

Jan. 14, 1941.

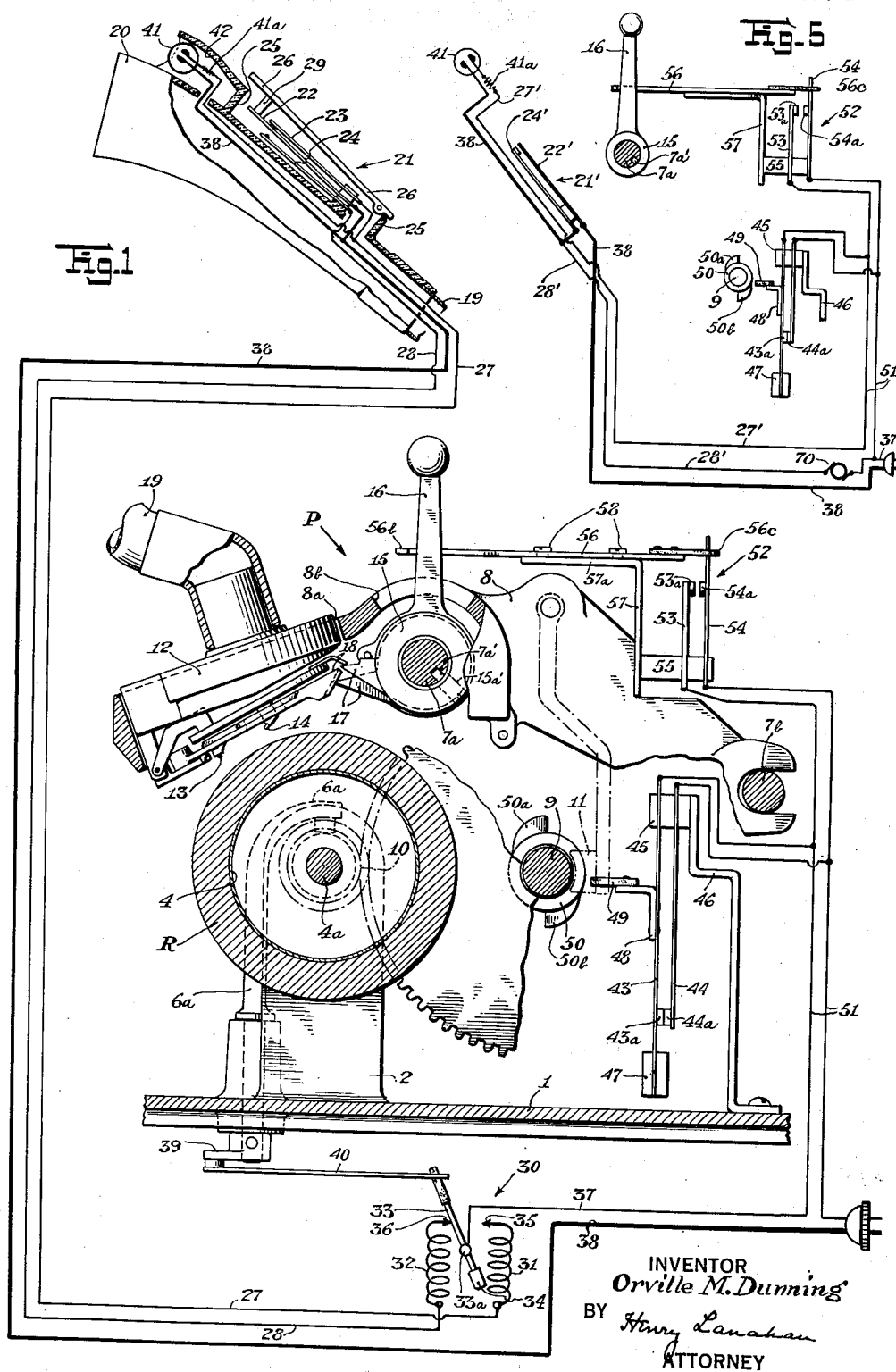
O. M. DUNNING

2,228,759

PHONOGRAPH

Filed Nov. 18, 1937

2 Sheets-Sheet 1



Jan. 14, 1941.

