March 23, 1943. A. CORTELLA 2,314,345

PHONOGRAPH DEVICE

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Fig. 1.

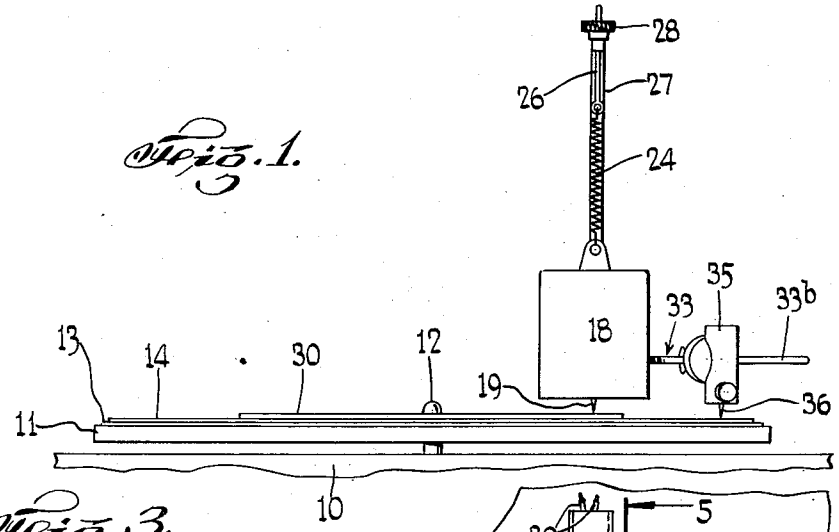


Fig. 3.

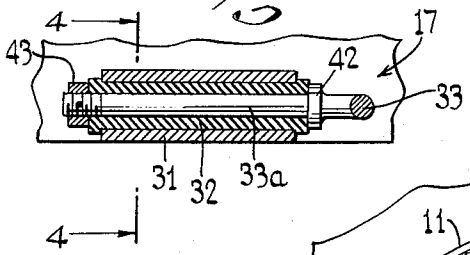
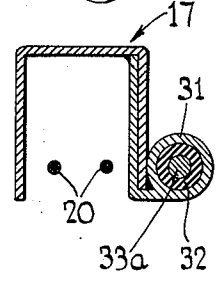


Fig. 4.



