Jan. 2, 1934. W. ELLMAN ET AL 1,941,668

ELECTRIC CONTROL SYSTEM AND RECORDING DEVICE

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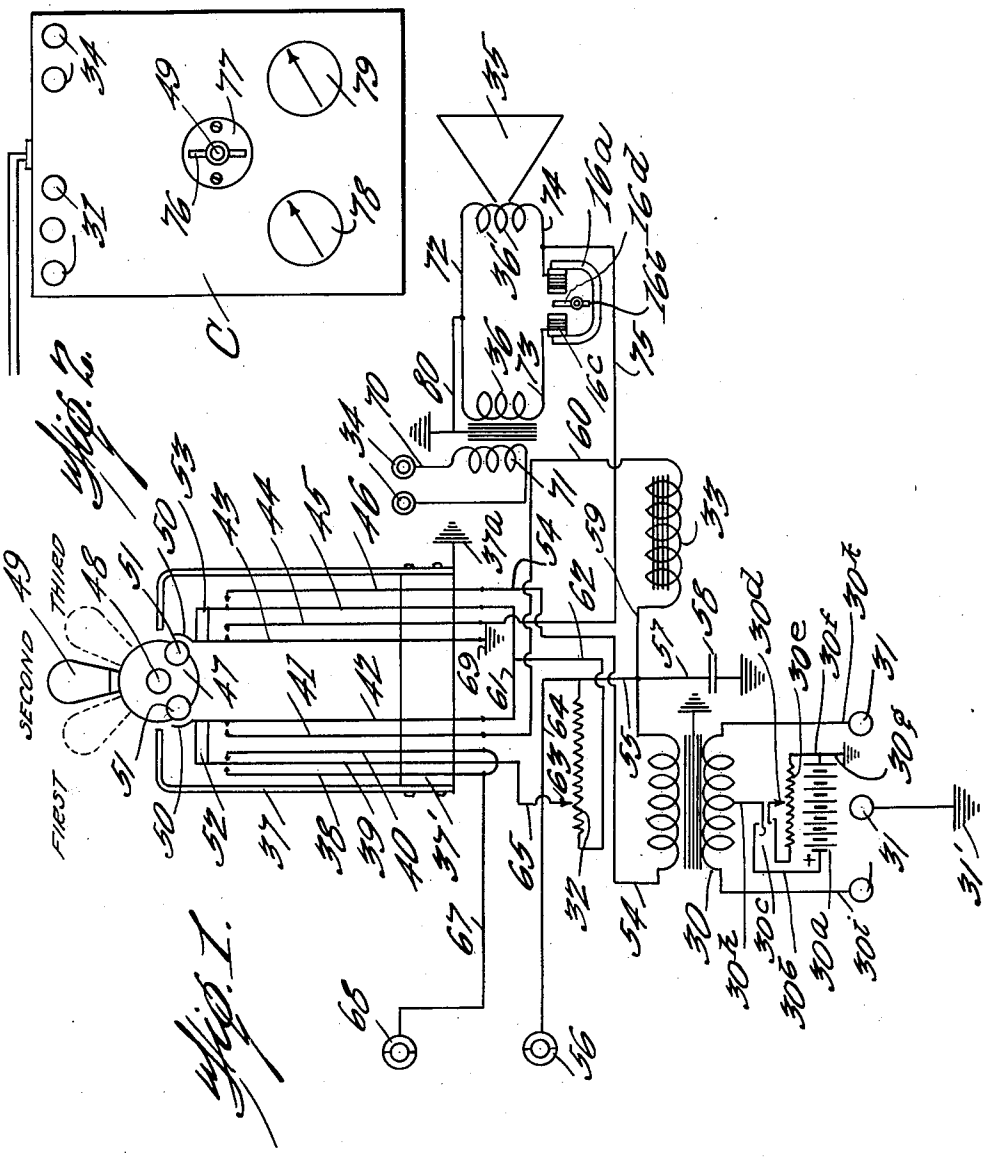


Fig. 1.

