April 17, 1945. C. HUENLICH 2,373,960

PHONOGRAPH

Filed Aug. 12, 1942

Fig. 1

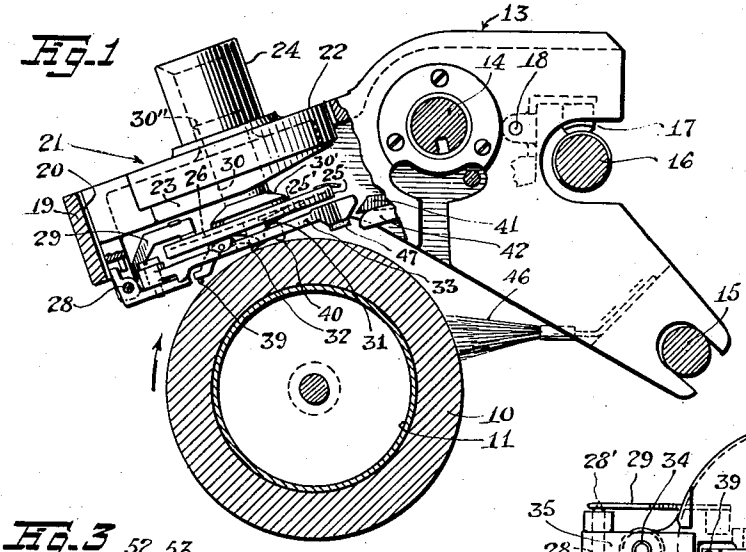


Fig. 2

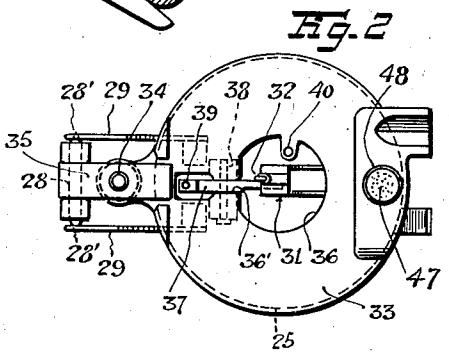


Fig. 3

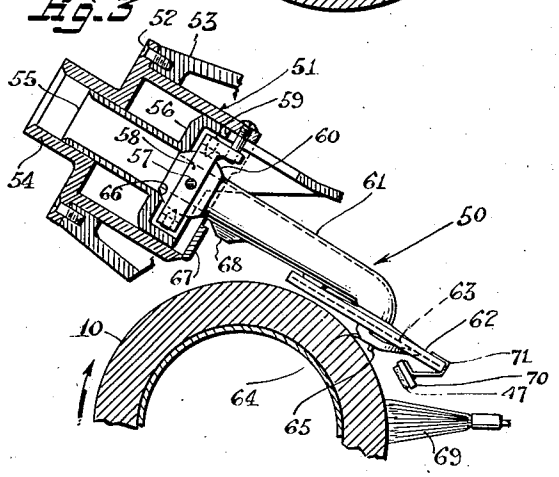


Fig. 4

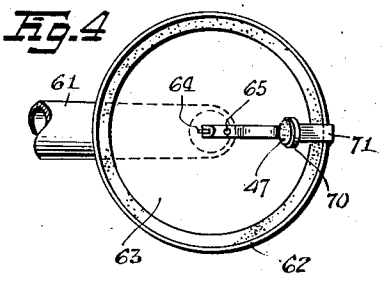


Fig. 5

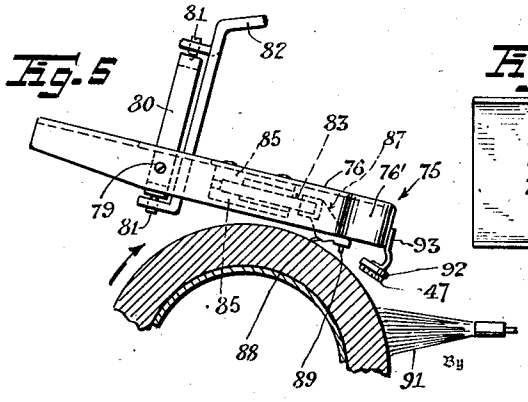
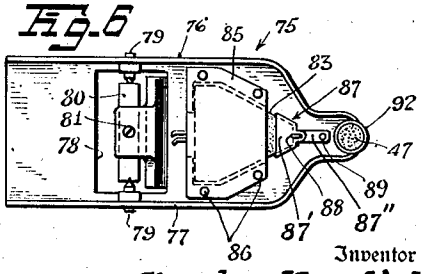


