R. BERNDT.

PHONOGRAPH.

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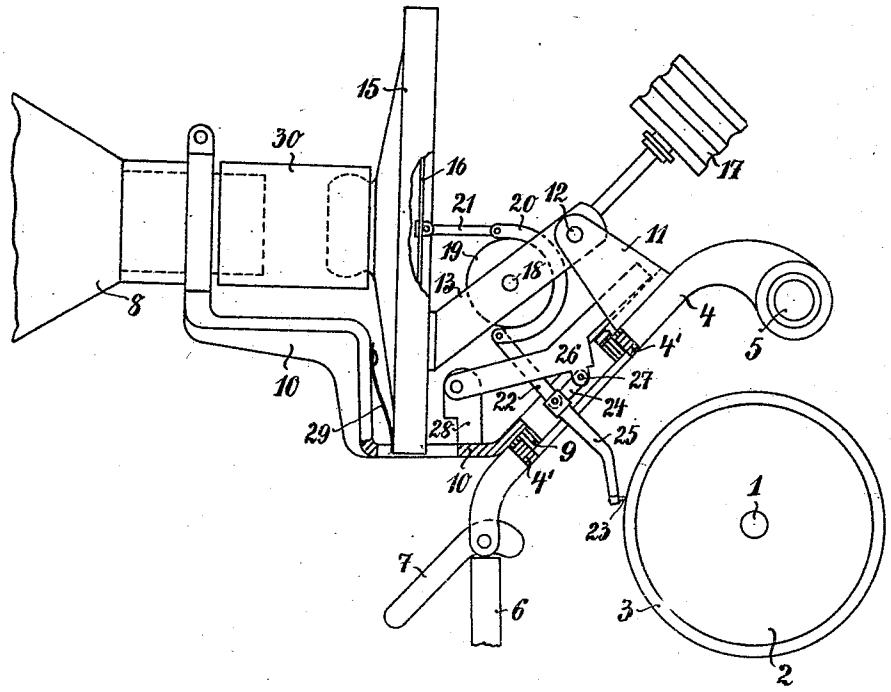
956,671. **Patented May 3, 1910.**



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REINHOLD BERNDT, OF BERLIN, GERMANY.

PHONOGRAPH.

956,671. Specification of Letters Patent. Patented May 3, 1910.

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To all whom it may concern:

Be it known that I, REINHOLD BERNDT, manufacturer, a citizen of Germany, residing at Berlin, Germany, have invented new and useful Improvements in Phonographs, of which the following is a specification.

This invention relates to phonographs with a device for strengthening the sound by means of a friction disk continuously driven from the motor and arranged between the needle and the membrane, all the parts concerned in the strengthening of the sound (the needle, the friction disk, the brake band and the membrane) being mounted in a common frame.

The purpose of the invention is to render the movements of the needle due to unevenness in the phonogram surface (*e. g.* an Edison cylinder) harmless, which movements when a frame is used which cannot follow them must cause alterations in the magnitude of the friction and therefore of the sound strengthening. The most obvious solution of this problem would be to make the whole frame oscillatory, as is usual with ordinary sound boxes, balancing the frame by means of a counter weight. If this is done, however, particularly if the trumpet is mounted upon the frame a very large mass is required to be moved. According to the invention therefore, only the friction disk and the membrane are arranged in this way, being pivoted for this purpose upon an oscillating part of the frame together with a counter weight while the axis of the needle is left as before in an immovable part of the frame.

The invention is illustrated in the accompanying drawing in one form of construction which is suited for the well known Edison cylinder.

