

July 22, 1952

A. B. SACK ET AL

2,604,547

AUTOMATIC SOUND REPRODUCER

Filed June 24, 1949

2 SHEETS—SHEET 1

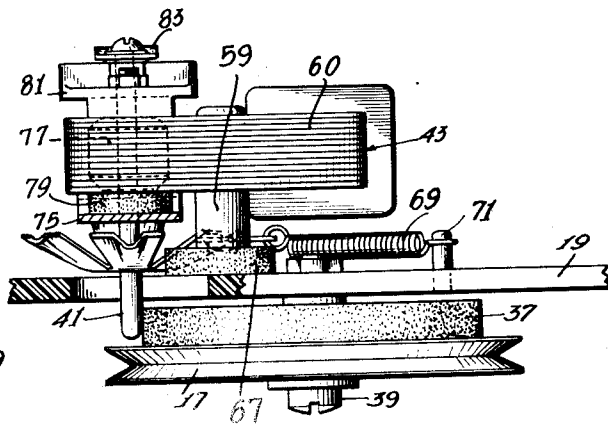
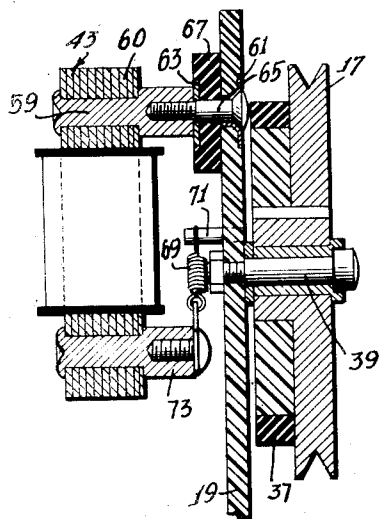
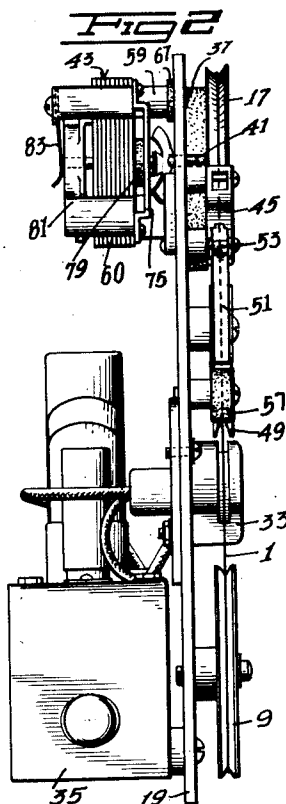
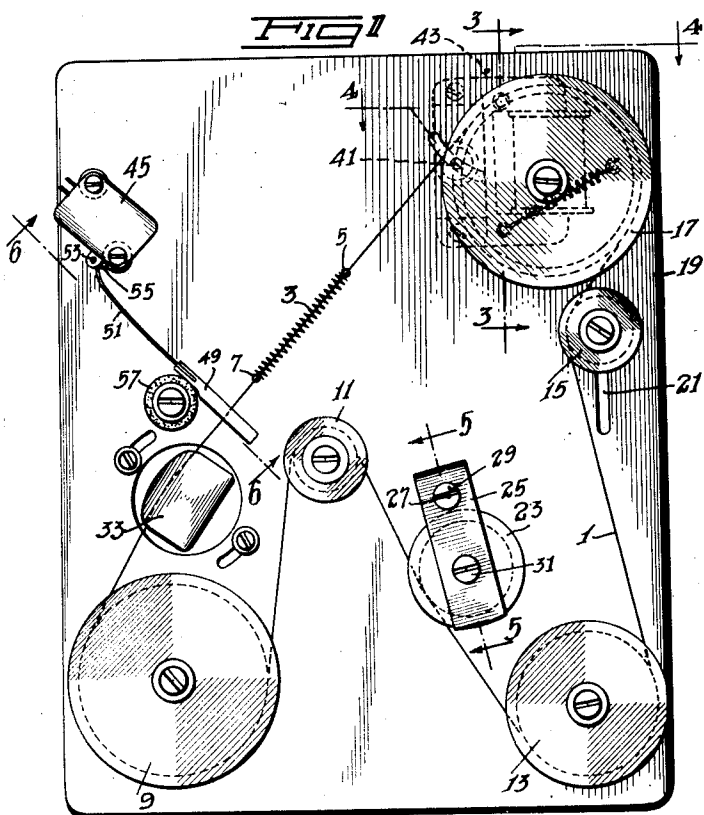


