

Feb. 9, 1937.

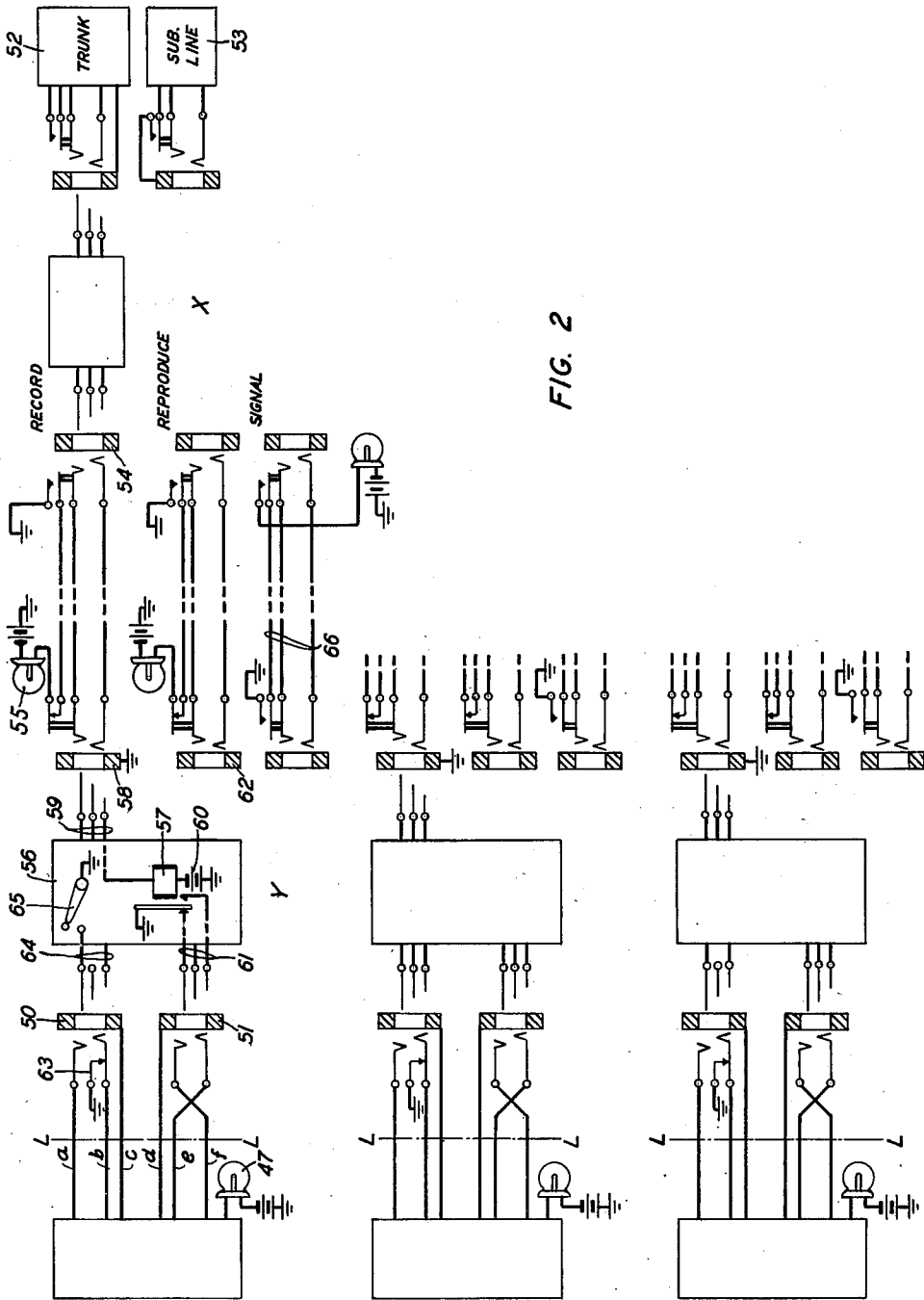
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2,069,841