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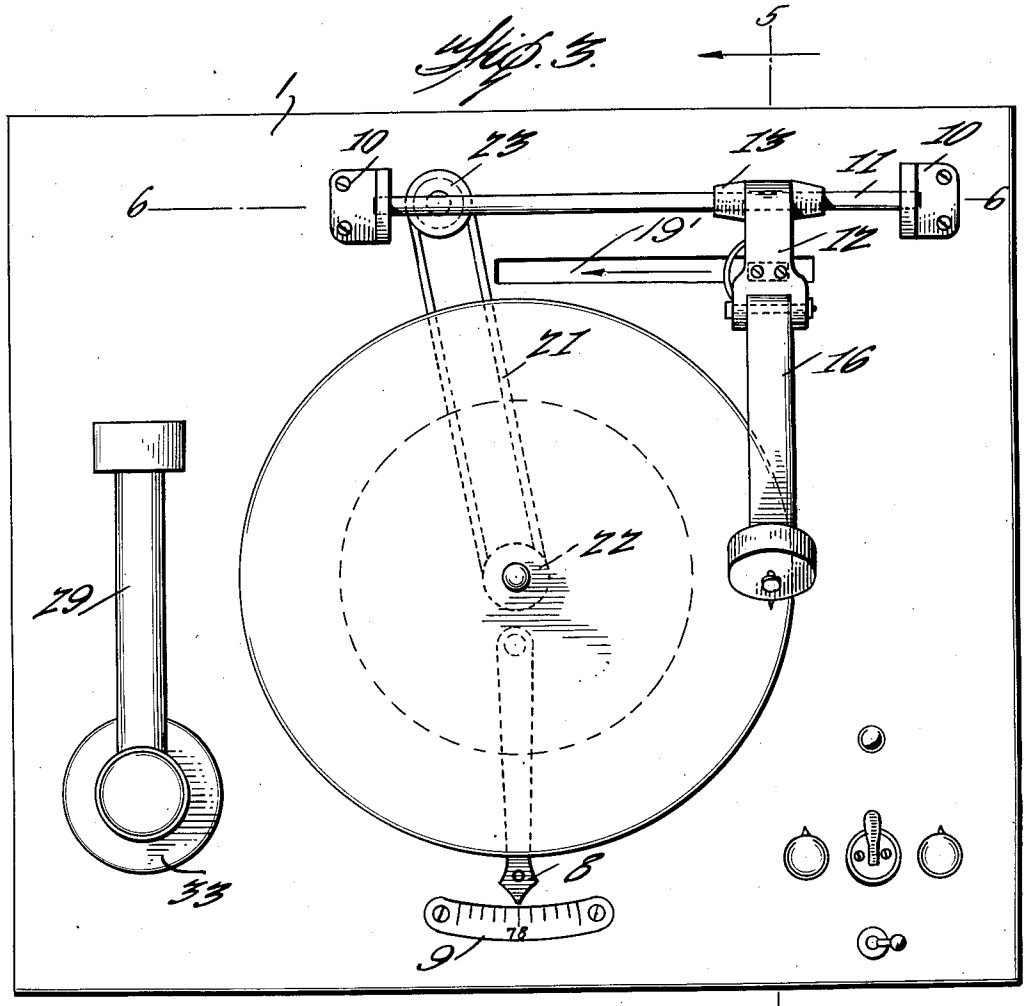
By Fred W. Ingram Attorney

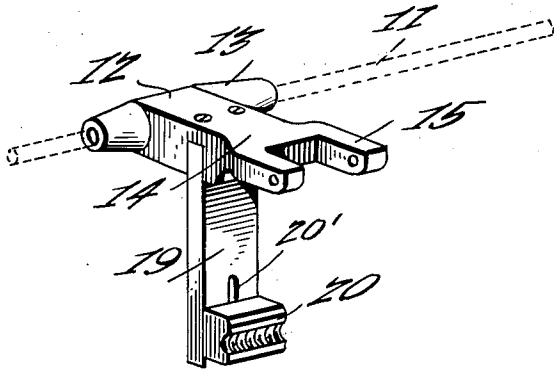
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Fig. 3.





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Fig. 4.