Fig. 6



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UNITED STATES PATENT OFFICE

2,373,960

PHONOGRAPH

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Application August 12, 1942, Serial No. 454,507

5 Claims. (Cl. 274—47)

This invention is concerned with the elimination of noises and other defects in the operation of phonographs such as arise from the presence of loose particles and dust on the surface of phonograph records, and is more especially an improvement on the invention disclosed and claimed in the pending Hornor application, Serial No. 389,268, filed April 19, 1941, now Patent No. 2,300,923 granted November 3, 1942, and entitled "Phonographs."

In phonographic recording machines which operate by the cutting process, there has been a long-standing problem in finding a simple way of removing the record particles, chips or strings which are cut from the record body, it being quite essential that these be removed before the recorded matter is reproduced, and even preferably during the recording operation, in order that they may not be a source of noise in the reproduction and be smeared over the record surface to mar permanently the recordation. It has been customary in the dictating machine art to remove the record particles, and such dust or dirt as may collect on the record surface, by sweeping the record surface with a fine brush made as of camel's hair. This method has been only partially effective however because the particles become statically charged by the rubbing contact of the brush and of the recording stylus with the record and by this charging are held attracted to the record body. In the pending Hornor application abovementioned there has been taught a way to annul the electrification of the record and to greatly improve the cleaning action of the brush, which comprises simply providing a small body or pellet of mildly radioactive material in the vicinity of the brush. I have found though that by specially mounting the radioactive pellet in the phonograph the effectiveness of the pellet on the cleaning action of the brush can be materially increased and that special practical advantages accrue.

It has for instance been found that the effectiveness of the radioactive pellet increases sharply as it is brought closer to the record surface and that for maximum effectiveness the spacing of the pellet from the record is critical. To this end my invention has in view a mounting of the pellet on a member that is maintained in fixed relation to the record surface during the operation of the machine, preferably on a suitable part of the translating unit itself. As so arranged, the pellet is especially rendered very much more effective in dictating machines which use wax records or cylinders that are shaved off again and again to be conditioned for reuse. Also, it is a feature of my invention to mount the radioactive pellet permanently to a relatively large-sized part of the machine so as to guard against independent handling and carrying of the pellets by service men in the field; by this expedient I effectively circumvent certain psychological objections that might be raised against the present particular use of a radioactive material in a phonographic machine.

My invention accordingly has for its object to provide improved mounting arrangements for radioactive pellets used in phonographs for improving the cleaning action of record brushes, which are adapted to render the pellets more effective and practical to use.

Other and allied objects and features of my invention will more fully appear from the following description and the appended claims.

In the description of my invention reference is had to the accompanying drawing, of which:

Figure 1 is a fractional side elevational view, with parts in section, of a conventional dictating machine of the acoustical type into which my invention is incorporated;

Figure 2 is a bottom view of the translating unit shown in Figure 1;

Figure 3 is a principally vertical sectional view of a modified form of acoustical translating unit to which my invention has been applied;

Figure 4 is a bottom view of part of the structure of Figure 3;

Figure 5 is a fractional view showing the application of my invention to a phonographic translating unit of the electrical type; and

Figure 6 is a bottom view of the translating unit shown in Figure 5.