SAFETY DEVICE FOR PHONOGRAPHS

Filed Feb. 9, 1935

2 Sheets-Sheet 2



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2,069,841

SAFETY DEVICE FOR PHONOGRAPHS

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Application February 9, 1935, Serial No. 5,689

9 Claims. (Cl. 179—100.2)

This invention relates to safety devices for apparatus operated according to a mode of operation which entails the performance of acts in a predetermined sequence. For the purpose of illustration it will be described with reference to a phonograph capable of being used for recording as well as for reproducing purposes.

A typical combined recorder and reproducer is the telegraphophone such as is described in the patent to Poulsen No. 661,619, dated November 13, 1900, wherein a single magnetizable medium is made to cooperate with electromagnets in such a manner that sound may be recorded therein as variations in magnetization, and these variations, upon passing a reproducing electromagnet, can be made to cause variations in the current in the reproducing electromagnet corresponding to those which actuated the recording electromagnet. The medium can be relieved of its record by means of an erasing electromagnet, usually placed just ahead of the recording electromagnet so that one passage of the medium toward the recording electromagnet erases the previous recordation and leaves the medium in condition to receive a new sound record. Thus it is possible to erase a record before it has been reproduced, and if the matter recorded is of great importance, its inadvertent erasure may cause irreparable damage.

The object of this invention is the prevention of an inadvertent impairment or destruction of a medium by an improper sequence of operations.

The preferred means for carrying out this object comprises relays associated with an essential element of the apparatus of which the medium is a part and controlled by an external switch. The switch is adapted to be operated according to the desired sequence and its operation according to any other sequence causes the essential element associated with the relays to become inoperative and thereby prevents the impairment or destruction of the medium. In addition to rendering the essential apparatus inoperative a signal is operated to indicate the cause of the inoperativeness.

In the accompanying drawings which form part of this specification, Fig. 1 is a schematic wiring diagram showing the novel safety device and the connections to the switch used therewith, and Fig. 2 is a schematic wiring diagram showing the novel safety device as applied to a telephone voice recorder.

Referring now to Fig. 1, 10 is a magnetizable

medium, such as a steel wire or tape, which is passed from a supply wheel 11 over guide pulleys 12 and 13 to winding reel 14. Between guide pulleys 12 and 13 are located the polarizing or erasing electromagnet 15, and the translating magnet 16, a depolarizing winding 17 being provided on the latter in accordance with the practice outlined in Patent 1,944,238, dated January 23, 1934 to C. N. Hickman. Each reel is provided with a suitable driving means controllable by individual electromagnetic devices 18, 19, such as electromagnetic clutches and automatic stopping means 20 and 21 are likewise provided for the reels, the stopping means becoming effective when either reel is full. As shown in Fig. 1, the stopping means comprise switches with normally closed contacts, one contact in each switch riding between the walls of its cooperating reel and moving with the magnetizable medium as it is wound on the reel. When a reel is full, the contacts are separated and the electromagnet cooperating with the full reel is rendered inoperative by the break in its circuit.

It is apparent from Fig. 1 and the construction of the apparatus thus far described that a convenient method of preventing re-recording on the tape before a previous message has been reproduced, would be to render reel 14 inoperative except at such times as the associated apparatus is conditioned for operation in proper sequence. It is therefore to this end that the remainder of the apparatus shown in Fig. 1 is designed.

Tracing the circuit through electromagnet 18, it is seen that starting at ground to the right of battery 22, the circuit continues through battery 22, upper contact 23 of relay 24, electromagnet 18, switch 20, blade 25 of three-position switch 26 and thence through either contact 27, 28 to record-reproduce contact of switch 29 and ground. This circuit may be broken at relay 24, switch 26 or switch 29. The means depended upon, however, to break the circuit if switches 26 and 29 are inadvertently set to record twice in succession, is relay 24 and the operation of this relay will now be described.