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ELECTRIC CONTROL SYSTEM AND RECORDING DEVICE

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Fig. 5.

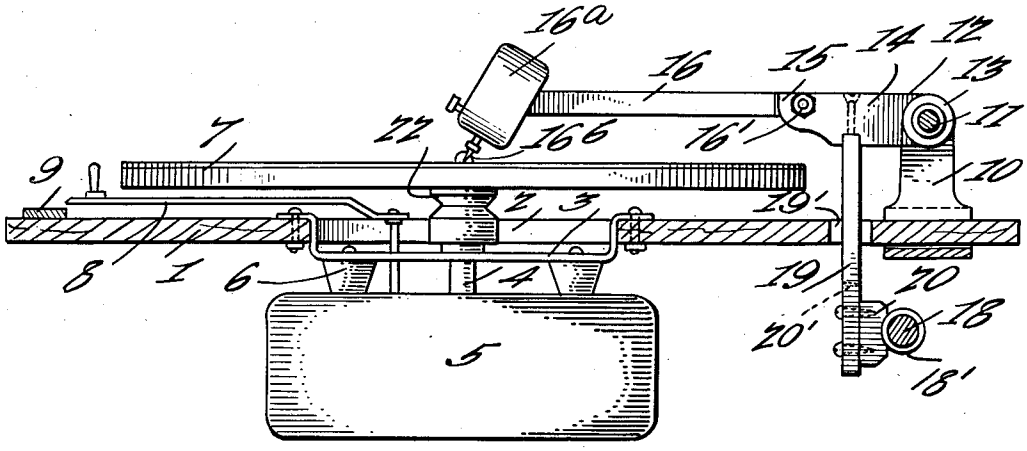
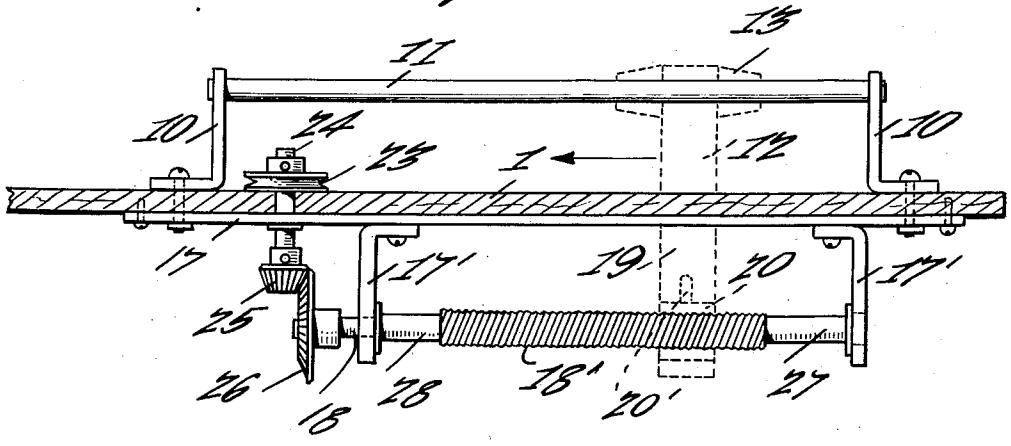


Fig. 6.



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UNITED STATES PATENT OFFICE

1,941,668

ELECTRIC CONTROL SYSTEM AND RECORDING DEVICE

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Application January 21, 1931. Serial No. 510,299

6 Claims. (Cl. 274—13)

This invention relates to an electrically operated phonograph recording device, and controlling apparatus therefor.

More particularly, the invention relates to a novel electrically operated device for recording sound effects on phonograph disks and a controlling apparatus so arranged and constructed that this recording device may be used in connection with a microphone, a radio receiver, and pick-up or electrical reproducer, the apparatus embodying as one element thereof a switch whereby the various devices may be brought into and out of electrical relation.

One important object of the invention is to provide, in combination with an electrical reproducer, an electrical phonograph recorder, a loud speaker, and a microphone transformer; connections between such elements and a three position switch arranged so that in one position a radio instrument may be connected to the recorder so that a program may be recorded, in a second position the microphone transformer may be connected to the recorder so as to have a silent recording, and in a third position the pick-up and recorder may be simultaneously used so that the recording may be heard at the time it is being effected.

