Oct. 28, 1941. C. W. NYSTROM 2,260,861

SOUND RECORDING AND REPRODUCING DEVICE

Filed Nov. 13, 1937 2 Sheets-Sheet 1

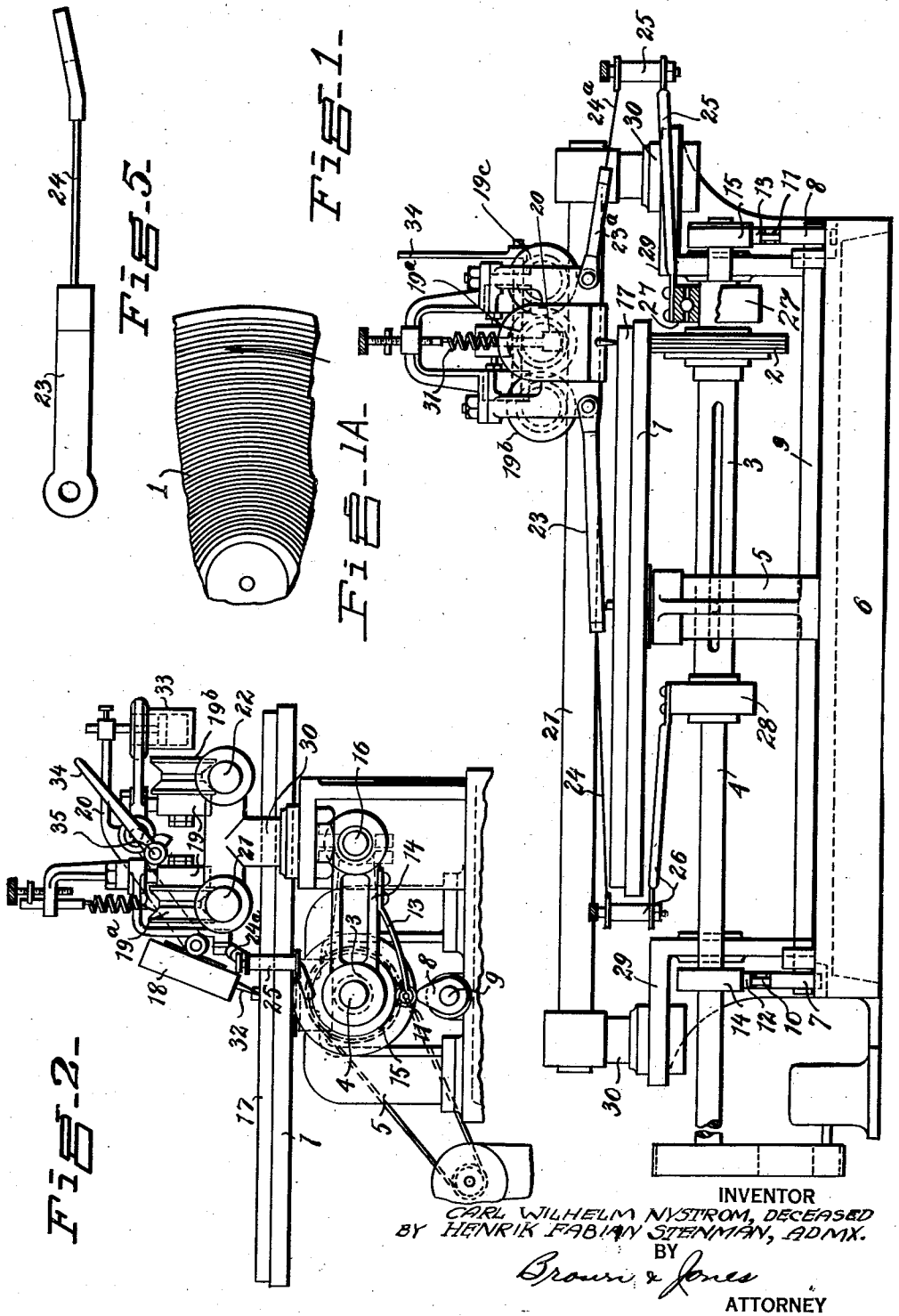


Fig. 1.

Fig. 1A.

Fig. 2.

Fig. 5.

