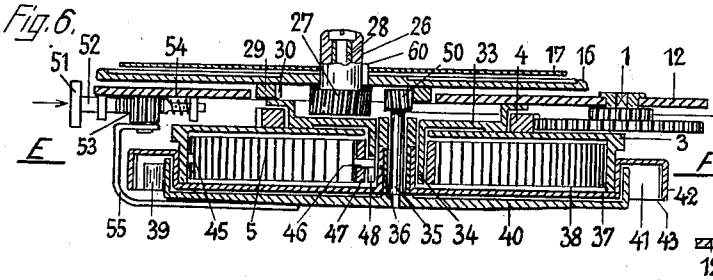


Fig. 10.

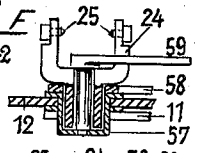


Fig. 7.

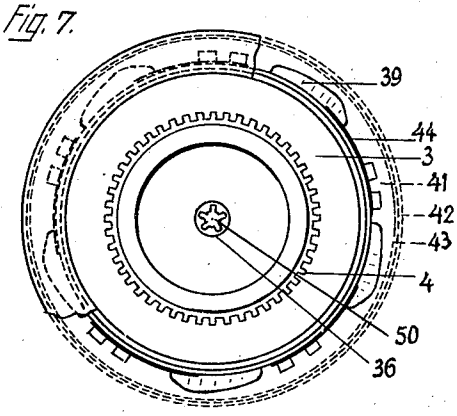


Fig. 9.

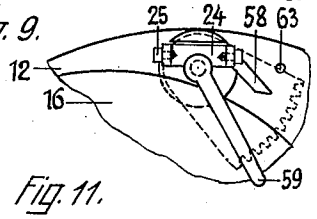


Fig. 11.

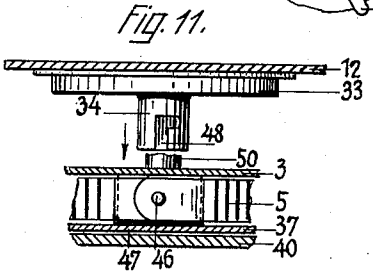


Fig. 8.

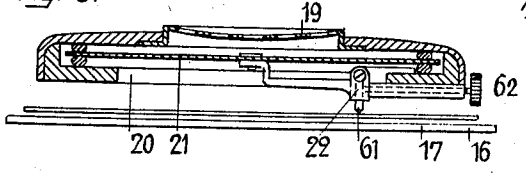
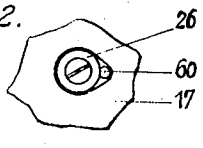


Fig. 12.



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UNITED STATES PATENT OFFICE

2,053,108

TALKING MACHINE FOR RECORDING AND REPRODUCTION

Willy Rabald, Leipzig, Germany

Application March 3, 1934, Serial No. 713,835
In Germany March 1, 1933

8 Claims. (Cl. 274—2)

This invention is intended to serve for the realization of the handiest apparatus for recording spoken letters and other sounds.

Such an apparatus must meet the following requirements:—It must be always ready for use at any time and at any place, it must be small and easy to operate, avoid almost all secondary noises both of the record and also of the gearing and must be cheap to use. The sound records must be capable of recording as much matter as possible and allow the full utilization of the surface of the record and interruption of the recording at any moment by quick stopping and starting.

The invention relates to a talking machine for recording and reproducing, which takes all these requirements fully into consideration. Owing to its properties it is suitable for all kinds of offices, for authors, reporters and for private use, in fact for everyone. It can further be advantageously employed in schools for teaching foreign languages and elocution.

The problem of a record letter writer is thus solved, because the tedious writing either by hand or on the typewriter is eliminated, the record sent through the post in an ordinary envelope not only imparts to the recipient the thoughts of the sender but also the individual intonation and manner of speaking. In the case of blind persons the tedious feeling of the blind characters is no longer necessary as the blind can hear the messages, purport of written articles, books and the like.

The talking machine for recording and reproducing sound according to the invention, therefore represents an important advance in a cultural and economical sense.

By employing a novel record from which sounds can be reproduced as often as desired, a good reproduction of sound with very little secondary noise is ensured and, owing to the small size of the record, a low selling price is possible.