1 indicates the axle of the cylinder cone, 2 the cone itself, 3 the cylinder, 4 the carrying arm movable upon the rod 5, 6 the supporting guide, 7 the disengaging lever and 8 the trumpet. In place of the sound box hitherto usual there is provided in a ring 4′ of the carrying arm, a ring 9 which carries the supporting frame 10 for all the members necessary for the reproduction and strengthening of the sound. The immovable part of this supporting frame is bent at an angle and carries on the one hand the trumpet 8 and on the other hand two lugs 11. In these latter is mounted an axle 12 for the oscillating part of the frame which consists essentially of two cheeks 13. These are rigidly connected on the one hand with the frame 15 of the membrane 16 and on the other hand with a balance weight 17, and they carry also an axle 18 for the friction disk 19. The friction band 20 which rests upon the disk 19 is connected by rods 21, 22, on the one hand with the membrane 16, and on the other hand with the angle lever 24, 25 carrying the needle 23. This angle lever is pivoted at 27 upon a weighted lever 26 (or a spring) which is hinged to a lug 28 of the frame 10. It is desirable also to insert a spring 29 between the frame and the sound box 15. If there are any inequalities in the cylinder 3 they cause the needle 23 to turn first about the axle 27 and these oscillations are transmitted through the rod 22 to the brake band 20, through this latter to the friction disk 19 and the members mounted with it in the cheeks 13, producing a revolution of these parts about the axle 12. Such revolution is rendered possible by a short tube 30 which connects the mouths of the sound box 15 and the trumpet 8. The transference of such inequalities, however, is damped from the start by the yielding mounting of the axle 27 of the angle lever 24, 25 carrying the needle 23, upon the weighted lever 26.

The present invention further attains the special advantage that the revolution of the friction disk 19 which is continuously driven from the driving mechanism causes the oscillating part 13 to lift and so largely relieves the needle 23 of stress, in consequence of the braking effect of the band 20 and the manner of suspension. For instance if the friction disk 19 is turned clockwise it tends to take the band 20 with it in the same direction on account of the friction. As a result there is a turning moment upon the cheeks 13 which bear the disk 19 about the axis 18. The cheeks 13, however, cannot turn about this axis but only about the axle 12, so there is a tendency to revolve about this axis also in a clockwise direction but to a correspondingly diminished extent. The needle 23 can with this arrangement follow every inequality of the record 3 but requires a very much smaller pressure than heretofore, in order to transmit the oscillations. Consequently the phonograph record wears much more slowly. In the position of rest the movable part 13 may rest upon the angle lever 24, 25 from which it is lifted by the

revolution of the friction disk 19. The driving of the friction disk 19 from the driving shaft can be effected in known manner by means of a correspondingly movable coupling, or instead from a special driving motor which is also mounted upon the part 13 and the weight of which must be balanced by a corresponding counter weight.

I claim:

1. In a phonograph, the combination with a record, a needle coöperating therewith, and a diaphragm, of a carrying arm, an oscillatory support mounted on the carrying arm, the diaphragm being carried by said oscillatory support, a rocking support for the needle, a friction disk carried by the diaphragm support, and a band operating over said disk and respectively connected to the diaphragm and needle.

2. In a phonograph, the combination with a record, of a diaphragm a counterbalanced oscillatory support therefor, a friction disk carried by said support, a needle coöperating with the record, and a band operating over the disk, and connected, respectively, to the diaphragm and needle.

3. In a phonograph, the combination with a record, of a diaphragm, a support therefor, a pivoted carrier arm, said support being mounted for oscillatory movement on said arm, a friction disk carried by said support, a needle coöperating with the record, a movable support for the needle, and a band operating over the friction disk and connected, respectively, to the diaphragm and needle.

4. In a phonograph, the combination with a record, of a diaphragm, a support therefor, a pivoted carrier arm, said support being mounted for oscillatory movement on said carrier arm, a friction disk carried by said support, a needle coöperating with said record, a movable support to which the needle is pivotally connected, and a band operating over the friction disk, and connected, respectively, to the needle and diaphragm.

5. In a phonograph, the combination with a record, of a pivoted supporting arm, a frame carried thereby, a rocking support carried by said frame, a diaphragm carrier supported on said rocking support, a needle also pivotally connected to said frame, and means carried by the diaphragm support, and connected, respectively, to the diaphragm and needle, for relieving the pressure of the needle against the record.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

REINHOLD BERNDT.

Witnesses:

HENRY HASPER,

WOLDEMAR HAUPT.