A second important object of the invention is to provide a novel controlling device and switch adapted to be used in connection with standard instruments of the character above described.

A third important object of the invention is to provide a novel construction of electrically operated recorder adapted to be used in connection with standard phonograph machines as an attachment therefor.

A fourth important object of the invention is to provide a novel wiring arrangement for connecting the various instrumentalities used herein.

With the above and other objects in view as will be hereinafter apparent, the invention consists in general of certain novel arrangements of parts and combinations of details hereinafter fully described, illustrated in the accompanying drawings, and specifically claimed.

In the accompanying drawings, like characters of reference indicate like parts in the several views, and:

Figure 1 is a diagrammatic view showing the switch, the various instruments and the wiring connections therebetween.

Figure 2 is a face view of the control box wherein the controlling mechanism for the invention is held.

Figure 3 is a plan view of the recording mechanism with the recording head in recording position and the reproducing head in inoperative position.

Figure 4 is a perspective view in detail showing the recording arm guide and mounting and the feed nut used therewith.

Figure 5 is a section on the line 5—5 of Fig. 3.

Figure 6 is a section on the line 6—6 of Fig. 3.

The recording apparatus will first be described, this being shown in Figures 3 to 6. As there shown there is disclosed the top or platform 1 of a phonograph cabinet, said top having a central opening 2, spanned by a suitable bracket 3. Through this bracket 3 passes the shaft 4 of the ordinary phonograph motor 5 which is supported in proper position by lugs 6 beneath the bracket. On the upper end of this shaft 4 which projects above the platform 1 is the usual turn table or platen 7. As is common in phonographs a speed control arm 8 is provided to control the speed of the motor and this arm works over the graduated speed scale 9. The parts which have been so far described are those quite common in disk phonographs and other similar instruments.

The particular attachment embodied as a part of this invention consists of a pair of spaced brackets 10 secured to the platform 1 and extending up therefrom behind and to one side of the platen 7. Between these brackets extends a guide rod 11 whereon is slidably mounted a sleeve 13 carrying a forwardly projecting arm 14 provided at its forward end with a fork 15 between the arms of which is received the rear end of a recording arm 16 forming an extension of the arm 14, this arm being pivoted in the fork of a suitable pivot bolt 16'. Beneath the platform 1 is arranged a plate 17 from which depends arms 17' having a shaft 18 journalled therein. This shaft has its central portion enlarged and screw threaded as at 18' to form a feed screw. Depending from the arm 14 is a vertical arm 19 which passes through a suitable slot 19' in the platform 1, this slot running parallel to the shaft 18 and rod 11. The lower end of the arm 19 extends downwardly in front of the shaft 18 and on its rear face there is provided a nut segment 20 which normally, in active position of the arm 14, engages the screw 18', but which may be disengaged from the screw by raising the arm 14 and tilting the arm 19 slightly forward, the slot 19' being made sufficiently wide to permit this action.

A belt 21 is provided which extends around a pulley 22 fitted on the shaft 4 beneath the platen 7, and this belt also extends around the pulley 23

carried on the upper end of a shaft 24, which passes downward to the plate 17 and carries on its lower end a bevel gear 25 which meshes with a bevel gear 26 fixed on the shaft 18. It will be noted that at each end of the screw 18' as at 27 and 28, blank spaces are left so that when the nut 20 runs on to these blank spaces, feeding of the nut, and consequently of the arm 14, ceases or, with relation to the blank space 27 on the outside, no feeding takes place when the arm 14 is moved to inoperative position so that the nut lies opposite this blank space 27. On the platform 1 is also pivoted in the usual manner the tone arm 29 carrying the reproducer 33. The ratio of the revolutions of the shaft 4 and the screw 18 is such that the feed of the arm 14 transversely of the disk on which the recording is to take place is in accordance with the standard practice, that is to say, recording will be at the rate of 100 lines to inch of radius on the part of the record covered by the recording.