FIG 3

FIG 4

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2 SHEETS—SHEET 2

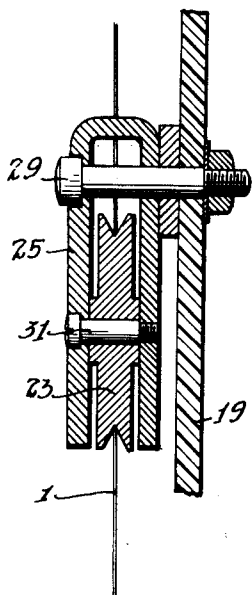


FIG 5

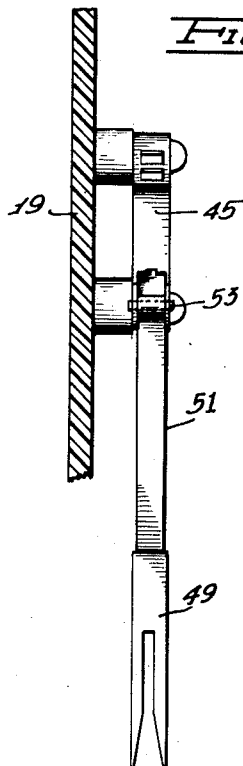


FIG 6

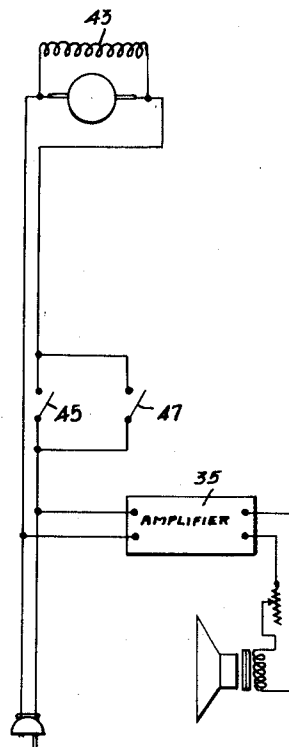


FIG 8

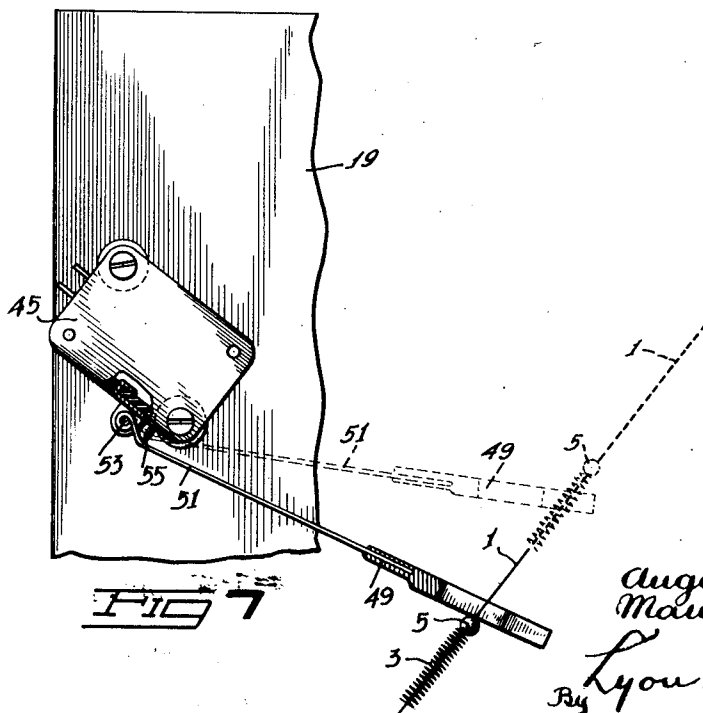


FIG 7

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2,604,547

AUTOMATIC SOUND REPRODUCER

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Application June 24, 1949, Serial No. 101,024

9 Claims. (Cl. 179—100.2)

1

This invention relates to an automatic sound reproducer and more particularly to a device for reproducing a message which will, at the completion of the message, automatically cease operation.

Many types of sound reproducing devices currently available are unsatisfactory for certain uses wherein it is desired to continuously repeat a single, often a brief message, on a given signal without either manual control or the need for, in some way, resetting the device. For instance, in recent years the use of mechanical dispensers for vending certain types of objects, in particular cigarettes, has come into widespread use. It is desirable to provide a sound reproducer which will audibly reproduce some predetermined courteous statement for the hearing of the purchaser each time the vending machine is operated. Such a device must be simple, compact and reliable. In addition, it must be operable at rapid intervals.