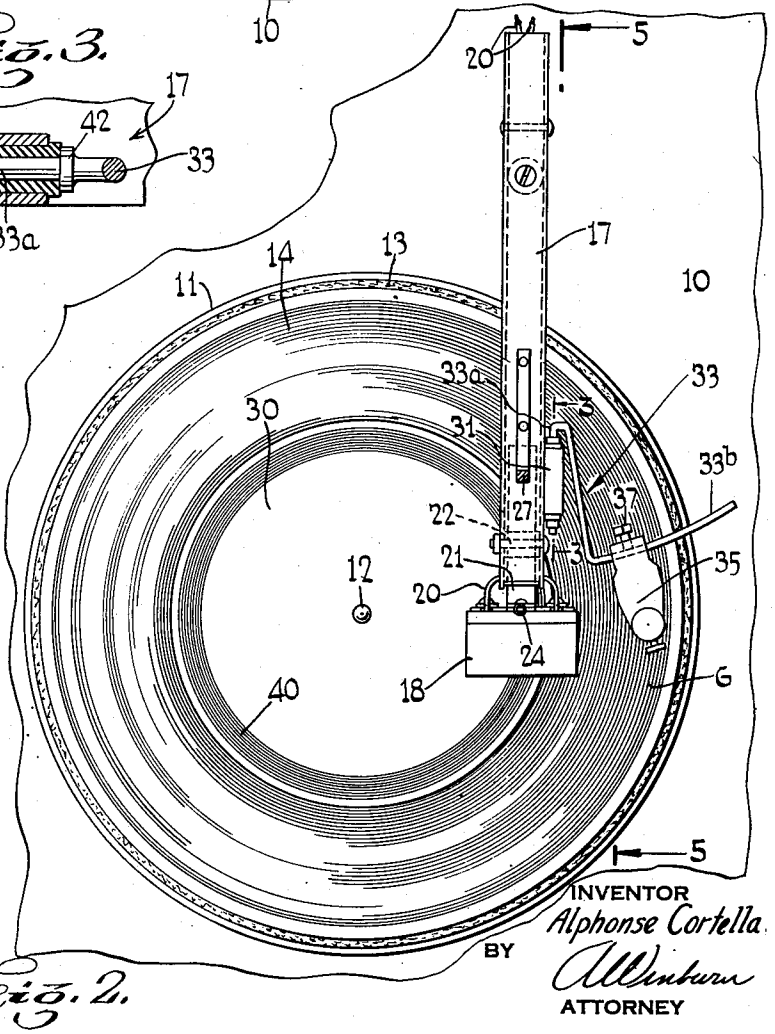


Fig. 2.

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Fig. 5.

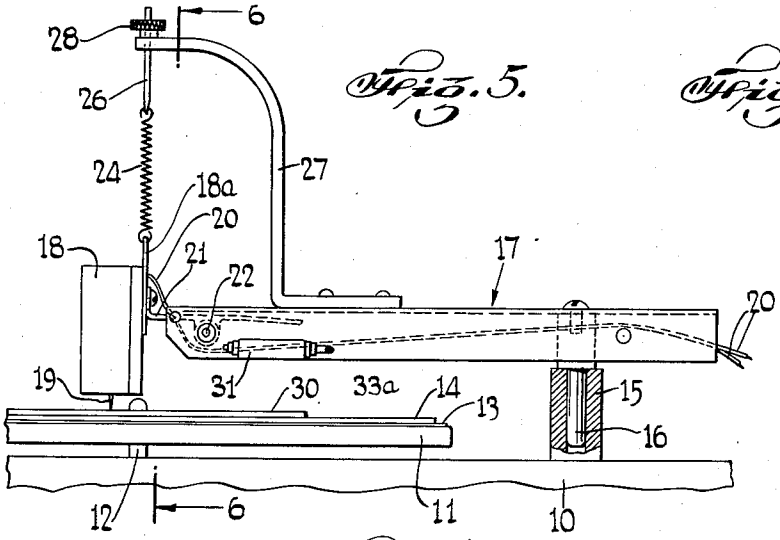


Fig. 6.

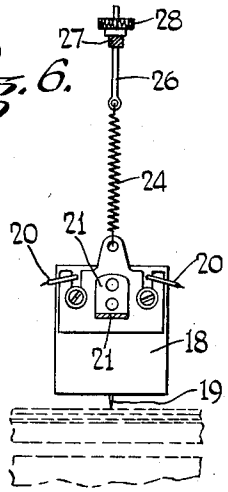


Fig. 7.