On the end of the arm 16 is mounted a standard electrical recording device 16^a provided with a recording point 16^b which, may be of hardened steel or may be made from a sapphire, diamond, or other suitable material. It is of course understood that while recording on metallic plates the point 16^b will be preferably made from a diamond. This recording head 16^a is preferably of a type resembling a polarized relay, as can be seen by reference to the diagrammatic showing in Figure 1, wherein a pair of opposed electromagnets 16^c operated upon a pivoted armature 16^d carrying the recording point 16^b.

The apparatus used in connection with the recorder just described, is preferably contained in a suitable casing such as is shown at C, the view Figure 2 showing the face of this casing. In this casing is mounted a microphone transformer 30, the primary winding of which is connected to a suitable battery 30^a. One terminal of the battery 30^a is connected by a suitable conductor 30^b to a microphone control switch 30^c, from one terminal of which a movable contact 30^d extends to a resistance 30^e connected to the other terminal of the battery by conductor 30^f, this terminal being also grounded as at 30^g. The other terminal of the switch 30^c is connected by a conductor 30^h to the middle point or neutral point of the primary winding of the transformer 30. One end of this primary winding is connected by a conductor 30^i to one plug connection 31, while the other end is connected to a similar conductor 30^k to a second plug connection 31. Between the two plug connections is a third plug connection 31 grounded as at 31'. The plug connections 31 are spaced in the usual manner so as to receive the connections from a microphone (not shown) which may be of any standard type. The switch employed herewith includes a casing 37 which is mounted on an insulated base 37', the casing being preferably grounded at 37^a. Supported on this base at one side of the casing are spring contact fingers 38, 39, 40, 41 and 42. On the opposite side of the casing the base 37' and supports the spring contact fingers 43, 44, 45 and 46.

At the top of the casing is a contact controlling disk 47, which is rotatably mounted on a shaft 48 and is provided with an upstanding handle 49 by means of which the disk may be oscillated to one position or another, as desired. Each of the contact fingers 42 and 43 is provided at its upper end with an extension 50 adapted to be engaged by an insulated lug 51 fixed on the disk. The contact fingers 42 and 39 on the first side, extend above the remaining contact fingers and are connected for simultaneous operation by an insulated bar 52. Similarly on the other side the contact fingers 45 and 43 extend above the remaining contact fingers and are connected for simultaneous operation by an insulated bar 53.

As shown in Figure 1 it will be seen that under the position there indicated in full lines, it may be termed the second position of the switch, the contact fingers 39 and 40 are in engagement and all other contact fingers are disconnected. Now if the switch be swung to the dotted line position, indicated as first position in Figure 1, then the right hand lug 51 will engage the right hand projection 50. This will close the contact finger 43 on the contact finger 44 and the contact finger 45 on the contact finger 46, leaving the contact fingers 39 and 40 in closed position, but leaving the finger 38 free from the finger 39 and the fingers 41 and 42 open. Again, if the switch be swung to third position as indicated in Figure 1, the contact between fingers 39 and 40 will be open and the finger 39 will be closed on finger 38 and finger 42 will be closed on finger 41, the right hand fingers being left in open position.

Now, the secondary of the transformer 30 has one end connected by a conductor 54 with the finger 46. The other end of this secondary is connected by a conductor 55 with a jack 56 arranged for the connection of one of the output leads of a radio receiver, or for the connection of input end of the amplifier. From the conductor 55 leads ground wire 57 which extends to the ground through a condenser 58, and also from the conductor 55 leads a conductor 59 which extends to one terminal of the electrically operated pick-up or reproducer 33. The other terminal of this reproducer 33 is connected by conductor 60 with the contact 41. The contacts 42 and 45 are connected in multiple by conductor 61 and from this conductor leads a conductor 62 which extends to one terminal of a resistance 32 traversed by a movable contact 63, this resistance and contact forming a potentiometer. The other terminal of this potentiometer is connected by a conductor 64 to the wire 57. The movable contact 63 is connected by a conductor 65 to the contact 39. The contacts 38 and 40 are connected in multiple by wire 66 and from this multiple connection a conductor 67 extends to a jack 68 to which may be connected the remaining lead of the output of the radio receiver or the remaining input terminal of a suitable amplifier (not shown). The contact 43 is grounded as at 69.