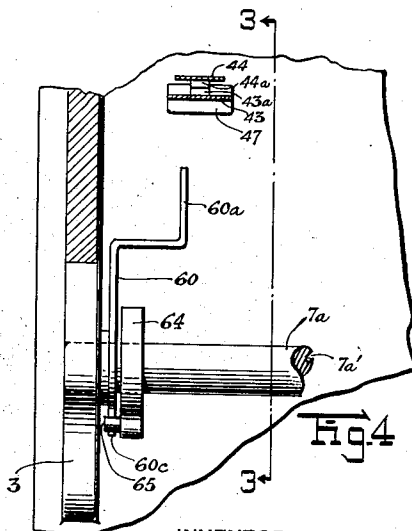
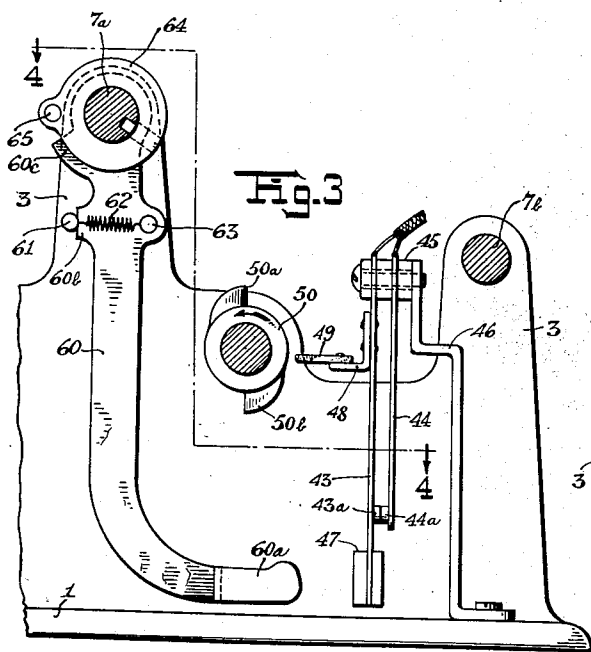
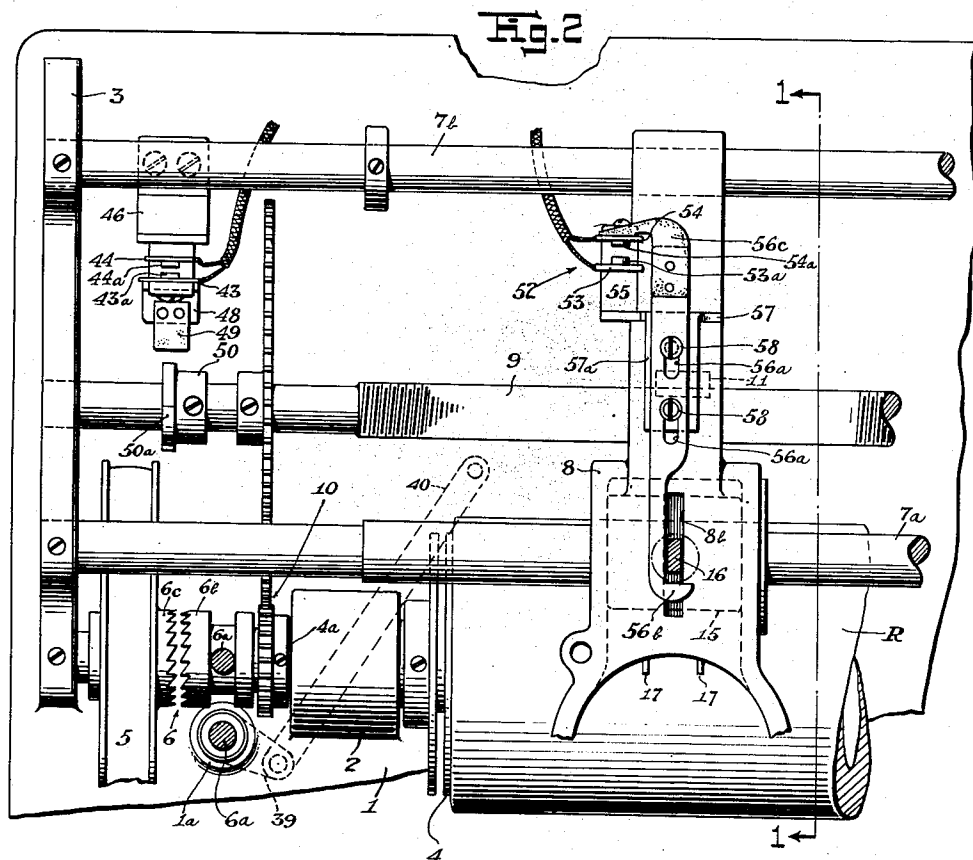
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PHONOGRAPH