Reference being had to Figures 1 and 2, there will be seen part of a conventional dictating machine comprising a record 10—for example, a cylindrical record made of wax-like material—which is carried by a rotatably mounted mandrel 11. Above the record is a carriage 13 mounted slidably on cross rods 14 and 15 for traveling movement along the record, the traveling movement being effected by a feed screw 16 and a cooperating feed nut 17 which is pivotally held to the carriage at 18. The carriage has a forward arm 19 provided with a central mounting hole 20 in which is held an acoustical type of translating unit 21 adapted for recording and reproducing.

This translating unit has a circular frame member 22 provided with a depending annular flange 23 and with a central upstanding tubular neck 24. Below the frame member there is a flat

cylindrical casing or sound box 25 which has a diaphragm 26 enclosing the bottom thereof. This sound box is pivotally held to a depending lug of the flange 23 by a cross pin 28 in this lug and a pair of spring arms 29 on the sound box which engage cones 28' provided on the ends of the cross pin. Sound communication to and from the sound box is had through the tubular neck 24 and a short coupling tube 30 which has a spherical flange 30' at the bottom fitting an apertured dome 25' of the sound box and has a flange 30'' at the top slidably engaging the interior surface of the neck 24, the coupling tube being retained to the sound box in any suitable way not herein necessary to show.

Mounted onto the diaphragm 26 is a depending stirrup 31 which carries a recorder stylus 32. In recording, the stylus 32 is maintained in coaction with the record by the weight of the sound box and its associated parts. As the sound box is raised and lowered into and out of coaction with the record, the coupling tube 30 pivots on the dome 25' and slides within the neck 24 to maintain sound communication of the sound box with a conventional speaking tube (not shown) which couples to the neck 24.

The mechanism for adapting the translating unit for reproducing comprises a disk-shaped weight 33 below the sound box which is pivotally held by a screw 34 to a short arm 35 that is pivoted on the cross pin 28 abovementioned, the pivotal connection of the weight to the arm affording the weight with a lateral freedom of movement and of the arm to the cross pin affording the weight with an up-and-down freedom of movement. This weight has a central aperture 36 and a slit 36' extending forwardly therefrom within which there is disposed a short lever 37 that is pivotally held to the weight by a cross pin 38. The rearward end of this lever terminates within the stirrup 31, and the forward end carries a reproducer stylus 39. In conditioning the translating unit for reproducing the sound box is held raised in relation to the record and the weight is supported between the sound box and the record in a floating state through the medium of the lever 37, the downward force of the weight on the lever serving to maintain the reproducer stylus in engagement with the record and also the lever in contact with the stirrup 31. During recording, the weight is supported on the record through the medium of an advance ball 40.

It is accordingly seen that both the sound box and reproducer biasing weight are released for sliding engagement with the record during recording, that only the sound box is held fixed in a raised position for reproducing, and that both the sound box and weight are held raised to place the unit in inoperative condition. For so controlling the sound box and weight there is provided a pair of lifting fingers 41 and 42 for the sound box and biasing weight respectively. These lifting fingers are controlled manually by any suitable mechanism not herein necessary to show, as such mechanisms are well known, a typical one being for example shown and described in Somers Patent No. 2,245,164 dated June 10, 1941, and entitled "Phonograph."

Mounted on the carriage 13 in the direction of rotation of the record from the translating unit is a brush 46 made of fine soft strands as for example of the hair of a camel or pony. This brush has the function of sweeping the record surface to clean it of dust or dirt and of record particles which are cut from the record body by the translating unit during recording. As aforementioned, however, the rubbing contact of the brush and of the cutting stylus with the record causes the particles to become electrified and to be attracted to the record body, with the result that the cleaning action of the brush is very much impaired. It has been found though, as is described in the abovementioned Hornor application, that this electrification of the particles on the record body may be neutralized and the cleaning action of the brush may be greatly improved by exposing the record surface to an ionizing medium such, for example, as to a radioactive pellet 47 made of radium chloride.