It is not desirable, according to the invention, for the record to give a loud sound reproduction as otherwise strangers could also hear, consequently the large lateral tone deflections, such as are generally employed on the known records, are not necessary. This enables a much more compact cutting of the sound grooves and consequently a greater capacity of the record.

For producing a sound record the apparatus is gripped with one hand, a starter is actuated with the index finger and then the speaking or singing is commenced, the apparatus being held near the mouth. The record can be directly reproduced. The reproduction or strength of the sound corresponds approximately to that of a telephone.

The endeavours hitherto made in this direction have not yet succeeded in producing a result similar to that obtained by the invention. The known apparatus and devices only fulfill the requirements to a limited extent, they are inconvenient, difficult to manipulate and transport and, what is most important, very expensive.

The operation of the talking machine according to the invention corresponds to a miniature talking machine of known type generally known in a much larger construction under the name "Gramophones" but which enables both recording and reproduction and can be accommodated in a box-like casing in so-called waistcoat pocket size.

The obtaining of a pure sound reproduction, as free as possible from secondary noises, presents great difficulties owing to the lack of a flywheel for compensating the irregular movement of the driving mechanism, such as is formed by a large and consequently heavy record turntable.

It has been endeavoured to overcome this objection by constructing the governor at the same time as a flyweight. This method requires an absolutely smooth driving transmission to the turntable, because all, even the slightest shocks, have a very disagreeable effect when listening to a record, owing to the vibration of the sounds. The necessary transmission is attained by employing inner wormwheel-teeth made of material causing no noises. By employing such inner wormwheel teeth a compact construction with high ratio of transmission is obtained, a smooth and uniform rotation of the turntable being effected by the connection with the governor and especially by the fact that several teeth are in mesh.

An embodiment of the invention is illustrated by way of example in the accompanying drawings in which

Fig. 1 shows in elevation the outer casing in natural size.

Fig. 2 is a side elevation of Fig. 1.

Fig. 3 shows the casing with lid opened and with the diaphragm housing.

Fig. 4 is an elevation showing the rear side of the mechanism carrying the record plate.

Fig. 5 is a section on line C—D of Fig. 3.

Fig. 6 is a section on line A—B of Fig. 3.

Fig. 7 is a section on line E—F of Fig. 6.

Fig. 8 shows a section through the diaphragm

casing, turned through an angle of 90° relative to Fig. 5.

Figs. 9 to 12 are details.

Winding of the spring motor

By turning in clockwise direction a key inserted in a square hole 1 in the hub of a toothed wheel 2 this toothed wheel, which meshes with a toothed rim 4 fixed on the upper spring barrel plate 3, is rotated and winds a spring 5. On the hub of the toothed wheel 2 and under this toothed wheel a toothed wheel 6 is arranged which transmits the rotary movements to the transmission wheels 6, 7, 8, 9 and 10, the toothed wheel 10 meshing with a toothed segment 11 for the purpose hereinafter described. The toothed wheels 2 and 6—10 are arranged in the order described on the underside of a plate 12 fixed by screws on the lower casing half 13. This casing half 13 is connected in known manner with the upper similarly shaped casing half 14 by means of a hinge 15 and carries the other parts in such a manner that, after the removal of the screws holding the plate 12, this plate can be taken out of the casing with all the parts arranged above and below it.

A record turntable 16 is provided above the plate 12 for carrying a record 17 of special construction; the plate 12 also carries a diaphragm housing 18 provided with a sound aperture 19. This housing is of circular shape and has in its under side an aperture 20 for accommodating the diaphragm 21 gripped at its edge between resilient intermediate layers and a needle holder 22 with a needle 61. The diaphragm housing 18 is mounted by means of a fork-shaped extension 23, in a bracket 24 fixed on the plate 12 and can move easily between points 25.

The record turntable 16 has an upwardly projecting socket 26 having at its lower end a toothed wheel 27 with helical teeth, and is rotatably mounted on a pin 28. The pin 28 is situated eccentrically to the central axis of the plate 12, this eccentric arrangement, rendered necessary by the governor drive hereinafter described, also gives access to the spring driving mechanism.