It is a general object of this invention to provide a sound reproducer which will, at a given signal reproduce a message and which will, at the completion of that message automatically cease operating.

A more particular object of this invention is to provide such a device for a vending machine which will operate automatically each time a purchase is made from the vending machine, and which will automatically cease operation at the conclusion of the desired statement.

A further object of the invention is to provide such a device of such compactness that it can be readily installed in the majority of commercial vending machines.

An additional object of this invention is to provide such a device of such character that it will be inexpensive to manufacture, install and maintain in operation.

A further object of this invention is the provision of such a device utilizing a single closed magnetic wire loop having magnetically recorded thereon the statement which it is desired to reproduce.

A still further object of this invention is the provision of such a device wherein a single closed magnetic wire loop is automatically passed through a magnetic playback head one complete revolution each time a purchase is made from the vending machine, and at the completion of which revolution the device becomes inoperative.

Other objects and advantages of the invention will be apparent during the course of the following description.

2

In the accompanying drawings forming a part of this specification:

Figure 1 is a front elevation of an automatic sound reproducer embodying our invention.

Figure 2 is an end view of the sound reproducer. Figure 3 is a vertical section taken on line 3—3 of Figure 1.

Figure 4 is a sectional top view taken substantially on the line 4—4 of Figure 1.

Figure 5 is a sectional end view taken substantially on the line 5—5 of Figure 1.

Figure 6 is a sectional view taken substantially on the line 6—6 of Figure 1.

Figure 7 is an enlarged fragmentary front elevation showing the operation of the switching mechanism.

Figure 8 is a simplified circuit diagram of the sound reproducer.

Referring now to the figures, a magnetized recording wire 1 joined to form a closed loop by means of a spring 3 connected to the ends of the wire 1 by beads 5 and 7 is carried by a plurality of pulleys 9, 11, 13, 15 and 17. The pulleys are journaled so as to freely rotate upon mountings which are mounted upon a supporting board 19 in any suitable manner. The pulleys are located on the board so as to accommodate the full length of the recording wire 1 and maintain the wire 1 in a condition of mild tension. As seen in Figure 1, the position of pulley 15 is made adjustable by means of the slot 21 whereby the pulley 15 can be located at any desired position on the slot. In this manner, the position of pulley 15 can be varied so as to accommodate slight changes in the length of different recording wires 1 which may be used on the device. In order to further insure that the recording wire is maintained under mild tension so as to prevent it from running off the pulley track, or from breaking if the device be jarred, a take-up pulley 23 is provided. The said take-up pulley is pivotally mounted upon the supporting board 19 by means of a pivoting yoke 25 which is journaled upon a bolt 29, which bolt 29 is fixedly mounted on the board 19. The take-up pulley 23 is freely rotatable upon a bolt 31 by means of which it is supported in the pivoting yoke 25. As seen in Figure 1, the take-up pulley 23 will tend to pivot about point 27 to a vertical position. The combined weight of the pulley 23 and the pivoting yoke 25 will therefore exert a force upon the recording wire 1 and take up any slack in the said wire, thereby maintaining it on the pulley track under tension.

As seen in Figure 1, the recording wire 1 passes

through a magnetic playback head 33 which is secured to the board 19. The output of the magnetic playback head 33 is fed to a suitable audio amplifier 35 mounted at the back of the board 19. The operation of a magnetic playback head and the audio amplifier is well known and will not be here described. After sufficient amplification, the signal from the magnetic playback head is applied to a suitable spaker, not shown.

Pulley 17 is utilized as a drive pulley to drive the recording wire 1 through the magnetic playback head 33 in the following manner. Referring now to Figures 3 and 4, it is seen that fixedly mounted on pulley 17 is a drum 37. Pulley 17 and drum 37 are journaled upon a bolt 39 which is fixedly mounted upon the supporting board 19. Pulley 17 is positively driven by means of the drive shaft 41 of a suitable motor 43 which frictionally engages the drum 37. The drum 37 is constructed of rubber or other resilient material so as to prevent slipping between the drum and the drive shaft 41. The periphery of the pulley 17 is V-shaped with the result that the pulley will grip the recording wire and prevent undue slippage between the pulley and wire as the pulley is driven.