Suitable jacks 34 are provided for the connection of the output leads of the amplifier and these jacks are connected in series by conductors 70 to the primary winding 71 of a loud speaker transformer 36, one terminal of which is connected to a conductor 72 with one terminal of voice coil or winding 36' of a loud speaker 35. The other terminal of the secondary 36 is connected by a conductor 73 to one terminal of the windings of the magnets 16^c, the other terminal of these windings being connected by a conductor 74 with the remaining terminal of the coil 36'. The conductor 74 is connected by a conductor 75 with the contact 44. The switch arm 49 acts through a suitable slot 76 formed in a switch plate 77 mounted on the casings C, and the microphone switch and its re-

sistance is controlled by a button 78 mounted on said casing, while the potentiometer is controlled by a button 79 similarly mounted.

In the operation of this device, let it be supposed that the switch arm is in the first position, as shown in Fig. 1. In this position it is to be understood that a microphone is connected to the microphone transformer 30 through the plug sockets 31 so that electrical impulses from the microphone will travel through the primary winding of the transformer and thus affect the secondary winding thereof. It will be remembered also in this position that the contacts 45 and 46 are closed as are the contacts 43 and 44 and contacts 39 and 40. Also, when used in connection with the microphone, the radio receiver will be omitted and the amplifier will be plugged in so the connection will be made between the sockets or jacks 56 and 68 and sockets or jacks 34 through the amplifier. Under these circumstances current will flow from one terminal of the secondary of transformer 30 through conductor 54, contact 46, contact 45, conductor 61, conductor 62, potentiometer 32, conductor 64, jack 56, primary 71 and the amplifier. This will affect the primary winding 71 which will in turn affect the secondary of the transformer 36 so that current will now flow from one terminal of the transformer 36 through the conductor 73, recorder 16a, conductor 75, contact 44, and contact 43 to ground 69. From the other terminal of 36 current will flow through conductor 72 to ground wire 80. Thus the recorder will be actuated and if the reproducer 33 be out of service the recording will be silent.

Now assuming the switch to be in the second position. In this position the only contacts which are closed are the contacts 39 and 40. Under these conditions the microphone is disconnected and the radio receiver is connected to the jacks 56 and 68 so that the current will flow from the jack 56 through conductor 64, potentiometer 32, conductor 65, contact 39, contact 40, conductor 67 and jack 68 back to the receiver. The amplifier, being still connected, the primary winding 71 will again be affected by the current impulses from the radio receiver, but in this case, the contact 44 being open, current will flow from one terminal of the transformer 36 through conductor 72, horn winding 36', conductor 74, recorder 16a, and conductor 73 to the other terminal of 76. Under these conditions, the radio program received by this instrument will be heard from the horn 35 and at the same time the recorder will operate to record such program on a suitable disk on the platen 7.

Assuming now the third position of the switch, the contacts 38 and 39 will be closed, as will also be the contacts 41 and 42. Under these circumstances, phonograph pick-up 33 will come into play, the action being as follows:

From one terminal of this pick-up current will flow through the conductor 59, conductor 55, and conductor 64 to the jack 56, while from the other terminal of the pick-up current will flow through conductor 60, contact 41, contact 42, conductor 61, conductor 62, potentiometer 32, conductor 65, contact 39, contact 38, conductor 67 to the jack 68. Again, this will affect the primary winding 31 and as before, current will flow through the closed circuit embodying the horn winding 36' and the recorder 16a, thus recording the phonographic record operating the pick-up 33. Under these circumstances it is to be understood that this pick-up 33 is located on a phonograph other than that employing the recording instrument.

There has thus been provided a highly efficient device of the kind described and for the purpose specified.

It is obvious that many minor changes may be made in the form and construction of the apparatus without departing from the material principles involved and it is not therefore desired to confine the invention to the exact form herein shown and described, but it is wished to include all such as properly come within the scope of the invention claimed.