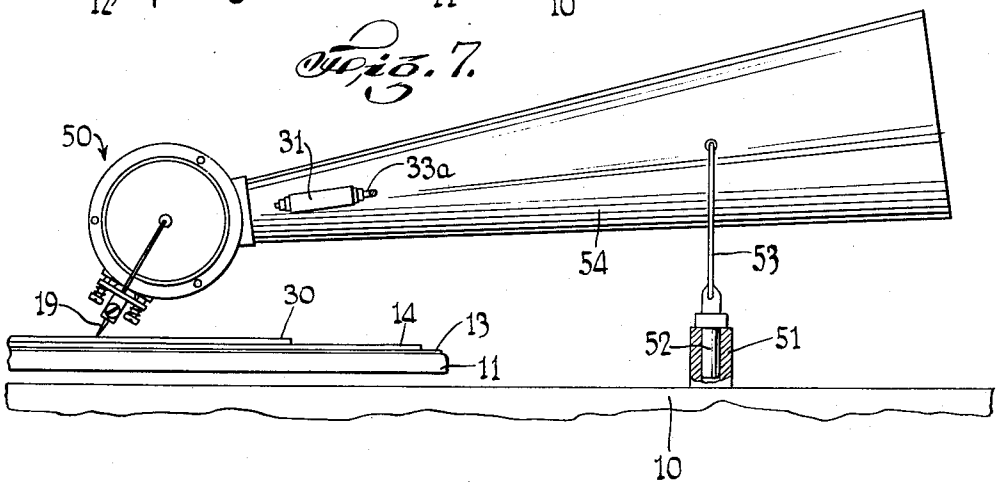
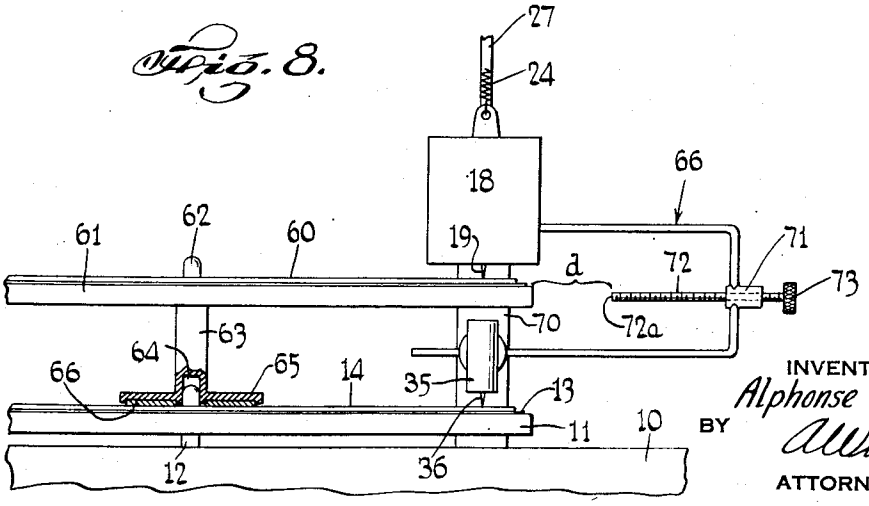


Fig. 8.



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Fig. 9.

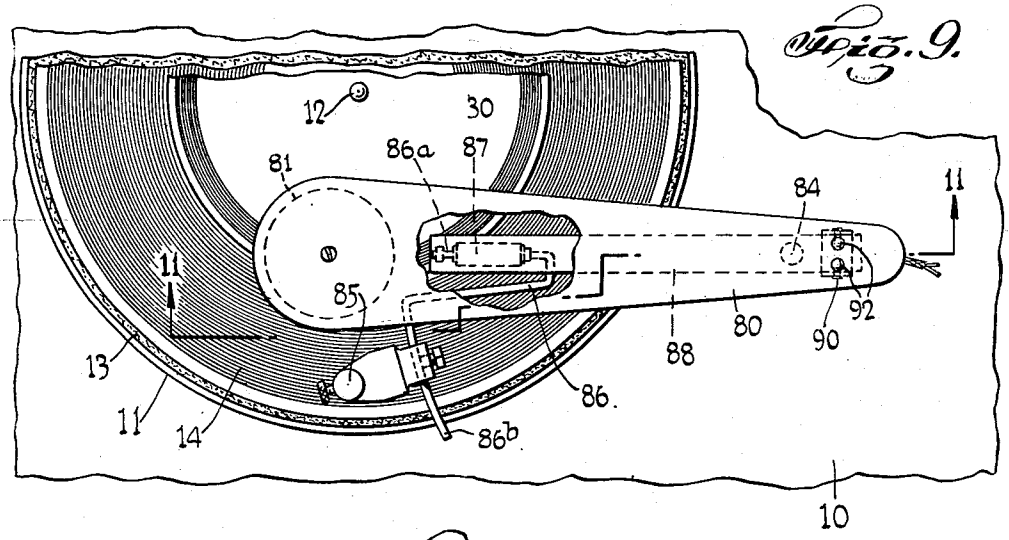


Fig. 10.