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2 Sheets-Sheet 2



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2,228,759

PHONOGRAPH

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7 Claims. (Cl. 274—17)

This invention relates to phonographs, and more particularly to phonographs employed for both the recordation and reproduction of sound—such for example as business phonographs for the recordation and reproduction of dictation and the like. The invention especially concerns the apt signalling, to the user of the phonograph, of the condition of the machine—for example, to the end that he may not dictate therein to in a mistaken belief that the phonograph is operating in a condition to record his dictation, and to like ends.

It is an object of the invention to provide generally improved means for signalling the condition of the phonograph, or the condition in which it is being operated.

It is another object to provide signalling means which will give the requisite indications independent of any noise or other momentary indication at the time of inception of operation of the phonograph.

It is another object to provide signalling means which will give adequate continuous indications of the operation and non-operation of the phonograph, as well as of the condition in which it is being operated.

Other objects are the provisions of such signalling means in highly effective location, in silent form, and in extremely simple association with other components of the phonograph.

Another object is the provision, for the signalling means, of a circuit interrupting device of improved form and operation.

Another object is the simple association of such an interrupting device with the operating circuits of the phonograph without impairment of their operation.

Other and allied objects will more fully appear from the following description and the appended claims.

In the description of my invention, hereinafter set forth, reference is had to the accompanying drawings, of which:

Figure 1 is a partly vertical sectional and partly diagrammatic view of a phonograph to which my invention has been applied, the main portion of the figure being taken along the line 1—1 of Figure 2 excepting for the breaking away of certain parts for the better illustration of parts therebehind;

Figure 2 is a partial plan view of the same phonograph;

Figure 3 is a vertical sectional view of a portion of a similar phonograph to which my invention has been applied in modified form, this figure be-

ing taken generally along the line 3—3 of Figure 4;

Figure 4 is a fractional plan view of the phonograph of Figure 3, being taken generally along the line 4—4 of Figure 3 to show certain parts in section; and

Figure 5 is a partial diagrammatic view of a phonograph to which my invention has been applied in still further modified form.

Reference being had to Figures 1 and 2, there will be seen a phonograph designated generally as P. This may comprise a base 1, provided with a central standard 2 and with end standards of which the lefthand one appears as 3. Journalled in the central standard 2 is a rotatable shaft 4a carrying the mandrel 4, onto which may be removably mounted a cylindrical record R. The mandrel 4 is connected to a pulley 5 driven by a suitable motor (not shown), through a clutch system 6 hereinafter further referred to. Supported between the end standards and parallel with the axis of the mandrel 4 are provided the carriage rods 7a and 7b; a carriage 8 is supported on these rods for movement therealong. Journalled between the end standards is a feed-screw 9 driven (counter-clockwise for example) from the mandrel shaft 4a through the gear system schematically shown in Figure 1 as 10. A feed-nut 11 carried by the carriage is arranged to be engaged with the feed-screw 9, whereby to propel the carriage 8 slowly along the rods 7a and 7b coincidentally with mandrel and record rotation.