As apparent from the above description, when electric energy is applied to the motor 43 the pulley 17 will drive the recording wire 1 through the magnetic playback head 33. The magnetic variations in the recording wire 1 which correspond to the desired audible signal will be transformed into voltage variations by means of the magnetic playback head 33. These voltage variations are amplified by the amplifier 35 and utilized to drive a loud speaker, thereby audibly reproducing the message magnetically recorded on the recording wire.

In order to provide a suitable sound reproducer for a vending machine it is necessary that the device be activated to respond for a single cycle only each time a purchase is made from the vending machine in which the device is installed. To achieve this result a system of switches is provided whereby when the coin plunger on the vending machine is used electrical energy is applied to the motor 43. This operation serves to close a second switch in the motor power supply line. When the device has completed a single cycle of operation, that is when the full length of the recording wire has passed through the playback head 33, the second switch is opened so as to cut off the supply of electrical energy to the motor 43, thereby removing the drive from drive pulley 17 and stopping the device.

Figure 8 illustrates schematically the electric circuitry in the device. Thus, it is seen that two parallel switches 45 and 47 are placed in the power supply connections for the motor 43. If either of these switches be closed, power will be applied to the motor. In the embodiment of the invention shown, the operation of the coin plunger in the vending machine serves to close switch 47. This operation applies power to the motor 43 which drives the recording wire 1 through the magnetic playback head 33 as heretofore described. The spring 3 and beads 5 and 7, later to be described, serve to hold switch 45 open. When the recording wire 1 is driven a slight amount, however, switch 45 is released and thereby closed. Switch 47 will be open when the coin plunger of the vending machine is released. At this time, however, switch 45 will be closed and the flow of current to the driving motor will not be interrupted. The recording wire 1 is driven a com-

plete cycle at which time the aforementioned spring and head assembly in a manner now to be described opens switch 45 thereby opening the power circuit to the motor 43 and arresting the operation of the device.

Referring now to Figures 1, 6 and 7, the operation of switch 45 will be described. As previously described the recording wire 1 is joined to form a closed loop by means of a spring 3 and beads 5 and 7. Straddling recording wire 1 is the bifurcated end member 49 of the arm 51 which is pivotally connected at 53 to the switch 45. The arm 51 is preferably constructed of spring steel or similar material and tends to force the end member 49 downwardly. Arm 51 contacts a pin 55 which projects from the switch 45. The switch 45 is open when the pin 55 is forced inwardly and is closed when the pin 55 is released. Such a switch is in common usage and is well known. Referring to Figure 7, the operation of the switch is illustrated. As the wire 1 is driven in the direction shown by the arrow the bead 5 will engage the bifurcated end member 49 of the arm 51. The beads 5 and 7 and the spring 3 being of larger diameter than the wire 1 will not pass freely through the said end member 49 but will engage it driving it upwardly to the position shown in dotted lines in Figure 7. When the arm 51 is in this upward position it will force the pin 55 upwardly thereby opening the switch 45 and cutting off the power to the motor 43. At this time the movement of the wire will, of course, cease. When the switch 47 is closed by the operation of the coin plunger in the vending machine, power will flow to the motor 43 which will again drive the recording wire 1 in the direction indicated. This will be a sufficient time, however, for the compression spring 3 and bead 7 to be disengaged from the member 49. When the coin plunger is released with the result that switch 47 is again open, switch 45 will have been closed with the result that the motor 43 will drive the recording wire 1 without interruption.

While the bead 5 will drive the arm 51 upwardly so as to open switch 45, the momentum of the recording wire 1 may cause the bead 5 to slip past the end member 49 thereby allowing the arm to spring downwardly closing switch 45. In order to prevent the arm 51 from falling back sufficiently far to release the pin 55 and thereby close the switch 45, the compression spring 3 is utilized. Even though the momentum of the recording wire 1 carries bead 5 slightly beyond end member 49, the said member will rest upon the compression spring 3 at such a height that the switch will remain open.

When the switch 47 is closed by the operation of the coin plunger of the vending machine the motor 43 will again drive the recording wire 1 in the direction indicated. The compression spring 3 and the bead 7 will be driven past the end member 49 of the switch arm 51. The arm 51 will then swing downwardly, coming to rest upon a bumper 57. The bumper 57 mounted upon the supporting board 19 is preferably constructed of rubber or other resilient material. Bumper 57 serves to prevent end member 49 from striking against the playback head 33. When the switching arm 51 is in this position, the pin 55 has been released a sufficient amount to close switch 45. The switch 47 will remain closed only during the time which the coin plunger is being operated.

