

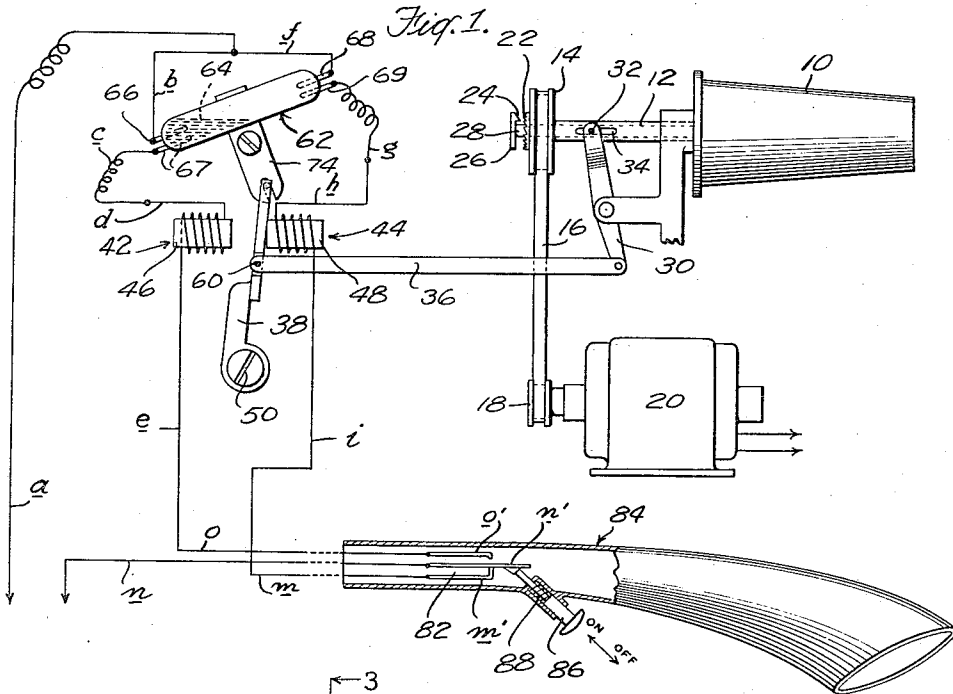
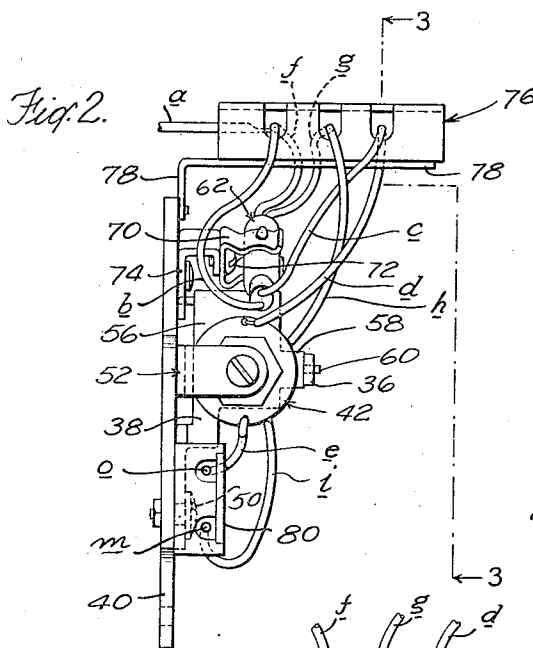
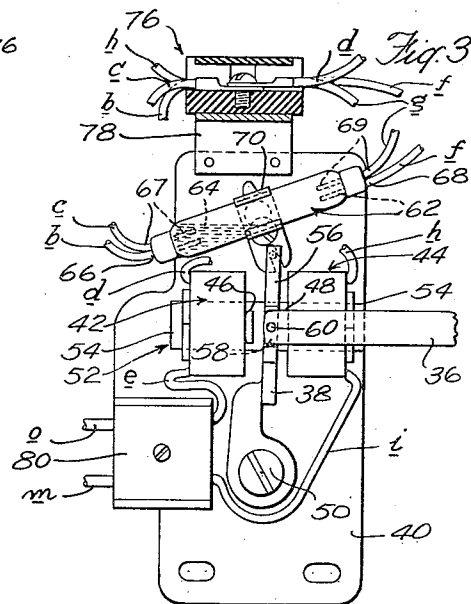
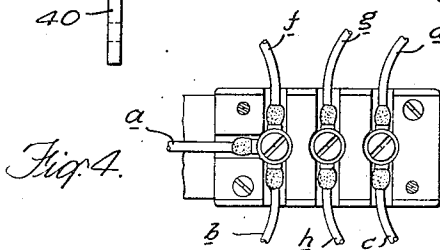
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CLUTCH OPERATING MECHANISM FOR PHONOGRAPHS

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CLUTCH OPERATING MECHANISM FOR
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This invention relates to clutch operation and more particularly to such operation to start and stop rotation of the record support of a phonograph.