Assuming that it is desired to record a message on a clear tape or wire, switch 29 is thrown to record-reproduce position and switch 26 is thrown to the right, thereby putting ground on contact 30 through blade 31 and completing the circuit through lower contact 32 of relay 24, one side of the winding of relays 24 and 33, resistance 34 and battery 35 to ground. This causes relay 33 to pull

up thereby putting ground on the other side of relay 24 and rendering it inactive. This means that the circuit through clutch magnet 18 is complete and reel 14 therefore will rotate. With switch 26 in the above position, microphone 36 is connected through blades 37, 38 to the input of amplifier 39, the output of which is connected through blades 40, 41 to voice coil 16 of the translating magnet. The apparatus is now in condition for recording and the operator may, by talking into the microphone, obtain a permanent record of his speech on magnetizable medium 10.

When the record has been completed, switch 26 is placed in mid-position, which removes ground from one side of clutch magnet 18 and stops reel 14. With switch 26 in this position, ground is likewise removed from contact 30 which removes the short across the winding of relay 24 and causes battery 35 to become effective to operate the relay. Both sides of relay 24 therefore pull up and thus break the circuit through clutch magnet 18. Relay 24 remains in this position as long as relay 33 is operated.

Before reproducing, switch 29 is thrown to REW position to put ground through switch 21 on one side of electromagnetic clutch 19, and since battery 45 and ground are connected to the other side of clutch 19, the latter will operate and will continue to operate until switch 29 is thrown to the off position, or until the circuit is broken through safety switch 21. With the tape fully rewound, the message can then be reproduced.

To reproduce, switch 29 is again thrown to record-reproduce position and switch 26 is thrown to the left, putting ground on contact 42 which thereby puts ground on the battery side of relays 33 and 24 and causes them to release. This restores the circuit through clutch magnet 18 and permits reel 14 to be operated. With switch 26 in reproducing position, translating magnet 16 is connected to the input of amplifier 39 through blades 37, 38 of switch 26, and the output of amplifier 39 is connected through blades 40, 41 to loud-speaker 43. Polarizing magnet 15, which functions as the erasing magnet, is connected to battery 44 and ground on one side, and to the back contact of armature 66 of relay 33 to ground on the other side. Since relay 33 is operated only when the apparatus is set for recording, the circuit to ground is not completed and the recorded message therefore is not erased by the reproduction.

When the reproduction is completed, switch 26 is thrown to its middle position, which does not alter the condition of relays 24 and 33 but leaves them in readiness for the next recording. The message can be reproduced a number of times if desired, each reproduction, of course, being preceded by a rewinding operation.

The procedure described to this point is the one ordinarily followed if the apparatus is used as it should be. If, however, it is inadvertently attempted to record before a message has been reproduced, the following takes place:

Assuming that a message has been recorded, switch 26 is in its middle position and tape or wire 10 is rewound on reel 11, it is obvious from the foregoing description that relays 24 and 33 will be in operative position, and that the circuit through electromagnetic clutch 18 will be broken. If, now, instead of throwing switch 26 to the reproducing position it is thrown to the recording position, ground will be put on the lower back contact 46 of relay 24 and will have no effect upon the operation of either relay. The circuit

through electromagnetic clutch 18 will therefore remain broken and the clutch will be inoperative. To indicate to the operator the reason for the inoperativeness of the apparatus, a lamp 47 and battery 48 are connected to lower rear contact 46 and ground so that throwing switch 26 to recording position twice in succession causes lamp 47 to light. Instead of a lamp or other visual signal, an audible signal such as a bell may be used.

The telegraphone is particularly well adapted to telephone message recording. It provides a record which does not require any processing to acquire a permanent form. No material is removed from the medium during the recordation and the apparatus can readily be controlled from a distance. Since a telephone message recorder is of necessity operated from a distance, it is particularly important that safeguards be provided to insure its proper operation.