Referring now to Figures 2, 3 and 4 the driving motor 43 is seen to be a low power alternating

current motor, the general characteristics of which are well known. The motor 43 is pivotally mounted to the supporting board 19 by a stud 59, which is attached to the laminated iron core 60, washers 61 and 63, a screw 65 and a large rubber washer 67. With such mounting the stud can, due to the resiliency of the rubber washer 67 against which the washers 63 and 61 are firmly engaged, pivot over a few degrees thereby pivoting the motor on the supporting board 19. A tension spring 69 is secured to the supporting board 19 at one end by a stud 71. The other end of the tension spring is secured to a stud 73 which is attached to the laminated iron core 60 of the motor 43. The spring 69 tends to pivot the motor about its mounting in such manner that the drive shaft 41 of the motor will be firmly pressed against the drum 37 of the driving pulley 17. In this manner the motor 43 will smoothly drive the drive pulley 17. The effect of any jarring of the vending machine which might otherwise serve to momentarily disengage the drive shaft 41 from the drum 37 and thereby cause the recording wire 1 to pass through the playback head 33 in a jerky and uneven fashion will be prevented by the action of the spring 69. The drive shaft 41 is journaled in a bracket 75 the ends of which are attached to the laminated iron core 60 as seen in Figure 2. Fixedly mounted upon the drive shaft 41 is the motor armature 77 and a washer 79. Washer 79 is preferably constructed of a material such as cork which will present a relatively high surface friction. Mounted at the rear of the motor on a bracket 81 in which is journaled the drive shaft 41 is a leaf spring 83. Leaf spring 83 serves to force the washer 79 against the bracket 75. With this arrangement when the power to the motor 43 is cut off friction between the bracket 75 and washer 79 serves to quickly stop the rotation of the drive shaft and in that way acts as a brake on the drum 37, hence the drive pulley 17. This braking action insures that the momentum of the system will not carry the bead 7 and spring 3 sufficiently far to release end member 49 and thereby close switch 45 at the completion of a cycle of operation.

While the function of the spring 3 in maintaining the switching arm 51 in a position to open switch 45 has heretofore been described, the spring 3 has a second and equally important function. One of the principal difficulties encountered in magnetic wire reproducers is the breaking of the recording wire if the instrument is jarred or if for any other reason the wire is driven in a jerky or uneven fashion. This difficulty is intensified in the device herein described because of the presence of the beads 5 and 7. Each time one of these beads passes over one of the pulleys, the result is to abruptly increase the tension on the wire. The spring 3, however, prevents this action from unduly straining the wire. As heretofore described, spring 3 joins the ends of the wire in a closed loop. The elasticity of the spring therefore serves to compensate for any increased tension on the wire and to thereby prevent breakage of the wire.

The operation of the sound reproducer is as follows: When a purchase is made from the vending machine and the coin plunger is operated the switch 47 closes the circuit to the motor 43 with the result that the drive shaft of the motor will frictionally drive the drum 37, hence the drive pulley 17. While the coin plunger is being operated the recording wire 1 will be driven

a sufficient distance for the compression spring 3 and the bead 7 to have passed beyond the bifurcated end member 49 of the arm 51 at which time the arm 51 will fall to the rubber bumper 57. This will release the pin 55 which will close the switch 45. At some time shortly after switch 45 is closed the coin plunger in the vending machine will have been released with the result that switch 47 will be opened. The motor 43 will drive the drive pulley 17 and hence the recording wire 1 through a single cycle at which time bead 5 will contact the end member 49 of the arm 51. The bead 5 will carry the arm 51 upwardly with the result that pin 55 will be forced upwardly so as to open switch 45. Due to the momentum of the various parts of the system, the bead 5 will usually slide beyond the end member 49. Its travel will, however, be limited due to the motor braking action heretofore described. The compressed spring 3 will, however, prevent the end member 49 from falling to its normal position against bumper 57 and will therefore maintain switch 45 in an open condition. Momentum of the various parts will not cause the spring 3 to slide beyond the end member 49 due to the braking action resulting from the frictional engagement of the bracket 75 and the washer 79. Until such time as the switch 47 is again closed by the operation of the coin plunger the device will remain idle.

It is contemplated that in the embodiment of the invention above described a single message will be magnetically recorded upon the wire 1, such as an advertising slogan or a courteous remark thanking the customer for making the purchase. A compact, sound reproducer is provided which utilizes but a single loop of recording wire and which will automatically repeat the single message impressed thereon each time a purchase is made from the vending machine in which the device is installed. In addition, the device will automatically shut itself off at the completion of the desired message.