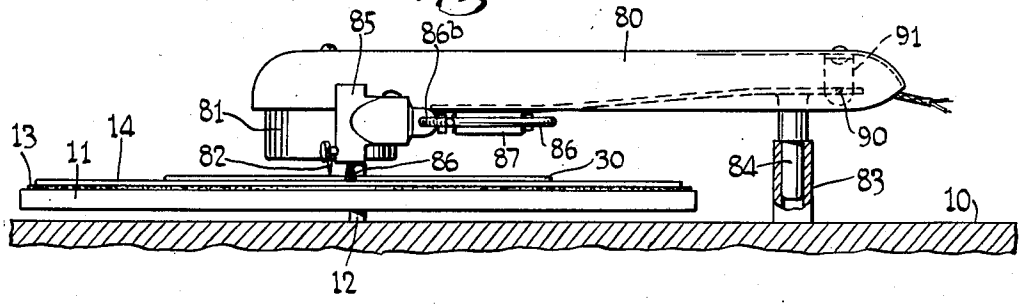


Fig. 11.

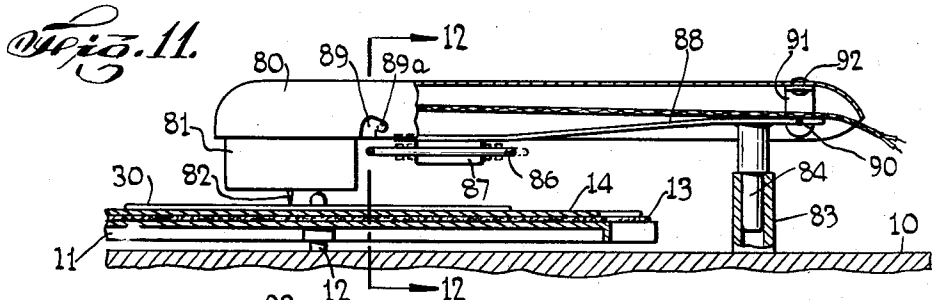
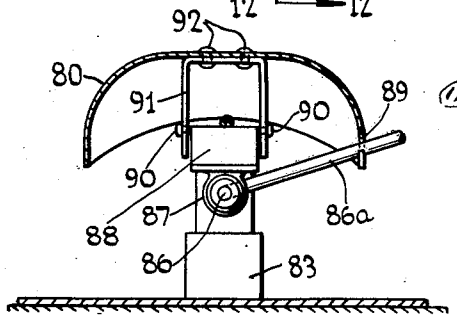


Fig. 12.



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Patented Mar. 23, 1943 2,314,345

UNITED STATES PATENT OFFICE

2,314,345

PHONOGRAPH DEVICE

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Application November 14, 1940, Serial No. 365,682

6 Claims. (Cl. 274—13)

This invention relates to phonographic devices. More particularly my invention relates to an improved phonograph recording and reproducing unit adapted for home use.

One of the objects of my invention is to provide an improved phonograph recording and reproducing unit of the class described, which is so designed as to utilize any standard type of sound record or pregrooved disc as a tracking guide for recording on a new disc.

Another object of my invention is to provide an improved phonograph recording and reproducing unit of the class described which shall comprise relatively few parts, which shall be characterized by its ease of assembly and simplicity of operation and which shall at the same time possess a high degree of efficiency and practicability.

Further objects of my invention will become apparent in the following detailed description thereof.

In the accompanying drawings,

Fig. 1 is a front elevational view of a portion of a phonograph recording and reproducing device constructed in accordance with my invention;

Fig. 2 is a top plan view thereof;

Fig. 3 is an enlarged cross-sectional view taken substantially on the line 3—3 of Fig. 2;

Fig. 4 is a cross-sectional view taken substantially on the line 4—4 of Fig. 3;

Fig. 5 is a cross-sectional view taken substantially on the line 5—5 of Fig. 2;

Fig. 6 is a cross-sectional view taken substantially on the line 6—6 of Fig. 5;

Fig. 7 is a side elevational view, partly in section, similar to Fig. 5, but illustrating my invention as applied to a different type of reproducing and recording unit;

Fig. 8 is a front elevational view, partly in section, of a portion of a phonograph recording and reproducing device similar to Fig. 1, but illustrating a modified form of my invention.