A toothed rim 29 provided with inwardly directed helical teeth is provided for the governor drive on the under side of the turntable 16.

The turntable 16 is driven by the toothed wheel 27 owing to the fact that this wheel meshes with a toothed wheel 31 arranged on the under side of this plate 12 and carries a toothed wheel 32 which meshes with the toothed rim 4 on the upper spring barrel plate 3. The toothed wheel 32 cooperates with a pawl 65 provided on the toothed wheel 31 and forms a locking device for the winding of the spring. A box-shaped casing 33 extends from the under side of the plate 12 and this casing has on its inner side a concentrically arranged sleeve 34 which serves for directly guiding an axle 35 together with the bearing sleeve 36 for the governor drive. This axle 35 carries a disc 40 with a plurality of centrifugal elements 39 (in the example illustrated five) uniformly distributed around its circumference. The centrifugal elements 39 are held by accurately straightened blade springs 44.

The circumference of the spring barrel bottom 37 is formed by a channel 41 open in downward direction, the outer wall 42 of this channel 41, having a damping surface 43 for example a velvet lining, restricts the outward deflection of the centrifugal elements 39 and maintains constant the rotation of the governor. By thus building the governor a compact construction is attained.

A toothed wheel 50 is fixed on the upper end of the axle 35 and meshes with the internal teeth 30 of the toothed rim 29.

The driving spring 5 is connected at its outer end, which participates in the rotation, to a pin 45 projecting from the inner wall of the spring barrel 38 and at its other end by means of a pin 46 to a block 47 which can be coupled with the plate 12 or with the sleeve 34 situated on its under side. The coupling which must evidently take place before the fixing of the plate 12 by screws, is effected by means of a bayonet joint (Fig. 11) the sleeve 47 having a slot 48 the vertical portion of which is open at its lower end and adapted to receive the inwardly extended pin 46 fixed in the block 47, whereupon the sleeve is turned. In this manner the position of the inner end of the spring is held unchangeable, and the spring barrel 38 with all the parts connected and coordinated thereto are protected against dropping out.

To enable the rotation of the record turntable 16 to be started and stopped as desired the following device (starter) is provided (Figs. 4 and 6). A rack 52 projecting from the casing part 13 and terminating at its outer end in a knob 51 is mounted on the under side of the plate 12. This rack 52 meshes with a pinion 53 and is continually pressed outwards by a spring 54. The pinion 53 carries a brake strip 55 bent to correspond to the rest of the arrangement. When the knob 54 is depressed together with the rack 52 this rack causes a part revolution of the pinion so that the brake strip 55 swings outwards and during this movement shifts the governor disc 40, thereby bringing the governor almost directly to the necessary speed of rotation by the sliding off a reinforced point on the outer side of the bottom of the spring barrel.

When stopping (that is removing the pressure from the rack 51) this latter jumps back under the action of the spring 54 and rotates the pinion 53 in the opposite direction, whereby the brake strip returns into its initial position and immediately stops the drive. The bracket 24 carrying the diaphragm housing 18 is pivotally mounted in the plate 12 by means of a pin 56 with a box-shaped sleeve 57, so that its toothed segment 11 pressed on to the sleeve 57 imparts a part rotation to the bracket 24 and also to the diaphragm housing 18, when the driving mechanism is engaged.

The gearing 2 and 6 to 10 respectively imparts the swing to the toothed segment 11 in a predetermined ratio to the speed of rotation of the record turntable 16, the extreme positions of the toothed segment 11 coinciding with the commencement and end of the record grooves. Moreover the path of the toothed segment 11 is limited by a lever 59 which contacts on the one hand by a pin 63 and on the other hand with the edge of the turntable 16.

During the making of a record the engaged lever 59 forms a rigid connection with the bracket 24 and the toothed segment 11, whereas during the reproduction and when the lever 59 is disengaged the diaphragm housing 18 is followed by the needle 61 sliding in the record groove.

In order to ensure, during the making of a record, an absolutely reliable following of the record 17 on the turntable 16 and prevent any shifting owing to the deflection of the needle 61 during the making of the record, an eccentrically mounted pin 60 is provided beside the pin 26 of the turntable 16 and by bearing against the flank of a suitably shaped, approximately pear-shaped

incision 61 in the record 17 (Fig. 12) this pin 60 causes the movement of the record without any play.