The carriage 8 is extended forwardly above the record, and is there provided with a shouldered aperture 8a in which is retained the sound box 12. This may be provided with recording and reproducing styli 13 and 14, respectively, adapted to alternately be in contact with the record R. The styli may be controlled by a hub assembly 15 carried in the carriage 8 about the front carriage rod 7a, which assembly in turn is controlled by a lever 16 projecting upwardly within a slot 8b in the top of the carriage—the assembly operating, through fingers 17 and lugs 18, to maintain either stylus or both styli out of contact with the record, and also operating to control the feed-nut 11 through known mechanism not necessary herein to show. Thus with the lever in a forward or "recording" position the recording stylus 13 may contact the record and the feed-nut may be engaged with the feed-screw; with the lever in a central or "neutral" position (as illustrated) both styli may be out of contact with the record and the feed-nut may be disengaged; and with

the lever in a rearward or "reproducing" position the reproducing stylus 14 may contact the record and the feed-nut may again be engaged with the feed-screw.

5 From the sound box 12 there may lead outwardly a speaking tube 18 terminating in a mouthpiece 20, their function being understood to be the transmission to the sound box of sound to be recorded on the record by the stylus 13, or the transmission from the sound box of sound reproduced from the record by stylus 14. On the mouthpiece 20, which is adapted to be grasped in the hand of the user of the phonograph, is provided a means for controlling the operation of the phonograph—e. g., the rotation of the mandrel and record. This means may be in the form of a switch 21, which controls an electromagnetic assembly 30 conveniently located beneath the base 1—the function of the assembly 30 being in turn the actuation of the clutch control arm 6a to engage and disengage the clutch system 6. The assembly 30, which is desirably of the general type disclosed in U. S. Patent No. 1,380,486 to S. G. Langley, may for example comprise "stop" and "start" electromagnets 31 and 32, respectively; an arm 33 pivoted as at 33a and carrying an armature 34 attractable alternately by the electromagnets upon their respective actuations; and means for open-circuiting each electromagnet upon its actuation and until actuation of the other, such means being permissibly switch contacts 35 and 36 in series with the upper-shown terminals of the respective electromagnets and adapted to be alternately contacted by the arm 33, which arm forms a switch pole to which may be connected the conductor 37 forming one side of the power supply for actuating the electromagnets. A conductor 38, forming the other side of that power supply, may be connected to the pole 22 of switch 21. The non-contact or lower-shown extremities of the electromagnets may be respectively connected, through conductors 27 and 28, to the top and bottom contacts 23 and 24 of the switch 21. These contacts are adapted to be touched alternately by the pole 22, the latter being biased, however, to normally touch contact 23 (connected with the "stop" electromagnet 31). The switch 21 may be housed within a rectangular casing 25 provided as a projection from the mouthpiece 20; a cover 26 for this casing may be pivoted thereto near one extremity thereof, and near its opposite extremity may be mechanically connected to the pole 22 as by the post 29, so that upon depression of the cover 26 the switch will be thrown to its non-normal condition.

The clutch system 6 is best seen in Figure 2 to comprise the co-acting members 6b and 6c—the member 6c being secured to the pulley 5, and the member 6b being splined to the mandrel shaft 4a and moved by the clutch arm 6a into and out of engagement with 6c. The arm 6a is supported rotatably in the boss 1a, passing downwardly therethrough and through the base 1 to have secured to its lower extremity the crank 39; a rod 40 may connect this crank with the electromagnet assembly arm 33 for clutch-engaging and disengaging rotation by the latter.