I have found that the neutralizing action of the radioactive pellet is very much improved when it is maintain especially close to the record surface, and in the vicinity preferably of both the brush and the point of stylus contact of the translating unit with the record. My invention accordingly contemplates mounting the pellet 47 on a member which is moved in conformity with variations in the level of the record surface traversed by the translating unit, preferably on a part of the translating unit itself fulfilling this condition, at a position between the brush and point of stylus contact with the record. In the present instance the reproducer stylus biasing weight constitutes an appropriate member for carrying the pellet 47. Preferably I secure the pellet to this weight by providing the weight with a well 48 and then permanently mounting the pellet within the well. In so mounting the pellet, it is maintained close to the record during recording, within a short predetermined distance therefrom, irrespective of the diameter of the record, and a maximum effectiveness of the pellet is preserved even though cylindrical records of different diameters are used in the machines such as is the case with dictating machines that use cylindrical wax records that are shaved again and again for conditioning for reuse.

From a practical standpoint there is another important aspect to my invention. While the radioactive pellets used in my invention are not sufficiently active to present any physical hazard to those who would handle them in the assembling or servicing of the machines, yet there have grown up certain phychological objections to any practice or work wherein a radioactive material is handled, particularly against any practice wherein a number of the pellets might accidentally be carried close to the body over periods of time. To guard against such a practice or inadvertence my invention contemplates permanently mounting the radioactive bodies to a part of the machine having such size that it will not ordinarily be put in one's pocket and be there forgotten and carried for any long period of time. Accordingly I fixedly mount the pellet to the biasing weight in any suitable way which will prevent it from being removed from the biasing weight.

In Figures 3 and 4 there is shown a modified form of translating unit 50, again of the acoustical type, to which my invention has been applied. This translating unit comprises a hollow cylindrical housing member 51 held by screws 52 to a carriage 53 fractionally shown. This housing member has a tubular neck 54 for conducting sound to and from the translating unit, the neck being adapted for coupling to a speaking tube not shown. Within the housing member there is a tube 55 which slidably engages the tube 54 at one end and which has a flanged part 56 at the other end that slidably engages the interior surface of

the housing member. Secured to this flanged part by horizontally-aligned pivots 57 is a gimbal ring 58, and pivoted to the gimbal ring by substantially vertically-aligned pivots 59 is a ball-shaped end portion 60 of a sound tube 61. This sound tube terminates into a sound box 62 having a diaphragm 63 at the bottom thereof carrying recorder and reproducer styli 64 and 65 for coaction with the cylindrical record 10.

In the structure just described the pivots 57 afford the sound box with an up-and-down freedom of movement and the pivots 59 afford a lateral freedom of movement. In movements of the sound box relative to the carriage 53, sound communication of the box to the neck 54 is maintained by the engagement of the ball-shaped end portion 60 of the sound tube 61 with a spherical seat 66 provided at the inner end of the coupling tube 55. Shifting the translating unit into recording and reproducing adjustments is effected by sliding the sound tube 55 and the sound box assembly in the housing member to bring either the recorder or reproducer stylus into engagement with the record. To prevent the styli from being slid on the record surface when the translating unit is adjusted between recording and reproducing conditions, there is provided a cam arrangement to lift the sound box from the record as it is moved from one adjusted position to the other, this cam arrangement comprising a lug 67 on the housing member and a cooperating cam 68 on the sound tube 61 as is shown in Figure 3.

A record brush 69 is spaced in the direction of rotation of the record from the translating unit 50—preferably substantially circumferentially in relation to the record from the styli 64 and 65. Between the brush and these styli there is mounted the radioactive pellet 47. This pellet has a permanent setting 70 which is secured permanently to a bracket 71 as by welding and the bracket in turn likewise permanently secured to the rim of the sound box. As so mounted, the pellet is advantageously placed close to both the styli of the translating unit and to the record brush, in line therewith circumferentially of the record 10. Also, the pellet is moved in conformity with variations in the level of the record surface both during recording and reproducing and is again made a permanent part of the translating unit as in the case of my embodiment above described.