An object of the invention is to provide a simple and efficient device of the character described comprising a movable member for operating said phonograph, actuatable between operative and inoperative positions by means of an oscillatory armature oppositely rocked by a pair of electromagnets, in which the alternate energizing of the respective magnets is controlled by a mercury switch oppositely oscillated by the said rocking movements of the armature, the mechanical connection of said switch to said armature and the arrangement of the switch contacts for the respective magnets being such, that the reversal of the magnet connections will not take place until the armature has moved to its extreme position with respect to one or the other of said magnets and, in consequence, the armature actuated movable member has completed its movement to operative or inoperative position.

Another object is to provide a simple arrangement of oscillatable armature and rockable mercury switch whereby the mercury tube and magnet armature are both held in their respective alternate extreme positions by the weight of the mercury in the tube and in the normal use of which it is impossible to reverse the magnet circuit connections before the magnet armature has finished its movement.

Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements and arrangement of parts as will be exemplified in the structure to be hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawing, in which is shown one of various possible embodiments of the mechanical features of this invention,

Fig. 1 is a schematic view showing the start and stop switch mechanism mechanically connected to operate a phonograph clutch, and diagrammatically the electrical devices, circuits and contacts for controlling the operation of said mechanism;

Fig. 2 is a left side elevation of the switch mechanism and connections;

Fig. 3 is a front elevation with the junction box for connecting certain switch wires shown in cross-section on line 3-3 of Fig. 2; and

Fig. 4 is a plan view of the junction box with the cover removed.

Similar reference characters refer to similar parts throughout the various views of the drawing.

Referring to the drawing, in Fig. 1 there is in-

dicated the record support or mandrel 10 of a well known type of commercial phonograph rigidly mounted upon a shaft 12 which also fixedly supports a pulley 14. This pulley is connected by a belt 16 with the pulley 18 mounted upon the shaft of a drive motor 20. The pulley 14 serves as the fixed member of a clutch and is provided on its hub with a plurality of outwardly extending teeth 22 any one of which may be engaged with the single tooth 24 carried by a shiftable clutch member 26. The latter member is rigidly mounted at the outer end of a reciprocatory rod 28 slidably mounted within the bore of the mandrel shaft 12. Reciprocation of the rod 28 to engage and disengage the clutch parts is accomplished by rocking a rocking lever 30 having pivotal connection with the rod 28 by means of pins 32 fixed in the said rod and extending laterally therefrom through slots 34 provided in the shaft 12 for that purpose. The other end of lever 30, which is pivotally mounted near its center on the frame of the phonograph, is pivotally connected to a link 36 which in turn is pivotally connected between the ends of a rockably mounted magnet armature 38.

Referring to Figs. 2 and 3, an upright plate 40, which may be rigidly secured to any suitable portion of the machine frame, is provided to support all of the individual parts of the switching mechanism. This mechanism comprises a pair of aligned electromagnets 42, 44 having cores 46, 48 and the beforementioned armature member 38 which is pivotally mounted at its lower end, as by the shoulder stud 50, upon the plate 40, in such manner as to be oscillatable back and forth between the opposing pole faces of the two magnet cores. These cores are secured to the plate 40 by means of a bracket member 52 having forwardly projecting arms 54 which support the individual cores.

That part of the armature member which is interposed between the magnets comprises a rectangular plate 56 disposed at right angles to the pole axes. Extending forwardly from an edge of the plate and centered substantially in a horizontal plane containing the pole axes, is a projection 58, from which projects, farther to the front, a pin 60 which serves as the pivotal mounting for the left end of the link 36, as seen in Fig. 3. In the schematic showing of Fig. 1 the position of the link 36 has been altered with respect to the magnets 42 and 44 in order to simplify the disclosure.

The mercury switch includes the usual glass tube 62 containing a globule of mercury 64, and sealed in the glass at each end of the tube are a pair of metallic terminals 66, 67, 68, and 69. Each pair of terminals is adapted to complete an electric circuit through one of the magnet coils when the mercury occupies the appropriate end

of the tube. The switch tube 62 is centrally mounted in a clip 70 which, by means of an adjustment screw 72, is supported upon a toggle lever 74. The toggle lever is pivotally mounted upon the plate 40 in substantially vertical alignment with the pivot 50 of the armature at a point between the lower end of said toggle lever and the screw 72. Thus when the lower end of said toggle lever is moved to the right by movement of the armature toward the magnet 44, the upper end carrying the tube is swung to the left and the mercury flows to the left end of the tube to close contacts 66 and 67. Movement of the armature in the opposite direction, of course, has the opposite effect and completes the electric circuit through terminals 68 and 69. The motion of the armature is transmitted to the toggle lever 74 by means of a pin and slot connection between the lower end of the lever and the upper end of the armature.