Having thus described the invention, what we claim is:

1. A recording attachment for disk phonographs, comprising a guide rod, a screw parallel to said guide rod, a sleeve slidable on said guide rod, an arm extending laterally from said sleeve, a second arm extending from the first arm to a point adjacent the screw and having its free end movable toward and from the screw as the first arm is rocked on the guide rod, a segmental nut normally engaging the screw, an extension for said first arm, interfitting ends on said first arm and its extension to prevent lateral movement of the extension relative to said first arm, a hinge joint extending through the interfitting ends to permit vertical swinging movement of the extension, a recording needle supported from the first arm extension, and means to drive said screw.

2. A recording attachment for disk phonographs, comprising a guide rod, a screw parallel to said guide rod, a sleeve slidable on said guide rod, an arm extending laterally from said sleeve, a second arm extending from the first arm to a point adjacent the screw and having its free end movable toward and from the screw as the first arm is rocked on the guide rod, a segmental nut normally engaging the screw, an extension for said first arm, interfitting ends on said first arm and its extension to prevent lateral movement of the extension relative to said first arm, a hinge joint extending through the interfitting ends to permit vertical swinging movement of the extension a recording needle supported from the first arm extension, and a pulley adapted for belt connection to the platen shaft of the phonograph, a shaft supporting said pulley, and gearing connecting the pulley and screw.

3. A recording attachment for disk phonographs, comprising a guide rod, a screw parallel to said guide rod, a sleeve slidable on said guide rod, an arm extending laterally from said sleeve, a second arm extending from the first arm to a point adjacent the screw and having its free end movable toward and from the screw as the first arm is rocked on the guide rod, a segmental nut normally engaging the screw, an extension for said first arm, interfitting ends on said first arm and its extension to prevent lateral movement of the extension relative to said first arm, a hinge joint extending through the interfitting ends to permit vertical swinging movement of the extension, a recording needle supported from the first arm extension, and means to drive said screw, said screw having reduced blank portions at each end opposite which the nut is adapted to ride freely.

4. A recording attachment for disk phonographs, comprising a guide rod, a screw parallel to said guide rod, a sleeve slidable on said guide rod, an arm extending laterally from said sleeve, a second arm extending from the first arm to

a point adjacent the screw and having its free end movable toward and from the screw as the first arm is rocked on the guide rod, a segmental nut normally engaging the screw, an extension for said first arm, interfitting ends on said first arm and its extension to prevent lateral movement of the extension relative to said first arm, a hinge joint extending through the interfitting ends to permit vertical swinging movement of the extension, a recording needle supported from the first arm extension, and a pulley adapted for belt connection to the platen shaft of the phonograph, a shaft supporting said pulley, and gearing connecting the pulley and screw, said screw having reduced blank portions at each end opposite which the nut is adapted to ride freely.

5. A recording attachment for disk phonographs, comprising a guide rod, a screw parallel to said guide rod, a sleeve slidable on said guide rod, an arm extending laterally from said sleeve, a second arm extending from the first arm to a point adjacent the scerw and having its free end movable toward and from the screw as the first arm is rocked on the guide rod, a segmental nut normally engaging the screw, a recording needle supported from the first arm, and means to drive said screw, said recording needle being supported from the first arm on a pivoted arm portion whereby the recording needle may be raised and lowered without corresponding movement of the first arm, the pivoted arm portion pivoted to the first arm to swing vertically and being restrained from lateral movement relative to the first arm.

6. A recording attachment for disk phonographs, comprising a guide rod, a screw parallel to said guide rod, a sleeve slidable on said guide rod, an arm extending laterally from said sleeve, a second arm extending from the first arm to a point adjacent the screw and having its free end movable toward and from the screw as the first arm is rocked on the guide rod, a segmental nut normally engaging the screw, a recording needle supported from the first arm, and a pulley adapted for belt connection to the platen shaft of the phonograph, a shaft supporting said pulley, and gearing connecting the pulley and screw, said recording needle being supported from the first arm on a pivoted arm portion whereby the recording needle may be raised and lowered without corresponding movement of the first arm, the pivoted arm portion pivoted to the first arm to swing vertically and being restrained from lateral movement relative to the first arm.

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