The apparatus so far described will be recognized as conventional. It will be understood that normally, switch pole 22 touching contact 23, the power supply will last have been connected with and thus actuated the "stop" electromagnet 31, causing the arm 33 to have swung to the position illustrated in Figure 1 and to have thereby open-

circuited the "stop" electromagnet at 35 and to have disengaged the clutch. A throwing of the switch pole 22 by depression of the cover 26, however, will connect the power supply with and thus actuate the "start" electromagnet 32, swinging the arm 33 clockwise, open-circuiting the "start" electromagnet at 36, and producing clutch engagement which will continue with continued cover depression—upon release of which the normal conditions will obviously be restored as a result of "stop" electromagnet actuation.

As a signal for warning the user of the phonograph of the fact that it is being operated—e. g., the clutch is being kept engaged and the mandrel rotating—out of condition to receive and record dictation, there has been proposed the use of a light signal, carried for example on the mouthpiece for certain visibility. As proposed, however, this and other types of signals have been purely warning devices, their extinguishment or non-functioning being the indication relied upon to show a condition for receiving dictation. I have found this not a wholly desirable arrangement, in that extinguishment or non-functioning of the signal may result from a variety of conditions independent of a suitable condition of the machine to receive dictation. To reverse the operation of the signal, however—i. e., to operate it to indicate readiness to receive dictation and to extinguish it otherwise—is likewise not wholly desirable, in that the warning function is then performed only negatively, by the non-functioning of the signal.

I have found a peculiarly useful solution of this signal problem to be the operation of the signal both as a pilot to indicate readiness to receive dictation and as a warning device to indicate operation of the machine in conditions not appropriate to receiving of dictation. I differentiate the pilot indications from the warning indications by mutually different operations of the signal; this I may do by causing the signal to act continuously for the one indication and intermittently or interruptedly for the other. Preferably I make the pilot indication the continuous one, and the warning indication the intermittent or interrupted one—primarily in view of the more striking nature of the latter. With the light signal this choice has the additional important advantage that when the machine is deliberately operated out of condition to receive dictation—e. g., for reproduction of dictation already recorded—the mouthpiece will be deliberately held near the ear, away from the front of the face of the user, so that the intermittency of the signal will not be annoying. A broad advantage of the creation of some visible indication whenever the machine is placed in operation, and independent of its condition, is the dispensing with any requirement for a noise indication of inception of operation; clutch members 6b and 6c may accordingly be made of less hard material than normally, if desired, and/or the usual noise attendant on clutch operation may be otherwise reduced.

In the drawings I have shown the signal as a light signal in the form of a lamp 41 carried on the top of the mouthpiece 20 within a housing 42, which is conveniently formed forwardly from the switch casing 25 abovementioned. In carrying out my invention therewith I may provide a circuit leading to the signal, and a circuit interrupter therefor responsive with operation or non-operation to the position of the control lever 16—i. e., which interrupts or continuously maintains

the circuit according to the position of that lever. I desirably limit the interrupting action so that it requires not only a condition of the lever 16 in certain positions (e. g., in "reproducing" or "neutral" position) but also a condition of mandrel rotation—i. e., so that if the mandrel is not rotating the interrupter is statically as well as dynamically out of operation, or closed—as this permits the greatest flexibility in combining the signal circuit with other circuits already described.