The current alternately exciting the coils of the magnets 42 and 44 may be taken from any suitable source over the wires *a* and *n*. The wire *a* is connected through the junction box 76 supported upon the plate 40 by means of a bracket 78 to two wires *b* and *f* leading respectively to the switch terminals 66 and 68. A wire *c* from terminal 67 connects through the junction box to a wire *d* connecting with the coil of magnet 42. From this coil a wire *e* connects through a suitable junction box 80, also supported upon plate 40, to a wire *o* leading to the normally open contact *o'* of a single-pole double-throw switch 82 which may be contained in a phonograph hand unit 84. The wire *g* for mercury switch terminal 69 connects through the junction box 76 to a wire *h* connecting with the coil of magnet 44. From this coil a wire *i* connects through the junction box 80 with a wire *m* leading to the normally closed contact *m'* of said switch 82. The other wire *n* from the source extends to a movable contact *n'* of switch 82 which contact is normally biased into closed condition with switch contact *m'*. The circuit at *m'* may be opened and the circuit at *o'* may be closed by manipulating a thumb actuating plunger 86 mounted in the wall of the hand unit 84, which plunger is normally retracted and held in inactive engagement with the movable contact *n'* by means of a biasing spring 88. When the plunger is pressed, the circuit including the coil of magnet 42 is closed provided the mercury switch is in the position shown in the drawing. When the plunger is released the circuit including the coil of magnet 44 is closed provided the mercury switch occupies its position in reverse to that shown.

The operation of the device, though largely obvious, may be briefly described as follows: Assuming the clutch to be disengaged, the magnet and mercury switch being in the position shown in Fig. 1, the hand controlled plunger is pressed closing the circuit through coil of magnet 42. Energizing this magnet causes the armature 33 to be drawn to the left away from the position disclosed in the figure, simultaneously shifting the clutch member 26 into engagement with the driving clutch member on the pulley 14. This immediately starts the phonograph in operation. Because of the fact that the inertia of the mercury in the then lower end of the tube 62, and the centrifugal force tending to hold the mercury in the same end of the tube as the toggle lever 74 rotates on its pivot, both act to prevent the mercury from changing position, the latter continues to close contacts 66, 67 until the armature

completes its throw and comes to a sudden stop. Then the mercury is flung into motion and, aided by gravity, slides down the tube to the opposite end closing contact between terminals 68, 69 and preparing for excitation of magnet 44 as soon as the operator, desiring to stop the machine, releases the plunger 86. When this happens, the magnet armature is shifted to its initial position, as shown, moving the clutch member 26 out of engagement with the driving clutch member thus effecting cessation of machine operation and again shifting the mercury switch to prepare the parts for repeated operation when pressure is again applied to the starting plunger 86.

It is to be understood that the mechanical connections between the armature and the shiftable clutch element are designed and adjusted to complete clutch engagement only when the magnet armature has completed its throw and, simultaneously, full clutch disengagement does not take place until the armature again completes its throw in the opposite direction. Because of this fact and because of the retarded shifting of the mercury until the armature has come to an abrupt stop, no detent means is necessary to prevent deenergization of the magnet coil which is then operative and energization of the opposing coil before the clutch has become fully engaged or disengaged. Nor is any detent means necessary to hold the clutch parts in either terminal position since the resistance of the toggle to movement to straight line position supplemented by the inertia of the mercury effectively maintain the armature in either extreme position. However, this holding effect is quickly and easily overcome when a new magnetic impulse is imparted to the armature.

It will be seen, therefore, that this invention provides simple start and stop mechanism well adapted to attain the objects hereinbefore set forth.

I claim:

1. A start and stop system for phonographs wherein a clutch member for operating said phonograph is rendered operative or inoperative by the alternate energization of the two coils of a magnet whose oscillatory armature lying between said coils is connected to said clutch member and is further connected to operate a switch alternately to open the circuit of one of said coils and to close the circuit of the other thereof, in which the said switch comprises a mercury containing tube having toggle connection with said armature and in which the circuit contacts for one coil are both disposed at one end of the tube and the circuit contacts for the other coil are both disposed at the opposite end thereof, whereby the alternate movements of the armature reversing the flow of mercury back and forth between the opposite ends of the tube serve alternately to close the circuits of the respective magnet coils.

2. A start and stop system as in claim 1 in which the disposition of the coil contacts is such that the circuit contacts of the active coil are open-circuited by the flow of mercury to the other end only after the armature has completed its throw in either direction.

3. A start and stop system as in claim 1 in which the clutch member is mechanically connected to the magnet armature by means which effect complete engagement and disengagement of the clutch only after the armature has completed its throw in the appropriate direction.

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