In Fig. 2 is shown a schematic diagram of a telegraphone used for recording messages for hotel guests. The apparatus to the left of broken line L—L of Fig. 1 is shown simply as a rectangle with the exception of signal lamp 47 and its co-operating battery. The apparatus to the right of the aforementioned line in Fig. 1 is replaced by a double jack, the upper jack being designated 50 and the lower jack 51. The leads to switch 26 of Fig. 1 at line L—L may be designated from top to bottom a, b, c, d, e and f.

Referring now to Fig. 2, two separate switch-boards X and Y are shown. The X-board is the main board or hotel P. B. X. position through which calls from trunk line 52 or subscriber's line 53 are routed to guests at the hotel. Several trunk lines and several subscribers' lines may, of course, be used. The Y-board may be termed the message recording position and it is controlled by a special operator whose duty it is to connect subscribers' lines to the telegraphone message recorders.

The P. B. X. operator, on receiving a call, either from trunk 52 or subscriber's line 53, connects the calling party to the guest's line. If no answer is received from the guest's line, the operator informs the calling party of the fact and also inquires whether the latter would wish to leave a recorded message. If the answer is in the affirmative the calling party is told that he may give his message as soon as he receives a signal to begin. The P. B. X. operator then plugs into recording jack 54 which lights a lamp 55 on the message recording position and indicates to the operator that a message is to be recorded on that line. The latter operator plugs into a telegraphone line which she believes to be unused. In the cord circuit 56 between the telegraphone and incoming recording line is a relay 57, the function of which is to put ground on lead e when it is desired to record and on lead f when it is desired to reproduce. Accordingly, the sleeve of each recording jack 58 on the message recording position is grounded and one side of relay 57 is connected to the sleeve contact of plug 59. Since the other side of relay 57 is connected to battery 50 and ground, inserting plug 59 into jack 58 pulls up relay 57 and puts ground on its back contact, which is connected through the sleeve contacts of plug 61 and lower jack 51 to lead e of the telegraphone circuit. The sleeve contact of reproducing jack 62 is not grounded and hence on plugging into the reproducing jack relay 57 does not operate and ground is transferred from the back contact of relay 57 to the

front contact, which is connected through plug 61 and jack 51 to lead *f*. Thus control relays 24 and 33 are operated in the same manner as was described with reference to Fig. 1. If the operator should inadvertently plug into a recording jack the associated telegraphone of which contains an unreproduced message, the warning lamp 47 will light and the operator will be notified thereby of her mistake. When an unused telegraphone is found, the message recording operator tells the calling party that he may begin, and plugs into the recording jack.

In the telegraphone as used with the telephone message recorder there is one important change in the rewind circuit, namely, lead *b* is connected directly to the lead from switch 21. The connection is shown dotted in Fig. 1. The purpose of this change is to place the control of the rewinding, reproducing and recording operations within reach of the message recording operator. The manner in which this is done is shown in Fig. 2. Ground is supplied to the rewind relay through contact 63 and the ring contact of upper jack 50, the latter being connected to lead *b*. When plug 64 is inserted into jack 50, ground is removed from rewind clutch magnet 19 and the latter therefore ceases to operate. Upon the removal of plug 64, rewind clutch magnet 19 is grounded and becomes operative until stopped by safety switch 21. The operation of rewind clutch magnet 19 is therefore automatic and requires no attention on the part of the operator. A start-stop switch 65 is included in the cord circuit of the message recording position to enable the operator to control the operation of electromagnet 18. The switch simply grounds the tip contact of plug 64, which when inserted into upper jack 50 puts ground on lead *a* and thereby operates electromagnet 18. This function, in the apparatus of Fig. 1, is performed by switches 26 and 29.