In Figures 5 and 6 there is shown an electrical type of recording and reproducing unit 75 to which my invention is applied. This translating unit—which is the type shown and described in detail in Di Toro Patent No. 2,246,296 issued June 17, 1941, and to which reference may be had for a detailed description thereof—comprises a generally rectangular frame 76 having a converging portion 76' at one end and a depending flange 77 at its rim. In the top of the frame there is a central opening 78. The frame is held by horizontally aligned pivots 79 to a member 80 which extends down through this opening, and the member 80 is in turn held by substantially vertically aligned pivots 81 to a carriage member 82, the frame being thus mounted to have both vertical and lateral freedom of movement. Mounted within the converging end portion of the frame 76 is a piezo-electric bending unit 83 of the so-called bi-morph type. This bending unit is held in cantilever fashion between a pair of mounting plates 85 which in turn are secured by screws or pins 86 to the bottom side of the frame 76. Secured to the free end of the bending unit is a stylus holder 87 comprising, for example, a rigid body portion 87' supporting a recording stylus 88 and a projecting resilient portion 87'' supporting a reproducing stylus 89. Adjusting the translating unit for recording and reproducing is had by moving it to bring the recording and reproducing styli selectively into engagement with the record, the means for so adjusting the unit being however not herein necessary to show.

Spaced a small distance in the direction of rotation of the record from the styli of the translating unit is a record brush 91 adapted for sweeping record particles and dust or dirt from the surface of the record body. Between the styli and the brush 91 there is mounted on the frame 76 the radioactive pellet 47. As in the embodiments above described, this pellet is preferably secured fixedly to the translating unit by providing it with a permanent setting 92 and securing this setting to the converging end portion of the frame 76 as by a bracket 93 which is permanently secured as by welding or soldering to the setting and to the frame 76. As so mounted, the pellet is advantageously located between the brush and the styli of the translating unit and is maintained in predetermined relation to the surface of the record body for maximum effectiveness in neutralizing the static charges acquired by the record and the particles thereon. Also, the pellet is made a permanent part of the translating unit to prevent possible mishandling thereof as is above noted.

The different embodiments of my invention herein shown and described are illustrative of the different aspects of my invention and are not to be construed as limitative thereof, as these embodiments are subject to many changes and modifications without departure from the scope of my invention, which I undertake to express according to the following claims.

I claim:

1. In a phonograph including a frame, a support for a record, and a brush held in moving contact with the record to sweep loose particles from the surface thereof: the combination of an ionizing means for neutralizing electrostatic charges on the record to facilitate the cleaning action of said brush; and means movably connected to said frame and in moving contact with the surface of the record for supporting said ionizing means at a predetermined spacing from the traversed surface of the record.

2. In a phonograph including a frame, a support for a record, and a brush held in moving contact with the record to sweep loose particles from the surface thereof: the combination of an ionizing means for neutralizing electrostatic charges on the record to facilitate the cleaning action of said brush; and a support member for said ionizing means movably connected to said frame and controlled by the record to move said ionizing means in conformity with variations in the level of the traversed surface of the record.

3. In a phonograph including a record and a record-cooperating translating device: the combination of a brush held in moving contact with the record to sweep the record surface free of loose particles; a radioactive body for neutralizing electric charges on the record to improve the cleaning action of said brush; a movable mounting for said radioactive body, said mounting having a freedom of movement in directions toward and away from the record and adapted to locate said body in proximity with the place of

coaction of said translating device with the record; and means controlling said mounting to maintain said body at a substantially fixed distance from the surface of the moving record.

4. In a phonograph including a record and a brush held in moving contact therewith to sweep loose particles from the surface thereof: the combination of a translating unit including a part slidably coacting with the surface of the record and moved in conformity with variations in the level thereof; and a radioactive material mounted on said part and effective to neutralize electrostatic charges on the record produced by the moving contact of said brush and said part of the translating unit with the record.

5. In a phonograph including a record and a brush for sweeping the surface of the record free of loose particles: the combination of a translating unit including a member slidably held by the record in predetermined relation to the surface of the record; and a radioactive body effective on the record at said brush and mounted permanently to said member.

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