Such an interrupter I have illustrated as formed by a normally closed switch, means for periodically displacing the switch parts from their normal positions without thereby opening the switch, and an inertia device associated with one of the switch parts so that upon rebound of the parts from their displaced positions one of the parts will momentarily overshoot its normal position to produce a momentary switch opening and circuit interruption. Thus the switch may be formed by the leaf springs 43 and 44, secured in and downhanging from the insulating stack 45, the stack being secured to the top of a bracket 46 upstanding from the base 1. The springs 43 and 44 are provided with the respective contacts 43a and 44a, and are biased so that these contacts are normally closed against each other. The forward spring 43 may extend downwardly below its contact 43a and may carry the weight 47 at its lower extremity. At an intermediate position on this spring may be secured the forwardly extending bracket 48, to which in turn may be secured the forwardly extending lug 49. On the feed-screw 9 is secured a cam device 50, provided with outwardly extending cam means which may be the plurality of cam ears 50a and 50b. The switch is positioned behind the feed-screw in such a place that the cam device in its rotation by the feed-screw is first spaced from the lug 49, then touches the lug and pushes it and the switch springs rearwardly, and then (by reason of appropriate shape of the cam ears) suddenly releases the lug 49 to permit the rebound of the switch springs, with momentary forward overshooting of spring 43 and opening of the contacts 43a—44a. When the feed-screw is rotating this action recurs, as many times per feed-screw rotation as there are cam ears. When the feed-screw rotation is stopped, although one of the cam ears may be in contact with the lug 49, yet the switch is positively maintained closed.

In the illustration of Figures 1 and 2 the interrupter is made responsive with operation or non-operation to the position of the control lever 16 through the medium of a switch 52 controlled by that lever and electrically paralleled with the interrupter. This switch may for example comprise the leaf springs 53 and 54 secured in and upstanding from the insulating stack 55, that stack being secured to a vertical surface on and near the extremity of the carriage 8. The springs 53 and 54 are provided with the respective contacts 53a and 54a, and are biased so that these contacts tend to be open from each other; the rear spring 54 may extend upwardly somewhat beyond its contact 54a. The control of this switch 52 by the lever 16 is effected by a link member 56; this may be slidably supported on the horizontal portion 57a of a bracket 57 upstanding from the carriage, as by screws 58 passing through slots 56a in the link member. At its front extremity the link member is provided with a sideward lug 56b hooking about the lever 16; at its rear extremity the link member is provided with a hook-shaped piece 56c of insulating ma-

terial hooking about the upper portion of the rear spring 54 abovementioned. So long as the lever 16 is in its rearward ("reproducing") or middle ("neutral," as illustrated) position, the link member will be idle and switch 52 open; when the lever 16 is moved forwardly to its "recording" position, however, the link member 56 will be drawn forwardly and will close the switch 52; this electrically short-circuits the interrupter, and so places it out of operation.

Since the interrupter is under no condition more than momentarily opened it may be serially inserted in the power supply for the electromagnet assembly 30 without impairing the operation of that assembly; it has been shown so inserted in the power supply conductor 37, by means of the conductors 51. Since the interrupter may be so inserted, the signal 41 may be supplied with power through that assembly. This is very desirable, as there is available a manner of power supply to the signal through that assembly which involves no extra conductors over and above those already provided for the switch 21—and because the provision of many conductors along or in the speaking tube 19 to the mouthpiece 20 is troublesome. This manner of supply to a signal has been broadly disclosed in my co-pending application Serial No. 70,042, filed March 21, 1936, on which Patent No. 2,146,425 has now issued (though not specifically in connection with a signal which acts as a combined pilot and warning signal). It involves simply the connection of the signal across that part of the operation-control switch (e. g., 21) which is closed to actuate the "stop" electromagnet (e. g., 31)—e. g., the connection of lamp 41 between the switch pole 22 and the switch contact 23, or between conductors 38 and 27. The lamp 41 will draw its power through the "stop" electromagnet 31, and must therefore be of sufficiently high resistance so that its current drain is less than that required for actuation of that electromagnet. A very favorable type of lamp for the signal 41 is a small gas (e. g., neon) discharge tube supplied internally or externally with a proper high resistance to limit the discharge current (such as has been schematically illustrated as 41a).