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Fig. 3

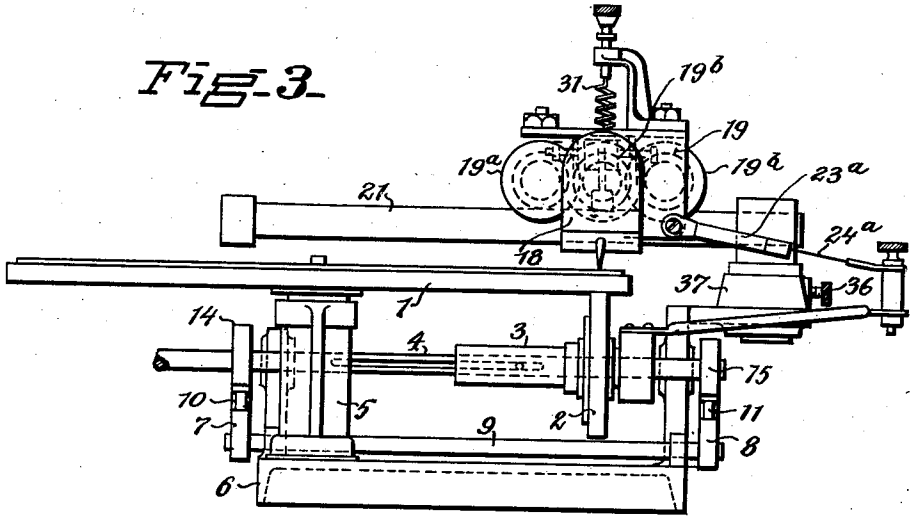
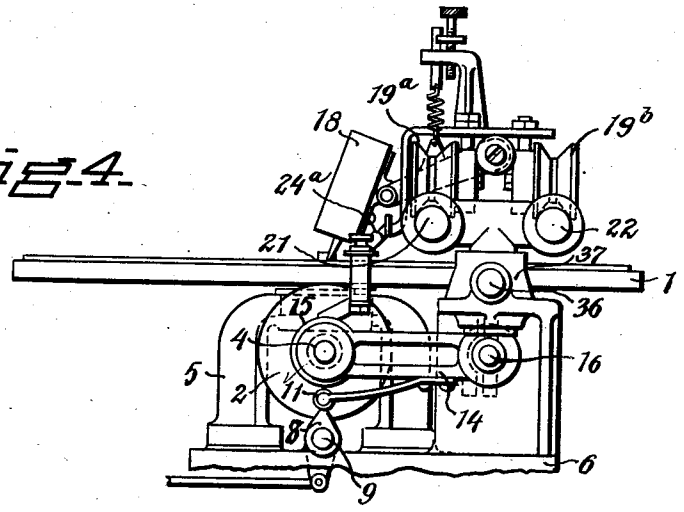


Fig. 4



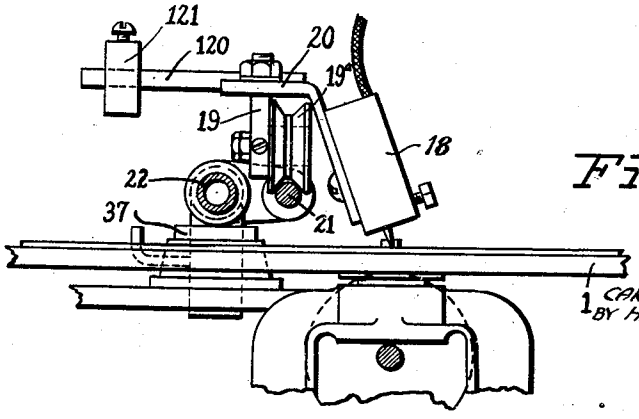


Fig. 6

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UNITED STATES PATENT OFFICE

2,260,861

SOUND RECORDING AND REPRODUCING DEVICE

Carl Wilhelm Nystrom, deceased, late of Karlstad, Sweden, by Henrik Fabian Stenman, administrator, Karlstad, Sweden

Application November 13, 1937, Serial No. 174,463
In Sweden July 6, 1937

2 Claims. (Cl. 274—13)

This invention relates to sound recording and/or sound reproducing apparatus, and more specifically to such apparatus of the turntable type.

In general, it is an object of the invention to provide a device of the character described, which will efficiently perform the purposes for which it is intended, which is simple and economical of construction, which can be expeditiously, conveniently and safely manipulated, and which can be readily manufactured and assembled.