If the message being recorded requires more than one reel of wire or tape, the message recording operator can, for example, by timing the message, estimate how much longer the telegraphone will operate and can give the P. B. X. operator a warning through signal line 56. The latter operator can interrupt the calling party and relay the information to him. If the message can not be terminated before the reel is completely filled, the calling party stops at a convenient point and the message recording operator then transfers the remainder of the message to another recording unit, after which the message is continued until completely recorded.

In the cord circuit of the message recording position there is also included a suitable amplifier which is switched into and out of the cord circuit in accordance with the disclosure in a copending application of C. N. Hickman, Serial No. 602,186, filed March 21, 1932, and since the amplifier switching means is not a part of this invention, no detailed description of it is included here.

The application of the safety device is not limited to a telephone system, or to a telegraphonic phonograph, and the above description therefore may be taken merely as illustrative of the mode of operation of the invention, the limits of the invention being defined only by the appended claims.

What is claimed is:

1. In a recording phonograph, a record receiving medium, means for effacing the record in the medium, driving means for the record medium, and automatic means for rendering the driving means inoperative upon a premature operation of

the effacing means to prevent the effacement of a record before said record is reproduced.

2. In a recording phonograph, a record receiving medium, recording apparatus cooperating therewith, driving means for the medium, and means for rendering the driving means inoperative upon an attempt to record over a record already received by the medium to avoid impairing either or both records.

3. In a combined recording and reproducing phonograph, a record receiving medium, means for recording upon the medium, means for reproducing from the medium, and means rendering the recording means inoperative after it has once cooperated with the record receiving medium and until the reproducing means has cooperated therewith to avoid impairing the record to be reproduced.

4. In a telegraphonic phonograph, a magnetizable body, recording, reproducing and erasing magnets cooperating therewith, driving means for the magnetizable body, and automatic means associated with the erasing magnets and adapted to render said driving means inoperative upon an attempt to re-record before first conditioning the phonograph for reproducing.

5. In a combined recording and reproducing phonograph, a record receiving medium, electric means for driving the medium, means for breaking the circuit through the electric driving means, said circuit breaking means comprising a pair of relays, the first of which controls the second, and the second of which controls the electric driving means, and exterior switching means connected to the relays and adapted to render said first-mentioned relay operable and the second relay inoperable, whereby sound may be recorded upon the medium, and to render both relays operable upon an attempt to record over the recorded sound whereby the circuit through the electric driving means is broken and damage to the recorded sound is prevented.

6. A phonograph, driving means therefore, an electric circuit to operate the driving means, relay means for breaking the circuit, one side of said relay being connected to an energizing means and ground, a second relay for putting ground on the other side of said first-mentioned relay, one side of said second relay being connected to an energizing means and ground, means on said first-mentioned relay to lock said second-mentioned relay in operative position, and external switching means for selectively putting ground on the free side of said second relay to shunt down said first-mentioned relay or on the energy side of said first-mentioned relay to shunt down both relays, whereby the driving means for the phonograph may be operated only upon first putting ground on the free side of the second relay, removing the ground therefrom and putting it on the energy side of said first-mentioned relay to insure the operation of the phonograph in accordance with a predetermined sequence.

7. Apparatus as in claim 6, recording means, reproducing means, and means for associating the external switching means with the recording and reproducing means, whereby the phonograph is rendered inoperative unless it is associated with the reproducing means after it is associated with the recording means to prevent the impairment of a record before its contents can be ascertained.

8. In a telegraphonic phonograph, a magnetizable medium, means for driving the medium, means for recording upon the medium, means for reproducing from the medium, and means for

rendering said recording means inoperative except after said reproducing means has been used, to prevent the impairment of a record by the superposition of a second record thereon.

- 5 9. In a combined recording and reproducing phonograph, a record receiving strip, means for driving the strip, recording and reproducing

means adapted to cooperate with the strip, and means for rendering the driving means inoperative upon an attempt to record upon the strip before a previous record thereon has been reproduced, to prevent the impairment of a record 5 before the record has been reproduced.

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