The lamp 41 is of course short-circuited by 22—23 when the switch 21 is in normal condition; but it is then intendedly open-circuited at contact 35—in view of a condition of non-rotation of the mandrel, when no signal is in any event needed. When the switch 21 is thrown to close 22 against 24, the power supply conductor 37 is connected through arm 33, contact 35 and "stop" electro-magnet 31 to the conductor 27, so that the lamp 41 will be lit coincidentally with the mandrel rotation accompanying this switch throwing—and that lighting of the lamp will be continuous or intermittent according to the position of the lever 16, and hence according to the readiness or non-readiness of the machine for dictation. When the switch 21 is returned to its normal position, it is possible that the interrupter contacts 43a—44a will be momentarily open; but in the very next instant they will be closed and the "stop" electromagnet will be energized, so that the delay in the throwing of arm 33 to disengage the clutch and extinguish the lamp 41 is utterly negligible. The availability of lamp operation which includes intermittent operation, resting on the ability to connect the interrupter in the electromagnet circuit which in turn rests on the certainty of closure

of the interrupter, is an advantage of great practical value.

It will be understood that the means which renders the interrupter responsive to the position of control lever 16—e. g., which maintains the interrupter positively close-circuited when the lever is in "recording" position—need not be of the electrical short-circuiting form typified by switch 52 of Figures 1 and 2; thus in Figures 3 and 4 I have alternatively illustrated such a means of mechanical form. The particularly illustrated such means is intended for use in a case wherein carriage rod 7a is rockably supported by the end standards and the hub assembly 15 is splined to that rod to rock it with lever 16 rotation—as indicated by rod key-way 7a' and hub assembly key 15a', and as frequently carried out for purposes unrelated to the present invention. The illustrated means comprises an arm 60 enlarged and pierced at its upper extremity to surround and hang down from the carriage rod 7a next to lefthand end standard 3; this arm is provided at its lower extremity with the rearwardly extending and offset portion 60a. When the lever 16 is in "reproducing" or "neutral" position the arm 60 may be held in a normal position, wherein a front surface portion 60b thereof rests against a stop pin 61 secured in standard 3, by a tension spring 62 connected between that pin and a pin 63 secured in the arm 60; in this normal position the extremity of the offset portion 60a may be spaced forwardly of the interrupter weight 47. A bushing 64 is secured on the rod 7a, conveniently in position to retain the arm 60 against sliding along rod 7a, and in this bushing is secured a leftwardly extending pin 65. The arm 60 is provided with a lug portion 60c against the edge of which this pin 65 impinges when the lever 16 is moved to "recording" position, in view of the accompanying rocking of rod 7a. This impingement causes arm 60 then to be moved so that the extremity of the offset portion 60a touches and presses on weight 47, positively holding closed the interrupter contacts 43a—44a in spite of continued pushing of lug 49 by cam means 50.

While I have particularly illustrated and described my invention in connection with a phonograph having a clutch and wherein that clutch is controlled by an electromagnet assembly, it will be understood that the broader aspects of my invention are not limited to phonographs having both or even either of these features. As a typical illustration of the application of my invention to other cases, I have schematically illustrated in Figure 5 an embodiment of the invention in a phonograph wherefrom both of these features are absent, the operation-control being a switch 21' having simply pole 22' and contact 24' from which the pole is normally open but against which it may be closed to complete the circuit of a motor 70. Thus the contact 24' of switch 21' and a first side of the lamp 41 (both of which may be located as formerly) are shown connected to a first terminal of the motor 70 through conductor 28'; pole 22' is connected to a first power supply conductor 38; the second power supply conductor 37 is connected to the second motor terminal and also to one of the interrupter conductors 51; and the other of those interrupter conductors is connected to the second side of the lamp 41 through the conductor 27' (whose only function need be the making of this connection). Means such as switch 52 may

be again employed for rendering the interrupter responsive to the control lever 16. It will be obvious that basically the same differentiated pilot and warning functions of the lamp 41 will be performed.