Another object of the invention is to provide sound reproducing and/or recording apparatus wherein the stylus moves in a straight line; wherein the stylus-moving mechanism is adapted to absorb that part of the motion of the stylus which is partaken of by that mechanism or at least not to feed back any such motion or oscillation to the stylus; wherein the stylus-moving mechanism is operated directly from the record operating mechanism but through a resilient connection so that oscillations of the record operating mechanism are not transmitted to the stylus and its moving mechanism, or are at least diminished if transmitted; and wherein the stylus-moving mechanism, as it moves in a straight line, is directed by guides which are substantially one with the general chassis and base of the device.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts, which will be exemplified in the construction hereinafter set forth and the scope of the application of which will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

Figure 1 is a view in elevation of a device embodying one form of the invention;

Fig. 1*a* is a plan view of a portion of the lower surface of a turntable shown in Fig. 1;

Fig. 2 is an end view in elevation of the device shown in Fig. 1, as seen from the right-hand end;

Fig. 3 is a front view in elevation of a simplified form of the device shown in Fig. 1;

Fig. 4 is a view in elevation of the device shown in Fig. 3, as seen from the right-hand end;

Fig. 5 is a pair of views of an element of the device shown in Figs. 1–4; and

Fig. 6 is an end view in elevation, and partly in section, of a simplified form of the device shown in Fig. 1.

The present invention contemplates a device for reproducing sound. It is of the turntable type and the stylus which is in contact with the impression disc on the turntable is preferably moved at substantially constant, linear speed, at the point of contact, with respect to the disc. The moving element is the disc. With such a device, the disc does not have constant angular velocity. Such mechanism gives an improved use of the limited space provided by the disc. The space is used with greater efficiency than in the case of devices which are driven with constant angular velocity. The term "reproduction" herein is intended generically to include the reproduction of sound onto a record disc and the reproduction of sound as taken from the record disc.

Swedish Patent No. 78,929, issued to Carl Wilhelm Nystrom, April 2, 1931, describes a device wherein the record moves at constant linear velocity with respect to the stylus. This result is obtained by means of the coaction between a record-supporting turntable with a spiral groove and a friction wheel or similar device which fits into that groove and which, during the driving, is fed radially on a surface of the turntable. Specially recorded records are required for this type of device. Recording machines used for recording of ordinary records cannot be used as the new records must be driven at an almost constant linear speed at the point of recording. The principle of the driving arrangements, as shown in the Swedish Patent No. 78,929, can also be used with advantage in recording. However, certain difficulties arise here because it is of importance that the motion of the recording device perform uniformly and without disturbances or harmful vibrations. The special recording device is a part of the subject matter of the present invention.

Although the driving arragement in itself may be of any kind desirable as long as it produces satisfactorily the running of the recording disc with approximately constant linear speed at the point of recording, it is, as referred to above, well to use an arrangement in principle of the same type as the one described in Swedish Patent No. 78,929. As shown in the drawings, 1 is a turntable. It may, in accordance with that patent, be provided on its under side with a spiral groove

(see Fig. 1*a*). There is a rotatable driving wheel 2 for driving the turntable with which it is in contact. The wheel may, in accordance with said patent, be provided with a number of circular grooves which sit against the adjacent turns of the spiral groove. The driving wheel is fastened to a sleeve 3, which is connected to a rotatable shaft 4 in such a fashion that the sleeve and the wheel rotate with the shaft, the sleeve also being movable axially along the shaft. Motive means (not shown) may be connected to the shaft and a flywheel may be used in order to give the shaft a more smooth rotation.

The turntable 1 which carries the recording disc 17, made of wax or the like, is positioned with suitable bearings on the vertical axle 5, the other end of which rests on the base 6. In order that the driving connection between the turntable 1 and the driving wheel 2 may be disconnected and connected again when required, mechanism is provided for a relative motion between the turntable and the wheel. As shown in the drawings, this may comprise two cams 7 and 8 on a rotatable axle 9. They are in contact with respective rollers 10 and 11 which are fastened to springs 12 and 13 respectively. The latter are fixed to braces 14 and 15 which carry shaft 4 so that the latter is rotatable about another axle 16. The axle 16 is rotatably fixed to the main chassis which extends upward from the base 6. The shaft 9 may be rotated manually or otherwise by any suitable means so as to bring the rollers 10 and 11 into contact with shaft 4 or a ring thereon whereby the shaft 4 is pivoted about the axle 16 and the driving wheel 2 on shaft 4 is brought into contact with the turntable.