Fig. 9 is a top plan view of a portion of a phonograph device similar to Fig. 1, but illustrating still another modified form of my invention;

Fig. 10 is a side elevational view thereof with certain parts in cross-section;

Fig. 11 is a cross-sectional view taken substantially on the line 11—11 of Fig. 9; and

Fig. 12 is an enlarged cross-sectional view taken substantially on the line 12—12 of Fig. 11.

Referring now in detail to the drawings and more particularly to Fig. 1 through 6 I have illustrated a portion of a phonograph cabinet 10 housing the usual standard phonograph driving mechanism and comprising the turn table 11 fixed to the usual vertical shaft 12 for rotation thereof. The turn table 11 may be covered with the customary layer of felt 13 to protectively receive and grip a previously recorded or pregrooved disc 14 of any suitable standard make. Fixed to the cabinet 10 is a bearing member 15 rotatably receiving therein a pivot shaft 16 which in turn is fixed to a standard type of tone arm 17 designed for the electrical type of reproduction or recording, well known to the art.

In accordance with my invention I have attached to the tone arm 17 a recorder unit 18 of any standard well known construction and having a cutting needle 19 of the type well known in the art. The unit 18 is of the type adapted for electrical recording by means of a suitable microphone or similar device (not shown) connected to said unit 18 by the wires 20 passing through the hollow tone arm 17. The recorder unit 18 is pivotally attached to the tone arm 17 by means of a bracket 21 fixed at one end to the said unit 18 and at the other end to a pivot 22 journaled in the tone arm 17. The unit 18 is of such weight as to provide sufficient cutting force to the needle 19 to plough a furrow in the surface of a suitable recording disc of any well known construction in accordance with the sound to be recorded in the well known manner.

To regulate the pressure force of the needle 19 on the record to be made, there is provided a spring 24 fixed at one end to an extension 18a of the unit 18 and at the other end to a screw-threaded member 26, the latter being supported in a bracket arm 27 fixed to the tone arm 17, as shown. A knurled portion 28 on the member 26 is provided to facilitate the adjustment of the tension on the spring 24 to relieve or increase the pressure force of the weight of the unit 18 acting on the cutting needle 19.

In accordance with my invention I have provided the following mechanism by means of which a recording may be made on a suitable blank recording disc, utilizing any standard type of record available in the average home as a tracking guide, to cut the spiral groove on the said blank disc.

As shown in Figs. 1 through 6 the tracking disc 14 may be a standard record having any recording thereon. The said record 14 is preferably of the larger diameter type. Overlying the record 14 I place a blank recording disc of smaller diameter than the tracking record, such

as, for example, the disc 30, so that the said recording disc 30 will rotate with the tracking record 14 on the turntable 11. Fixedly attached to the tone arm 17 for movement therewith by any suitable attaching means, such as welding, is a bearing member 31. The said member 31 is lined with a soft rubber bushing 32 in which is received, for axial rotation, a shaft portion 33*a* of the bracket arm 33. The bracket arm 33 is provided with an outwardly extending portion 33*b* disposed transversely of the direction of movement of the spiral groove on the record 14.

Mounted on the arm portion 33*b* for sliding movement along the axis of said portion 33*b* is a needle-holding gravity member 35 designed to removably hold therein a phonograph needle 36 of the usual type. The member 35 is free to rotate about the arm portion 33*b*, as an axis. A set screw 37 is provided so that after the member 35 is slidably positioned at any desired point along the arm 33*b*, it may be maintained in its position.

It is thus seen that the member 35 is so mounted that it may be rotated in two directions substantially at right angles to each other. In other words the needle carrying member 35 not only may rotate about the arm portion 33*b* as an axis, but the arm 33 may in turn rotate in the bushing 32 in a direction about the axis of the shaft portion 33*a*.

When it is desired to make a recording on the disc 30, the cutting needle 19 is positioned adjacent the peripheral edge of the said disc 30, after which the member 35 may be adjustably moved to a position along the arm portion 33*b* where the tracking needle 36 will be disposed substantially at the beginning of the spiral groove G on the tracking record 14. If when in such relative positions of the needles 19 and 36, the turntable 11 is set in rotation, and the sound which it is desired to be recorded is effectively being produced and transmitted electrically through the wires 20 and into the unit 18, the cutting needle 19 in ploughing a groove 40 in the disc 30 will follow the spiral formation of the tracking record 14, due to the construction and mounting of the tracker member 35 as above described.