It will also be understood that my invention is capable of wide further variations from the embodiments herein particularly illustrated and described, in various respects and without departure from the true spirit or scope of its broader aspects. Purely by way of example it will be obvious that, although a sound box has been particularly illustrated as a translating device—e. g., for the translation of acoustic vibrations into mechanical vibrations and vice versa—other forms of translating device, involving other types of vibration or oscillation, may be used in carrying out my invention. Again by way of example it will be obvious that, although I have preferred to differentiate between recording adjustment on the one hand and other adjustments on the other, other differentiations may be equally well performed by the structure according to the invention.

In the claims hereunto appended I undertake to express the scope of my invention in many instances broadly, subject however to such proper limitations as the state of the art may impose.

I claim:

1. In a phonograph including means for moving a record and a translating device: the combination of means for adjusting said device to record upon the record and to another adjustment; a signal; an electric circuit for supplying power to said signal during operation of said moving means; a switch serially included in said circuit, and means for periodically opening and closing said switch; and means, controlled by said device-adjusting means, for short-circuiting said switch.

2. In a phonograph including means for moving a record and a variously adjustable record-cooperating translating device: the combination of a signal for indicating the adjustment of said translating device; an electric circuit for supplying power to said signal; a switch serially included in said circuit and comprising normally closed contacts; means, operated by said record-moving means, for periodically effecting a displacement and release of both said contacts; and inertia means associated with one of said contacts for causing a momentary opening thereof from the other contact upon each said release.

3. In a phonograph including a translating device, and means for relatively moving said device and a record for translation-effecting cooperation thereof: the combination of an electrically actuated signal; a switching device connected with and controlling the supply of current to said signal and throwable from a normal to an opposite condition; means, operated concomitantly with the operation of said moving means, for periodically effecting a displacement and release of at least a portion of said switching device; and inertia means included in said switching device for causing a momentary throw of the switching device once in each cycle of said displacement and release.

4. In a phonograph including a translating device, and means for relatively moving said device and a record for translation-effecting cooperation thereof: the combination of means for selectively adjusting said device to a predetermined translational condition, and to another condition, with respect to the record; an electrically actu-

ated signal; means connected with said signal for periodically interrupting the supply of current thereto during the operation of said moving means; and means associated with said interrupting means, and having a similar operative connection with said device-adjusting means for uniform control thereby at all positions of the translating device relative to the record, for maintaining continuous the supply of current to said signal when the translating device is adjusted to one of said conditions.

5. In a phonograph including a translating device, and means for relatively moving said device and a record for translation-effecting cooperation thereof: the combination of means for selectively adjusting said device to a predetermined translational condition, and to another condition, with respect to the record; an electrically actuated signal; a switch connected with said signal and controlling the supply of current thereto; means for imparting a periodic opening and closing influence to said switch; and means, having a similar operative connection with said device-adjusting means for uniform control thereby at all positions of the translating device relative to the record, for holding said switch closed when the translating device is adjusted to one of said conditions.

6. In a phonograph including a translating device, and means operable at will for relatively

moving said device and a record for translation-effecting cooperation thereof: the combination of an electrically actuated signal; a switching system, comprising a switch serially connected with said signal and controlling the supply of current thereto, and means operated concomitantly with said moving means for recurrently throwing said switch; and means, included in said switching system, for constraining said switch into closed condition, whereby it is caused to assume that condition whenever said throwing means is out of operation.

7. In a phonograph including a translating device, and means operable at will for relatively moving said device and a record for translation-effecting cooperation thereof: the combination of an electrically actuated signal; a switching system, comprising a switch connected with said signal and controlling the supply of current thereto and throwable from a normal to an opposite condition, and means operated concomitantly with said moving means for recurrently throwing said switch out of said normal condition; and means, included in said switching system, for limiting the throwings of said switch out of said normal condition to momentary throwings only, whereby said switch is caused to be left in said normal condition irrespective of the position at which said moving means stops.

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