Concerning the diaphragm housing it is also mentioned that the diaphragm, for the sake of saving space, is horizontal, so that the diaphragm can be made of relatively large diameter, and the fulcrum of the needle holder 22 is arranged so that a low constructional height is possible with a gear ratio, for example 1:2. A screw 62 easily accessible from the outer side, serves for securing the needle 61 in the needle holder 22 which must be made very short owing to the compact construction.

For producing the sound grooves in the record during the making of the record, sharp cutting needles are employed which are unchangeable in position (shaped needle shank which protects it against turning) whereas for sound reproduction needles made of soft material are used.

Owing to the fact that the talking machine is employed almost exclusively in vertical position for the purpose of easy manipulation, it is necessary for the diaphragm housing 18 to press the needle against the record with the necessary pressure (inscribing pressure). For this purpose a spring 66 is provided in the extension 23 of the membrane housing 18. When closing the casing cover 14 a nose 67 therein presses against the upwardly projecting spring end which is held in position by a notch.

I claim:—

1. A pocket size apparatus for recording and reproducing sound records, comprising in combination a casing composed of an upper part having a central aperture and a lower part hingedly connected to the upper part, a turntable eccentrically mounted in the lower part of said casing, a spring motor below said turntable comprising a spring, and a spring barrel with a toothed rim with outwardly directed helical teeth, a rim on the under side of said turntable with inwardly directed helical teeth, a train of gears engaging both of said toothed rims to transmit the movement from said spring barrel to said turntable, a sleeve rigidly connected to the underside of said turntable and extending through said spring barrel, a governor disc on the lower end of said barrel concentric with said turntable, centrifugal elements on the periphery of said disc, an inverted channel forming the periphery of said spring barrel and bridging the periphery of said governor disc, the inner surface of the outer wall of said channel adapted to restrict the outward movement of said elements to regulate the speed of rotation of said turntable, a forked bracket pivotally mounted on said driving motor outside the periphery of said turntable, a diaphragm housing mounted on said bracket, a diaphragm resiliently mounted in said housing, a needle holder on the underside of said diaphragm, a needle detachably mounted in said holder, and means actuated by said motor for swinging said bracket to swing said needle from the centre towards the periphery of said turntable.

2. In an apparatus as specified in claim 1 the means for swinging said bracket, comprising a train of gears driven by the spring barrel, and a toothed segment rigidly connected to said bracket and meshing with said train of gears.

3. In an apparatus as specified in claim 1 means for detachably coupling the spring to the turntable, comprising a plate rigidly mounted on the under side of said turntable, a sleeve projecting from the under side of said plate and having a bayonet slot, and a pin on the inner end of the spring adapted to engage in said slot to couple said spring with said turntable.

4. In an apparatus as specified in claim 1 the inner side of the outer wall of the channel being lined with soft material to eliminate the noise of the brake.

5. In a pocket size apparatus as specified in claim 1 the means for swinging said bracket, comprising a train of gears driven by the spring barrel, and a toothed segment rigidly connected to said bracket and meshing with said train of gears, a lever carried by said bracket to swing the same and bring said toothed segment into engagement with said train of gears.

6. In an apparatus as specified in claim 1 means for stopping and starting the spring motor, comprising a press knob provided with a rack, a pinion meshing with and adapted to be rotated by said rack, a brake strip rigidly connected with said pinion and normally bearing against the regulator disc, said brake strip adapted to be swung off said regulator disc at the depression of said knob.

7. In an apparatus as specified in claim 1 two inwardly projecting points on the bracket, an extension projecting radially from the diaphragm housing and engaged by said points to allow said housing to be swung towards and away from the plane of the turntable, a spring in said extension, a nose fixed on the inner side of said lid and having a notch adapted to receive said spring to lock the two casing parts in closed position and press said needle against the record on said turntable.

8. In an apparatus as specified in claim 1 the turntable having a central pin and an eccentric pin and the record having a pear-shaped aperture adapted to receive both of said pins to prevent a relative movement between the record and the turntable.

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