It is noted that when the tracking record 14 is of the twelve inch diameter type and the recording disc 30 is six inches in diameter, there will be a margin of three inches between the outer edges of the disc 30 and record 14.

This will allow for a maximum recording surface on the disc 30 of approximately three inches across the record. If it is desired to make an additional recording on the disc 30 after the said three inches have been recorded, the tracker member 35 may be slidably moved further along the arm portion 33*b* and the tracking needle 36 again positioned at the beginning of the spiral groove G on the tracking record 14.

If on the other hand a ten inch recording disc 30 is employed with a twelve inch tracking record 14 only approximately one inch of recording may be made at a time on the said disc 30, after which the member 35 may be adjustably moved outwardly on the arm portion 33*b* to allow further movement of the cutting needle 19.

The arm portion 33*a* may be maintained within the bearing 31 by providing a shoulder 42 on the said arm portion 33*a* abutting one edge of the bushing 32 and a nut 43 threadedly received on the free end of the said portion 33*a*. When the nut 43 is tightened it will compress the soft rubber bushing 32 to cause slight bulging at opposite ends, as shown in Fig. 3 of the drawings, to thus hold the shaft portion 33*a* as well as the soft bushing 32 within the bearing 31.

It is noted that the soft rubber bushing 32 is designed to prevent any vibration, which may be picked up by the member 35 from the tracking record 14, from being transmitted to the recorder unit 18 and the cutting needle 19.

In Fig. 7 I have illustrated the manner in which my invention may be satisfactorily employed in connection with a mechanical type of recording and reproducing unit instead of the electrical type described in the Figs. 1 through 6 form of my invention.

In Fig. 7, it is noted that I have illustrated a mechanical type recorder 50 instead of the unit 18, attached to a hollow horn type of tone arm 54. The said tone arm 54 is supported by a ball member 53 attached to a pivot shaft 52 which in turn is received in a bearing member 51 fixed to the phonograph cabinet 10.

The operation of the Figure 7 form of my invention is the same as that described in connection with the Figs. 1 through 6 form, except that the sound to be recorded on the disc 30 travels through the horn 54 to the unit 50 instead of being electrically transmitted.

In Fig. 8 I have illustrated a modified form of my invention in which it is shown how any selected size tracking record may be employed to record on any desired size recording disc. In this form of my invention I employ the same type of turntable 11 covered with felt 13 and on which is placed the tracking record 14, in this instance of the twelve inch type. However, I employ a recording disc 60, which may be of any desired size, but which for the purposes of illustration, I have shown to be of the same diameter as the tracking record 14. This recording disc 60 I mount on a second turntable 61, which in turn is fixed to a shaft 62 for rotation therewith and forming a part of a spacer bushing member 63 having an opening 64 at the lower end thereof for receiving the portion of the shaft 12 therein, which projects above the record 14. The member 63 is also provided with an outwardly extending flange 65 slightly recessed on the underside thereof for receiving a resilient washer 66 to frictionally cause simultaneous rotational movement of both turntables 11 and 61, so that the record 14 and disc 60 will be simultaneously rotated at uniform speed. The height of the member 63 is such as to space the turntable 61 from the turntable 11 a sufficient distance to permit the free lateral movement of the tracker-needle carrier 35 therebetween.

In this form of my invention I employ the same bearing member 31 on the tone arm 17 for supporting a bracket arm 67, similar in function to that of the bracket arm 33, but of slightly different shape as shown, to provide for the difference in levels of the disc 60 and record 14.

It is noted that in the Fig. 8 form of my invention when the recording disc is substantially of the same or smaller size than the tracking record, a complete recording may be made on the recording disc without the necessity of readjusting the position of the member 35 as hereinbefore described in connection with the Figs. 1 through 6 form of my invention.