The recording device itself consists of a receptacle 18 having any desired mechanisms therein and a stylus 32 leading therefrom. The receptacle is carried by an arm 20 which is pivotally attached to a carriage or frame 19. This frame moves parallel with, and simultaneously with, the driving wheel as the latter moves radially. The cariage ist borne upon one or more, preferably two, parallel guide rails 21 and 22 by means of wheels 19*a*. 19*b* and 19*c*, two of the wheels riding on one of the rails and one on the other. The rails may have a circular cross-section. They are supported by two stationary blocks 29 and 30 which rise from the base 6. The carriage is connected with the sleeve 3. The connection may be by means of flexible leaves (see Fig. 5). Leaves 23 and 23*a* are fastened to the carriage 19 and leaves 24 and 24*a* are connected to intermediate jointures 25 and 26 which are secured to the sleeve 3 by bearings 27 and 28. Element 23 may be attached to the frame 19, at the forward side thereof, as it moves toward the center of the record. Element 23*a* may be attached to the rear side thereof. The connections to the bearings 27 and 28 may be positioned so as to extend down around the opposite sides of the turntable. As shown, leaves 23 and 23*a* may be attached to leaves 24 and 24*a*. 23 or 23*a* is flexible principally in one direction and 24 or 24*a* is respectively flexible principally in a direction perpendicular to said one direction.

The above-described parts make it possible for the carriage 19, with its stylus 32, accurately to follow the radial motion of the driving wheel 2 without there being any disturbance or vibration, due to the flexibility of the connecting elements which allow bending and turning in different directions without interfering with the transmission of the principal motion from the driving wheel to the carriage. Furthermore, the latter undergoes an extremely steady motion, due to the manner in which it is borne along the fixed axles 21 and 22. This steadiness is very important especially in the original recording upon a wax disc.

The arm 20 may be attached to the carriage 19 by a further spring means 31 whereby the pressure between stylus 32 and the recording disc 17 may be regulated. In order to eliminate disturbances caused by air currents, etc., the arm 20 may have its other end connected to shock-absorbing means 33, shown in the drawings as a movable piston in an oil container. The arm 20 may also be connected with lifting means such as the arm 34 and an eccentric disc 35. The operation of the device will be apparent from the foregoing. The stylus is carried toward the center of the record disc at the same time as the driving wheel. Stylus 32 keeps a position preferably directly above the driving wheel 2.

Figs. 3 and 4 show a simplified arrangement suitable for the home. In this case, the axles 21 and 22 are supported only at one end and elements 23, 24, 25 and 27 are omitted. The recording device as a whole can be removed by loosening screw 36 on block 37 and detaching connections 24*a* and 25*a*. If desired, there may be only two wheels or rollers bearing on the axles 21 and 22. The latter need not be positioned parallel with shaft 4, although such a position simplifies the device.

Figure 6 shows a device which is further simplified. The receptacle 18 is supported by an arm 20 on a frame 19. The latter rides along a rail 21, there being one or more rollers 19*a* between the frame and the guide. The frame 19 is rotatable about rail 21. For example, as shown, the roller 19*a* has a grove which seats on top of rail 21 which has a circular cross-section. The guide rail 21 is parallel to and fixed with respect to a second rail. The latter, in this modification, gives strength but does not act as a guide. It is supported from the block 37 which rises from the base, not shown. Means for balancing the receptacle 18 are provided. As shown, they comprise an arm 120 fixed to frame 19 and extending in the direction away from receptacle 18. It has a counter-weight 121 slidable along it. The frame in this case, as in the others, is caused to move by means which connect it to the driving wheel. The motion of the latter along its axle is thus transmitted to the frame 19.

Since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

What is claimed is:

1. In a device of the character described, the combination comprising movable reproducing means, movable means adapted for moving in substantially a straight line and for guiding said reproducing means substantially parallel thereto, a turntable, means adapted for actuating said turntable and said movable guiding means, and

resilient connecting means between said actuating means and said movable guiding means, said resilient means having one potrion principally flexible in one direction and having another portion principally flexible in a direction perpendicular to said one direction.

2. In a device of the character described, the combination comprising reproducing means, a fixed, straight, guide rail, a roller rollable along said rail, a frame supported by said roller and carrying said reproducing means, a turntable, driving means for said turntable and movable along a substantially straight line, and means connecting the forward and rearward parts of said driving means in the direction of said line with the forward and rearward parts of said frame and transmitting motion from said driving means to said frame and extending around opposite sides of said turntable.

HENRIK FABIAN STENMAN,
Administrator of the Estate of Carl Wilhelm Nystrom, Deceased.