To compensate for the difference in levels between the cabinet 10 and the turn table 61, I provide a bearing member 70 similar in func-

tion and design to that of the member 15 but extending higher, to receive therein the pivot shaft 15.

In connection with the Fig. 8 form of my invention I have also illustrated the following means for gauging the amount of recording desired and for automatically stopping the further recording at such predetermined point.

On the arm 66 I provide a bearing member 71 having an internally threaded opening for receiving therein an elongated screw member 72. The member 71 is so disposed that the screw 72 will be in abutting alignment with the rim of the turn table 61, as shown. A knurled head 73 is provided to facilitate the rotation of the screw 72 to alter the distance *d* between the rim of the turn table 61 and the screw 72.

It is thus seen from the above described construction that when the screw 72 has been adjustably positioned as shown in Fig. 8, the end 72*a* of the screw 72 will abut the rim of the turn table 61 when the needles 19 and 36 will have moved a lateral distance equal to *d*, at which time the said needles will be prevented from further lateral movement.

In Figs. 9 through 12, I have shown still another modified form of my invention in which the weighted tracking member is so mounted that it may be relatively moved with respect to the tone arm. In this way vibrations picked up by the tracking member from the grooved tracking disc will be prevented from affecting the cutting needle.

In this latter form of my invention I utilize the same phonograph cabinet 10 and vertical shaft 12 to which is fixed the turn table 11. The same covering of felt 13 is provided over the turn table 11 for receiving the tracking disc 14. Overlying the said tracking disc 14 is the record disc 30. Instead of the tone arm 17 employed in the Figs. 1 to 6 form of my invention, I may use a tone arm 80 which is of hollow shell-like construction (see Fig. 12) and which carries at one end thereof a standard type of recording unit 81 carrying a cutting needle 82 of the same construction and function as the needle 19. The opposite end of the tone arm 80 from that of the unit 81 is pivotally supported in a bearing member 83 which receives the pivot 84, in the following manner. The said pivot 84 is attached to an inverted U-shaped bracket 91 by means of a rigid strip 88 which in turn is fixedly attached to the pivots 90 and 84 in the customary manner, known to the art. The bracket 91 is fixed to the tone arm 80 by the rivets 92.

By the above described construction it is seen that when the tone arm 80 moves laterally across the disc 30 it is free to rotate about the vertical axis of the pivot 84 while at the same time the said tone arm 80 may be rotated about the axis of the pivot 90 to withdraw the needle 82 out of contact with the disc 30 in a direction at right angles to the direction of rotation about the pivot 84. In accordance with the Figs. 9 through 12 form of my invention, instead of mounting the bearing member 31 directly on the tone arm 17, I employ the following construction: A bearing member 87 similar in function and design to that of the bearing member 31 is mounted on an extended portion of the rigid longitudinal strip 88. As above described the said strip 88 is mounted on the pivot shaft 90 for rotation therewith and at the same time is fixed to the pivot 84 for movement therewith. Therefore the bearing member 87 may rotate about the pivot 90 relatively to the tone arm 80. Mounted in the bearing member 87 is a bracket arm 86 similar to the bracket arm 33 comprising a portion 86*b* on which there is slidably mounted the weighted tracking member 85. Mounted on the tracking member 85 is a guide member 86 designed to ride in the spiral groove of the tracking disc 14. The said member 86 may take the form of an ordinary phonograph needle such as the needle 19 or it may consist of a piece of felt or a metallic brush member as shown in Fig. 10.

In the side wall of the hollow tone arm 80 there is provided a notch 89 having an indented portion 89*a*. This notch 89 is designed for the purpose of receiving the portion 86*b* of the bracket arm 86 when the tracking member 85 is not in effective use. When the desired amount of recording has been made, it is merely necessary to raise the bracket arm portion 86 into the notch 89 and then to move the same slightly rearwardly and downwardly into the portion 89*a* to retain the tracking member 85 out of contact with the disc 14. In order to permit the above described slight rearward movement of the arm 86, the portion 86*a* thereof in the bearing 87 is made slightly longer than the bracket 87 to permit of such movement.

While in the drawings I have shown a type of recording unit which may be removably attached to the tone arm so that after the recording has been completed it may be replaced by a reproducing unit so that the sound on the recorded disc may be reproduced with the same tone arm. However, it is understood that instead of having a removable recording unit, my invention may also be satisfactorily practised by providing a separate recording unit and a separate reproducing unit, each unit having its own tone arm and each being permanently mounted in the phonograph cabinet for selective use.

In accordance with the provisions of the patent statutes, I have herein described the principle and operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the apparatus shown is only illustrative and that the invention can be carried out by other means. Also, while it is designed to use the various features and elements in the combination and relations described, some of these may be altered and others omitted without interfering with the more general results outlined, and the invention extends to such use.

Having described my invention, I claim as new and desire to secure by Letters Patent:

1. In a phonograph device of the class described the combination of a first turn table, a pre-grooved disc on said first turn table, a second turn table, a recording disc on said second turn table, means for causing simultaneous rotation of said first and second turn tables, a tone arm, a recording unit attached to said tone arm and having a cutting needle adapted to plough a groove in said recording disc in accordance with the sound to be recorded, a tracker member, a guide member carried by said tracker member and adapted to ride in the spiral groove of said pre-grooved disc, and means for interconnecting said tracker member with said tone arm to cause said cutting needle to travel in a spiral path on said recording disc in conformity with the spiral groove on said pre-grooved disc, said last named means including a bracket arm adapted to extend transversely across the spiral groove of the

pregrooved element, said track member being additionally slidable on said bracket arm so that after a predetermined amount of recording the tracker member may be slidably moved on said bracket arm to a new point thereon to enable another predetermined amount of recording to be made on the recording element with the same portion of the pregrooved element as previously used.

2. In a phonograph device of the class described the combination according to claim 1 in which means are provided to limit the amount of spiral travel of said cutting needle.

3. In a phonograph device of the class described the combination of a first turn table adapted to receive a pre-grooved disc thereon, a second turn table adapted to receive a recording disc thereon, means for causing simultaneous rotation of said first and second turn tables, a tone arm, a recording unit attached to said tone arm and having a cutting needle adapted to plough a groove in said recording disc in accordance with the sound to be recorded, a tracker member, a guide member carried by said tracker member and adapted to ride in the spiral groove of said pre-grooved disc, and means for interconnecting said tracker member with said tone arm to cause said cutting needle to travel in a spiral path on said recording disc in conformity with the spiral groove on said pre-grooved disc, said last named means including a bracket arm adapted to extend transversely across the spiral groove of the pregrooved element, said tracker member being additionally slidable on said bracket arm so that after a predetermined amount of recording the tracker member may be slidably moved on said bracket arm to a new point thereon to enable another predetermined amount of recording to be made on the recording element with the same portion of the pregrooved element as previously used.

4. In a phonograph device of the type wherein a spirally pre-grooved element and a recording element are mounted for simultaneous rotation and in which a recording unit having a cutting needle is adapted to plow a groove in the recording element in accordance with the sound to be recorded and in which the said cutting needle is caused to travel in a spiral path in conformity with the pre-grooved element—that improvement which comprises a support for said recording unit, said support being mounted on a pivot, a tracking member adapted to ride in the spiral groove of said pre-grooved element, a holder for said tracking member and a bracket arm mounted on said recording unit support, said bracket arm comprising a portion rotatably mounted on said recording unit support, and an integral portion adapted to extend transversely across the spiral groove of the pre-grooved element, said last named transverse portion being arcuately curved with the axis of said pivot as the center of curvature thereof, said tracking member holder being rotatably mounted on said transverse portion of said bracket arm.

5. A phonograph device according to claim 4 in which said tracking member holder is additionally slidable on said transverse portion of said bracket arm so that after a predetermined amount of recording the tracking member may be slidably moved on said transverse portion of said bracket arm to a new point thereon to enable another predetermined amount of recording to be made on the recording element with the same portion of the pregrooved element as previously used.

6. A phonograph device according to claim 4 in which means are provided for preventing the vibrations of said tracking member from being transmitted to said cutting needle.

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