It is to be understood that our invention may have other applications than its use in a mechanical vending machine. Thus, it may be used whenever it is desired to automatically reproduce on a given signal a single message a single time only.

It is to be further understood that our invention is not limited to a recording wire having but a single message recorded thereon. Thus, if it be desired to reproduce a series of messages in some predetermined sequence a bead and spring assembly need only be placed at the end of each message. The movement of the recording wire will be interrupted, in the manner heretofore described, at the completion of each such message, and will continue only when the device is again activated by momentarily applying power to the driving motor.

It is also to be understood that the form of our invention herewith shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of our invention or the scope of the subjoined claims.

Having thus described our invention, we claim:

1. In an automatic sound reproducer, a magnetic pickup head, a driving motor, a recording wire, a bead joining the ends of the said recording wire in a closed loop, a switch, means operable to open and close said switch extending into the path of travel of said recording wire and acting to arrest the movement of the recording wire

through the magnetic pickup head after the recorded intelligence on the said wire has once been reproduced by opening the said switch and thereby cutting off the source of power to the drive motor when the said bead engages the said means, and a spring attached to the said bead, having a cross-section substantially in excess of said wire and acting to maintain said means in such position that the switch is open.

2. In an automatic sound reproducer, a magnetic pickup head, a recording wire, means joining the ends of the recording wire in a closed loop, a driving motor for driving the recording wire through the pickup head, a switch in the power supply leads to the motor, a switching arm attached to the said switch said means operable to engage the said switching arm and thereby to open the said switch to cut off the power to the said driving motor after the recording wire has been driven through the magnetic pickup head a single time, and additional means attached to the first mentioned means for engaging the said switching arm and thereby maintaining the said switch in its open position, said additional means including a longitudinal member along the said wire having a cross-section substantially in excess of said wire.

3. In an automatic sound reproducer, a magnetic pickup head, a recording wire, means joining the ends of the recording wire in a closed loop, a driving motor for driving the recording wire through the pickup head, a switch in the power supply leads to the motor, a switching arm attached to the said switch said means operable to engage the said switching arm and thereby to open the said switch to cut off the power to the said driving motor after the recording wire has been driven through the magnetic pickup head a single time, additional means attached to the first mentioned means for engaging the said switching arm and thereby maintaining the said switch in its open position, said additional means including a longitudinal member along the said wire having a cross-section substantially in excess of said wire, and a second switch connected in parallel with said first mentioned switch and operable to close the power circuit to the said driving motor.

4. In an automatic sound reproducer, a magnetic pickup head, a recording wire having magnetically recorded thereon a plurality of messages, a driving motor for driving the recording wire over the pickup head, a switch in the energizing circuit for the said driving motor, a switching arm linked to the said switch and operable to open and close the said switch, members spaced on the said recording wire at intervals corresponding to the end of each message recorded on the wire, said members engaging the said switching arm, opening the said switch and thereby deenergizing the said driving motor after the reproduction of each message, and additional members attached to said first mentioned members and engaging the said switching arm to maintain the said switch in an open position, said additional members including a longitudinal portion extending along said wire and having a cross-section substantially in excess of said wire.

5. In an automatic sound reproducer, a magnetic pickup head, a recording wire having magnetically recorded thereon a plurality of messages, a driving motor for driving the recording wire over the pickup head, a switch in the energizing circuit for the said driving motor, a switching arm linked to the said switch and operable to open

and close the said switch, members spaced on the said recording wire at intervals corresponding to the end of each message recorded on the wire, said members engaging the said switching arm, opening the said switch and thereby deenergizing the said driving motor after the reproduction of each message, additional members attached to said first mentioned members and engaging the said switching arm to maintain the said switch in an open position, said additional members including a longitudinal portion extending along said wire and having a cross-section substantially in excess of said wire, and a second switch, connected in parallel with said first mentioned switch and operable to energize the said driving motor.

6. In an automatic sound reproducer, a magnetic pickup head, a closed loop recording wire, members located on the said recording wire at a position corresponding to the end of the message recorded thereon, a driving motor for driving the recording wire over the magnetic pickup head, a switch in the energizing circuit for the said driving motor, a switching arm linked to the said switch and operable to open and close the said switch, said members engaging the said switching arm and retaining the said switching arm in a position opening the said switch at the completion of the message recorded on the said recording wire, a second switch connected to parallel with the first mentioned switch and operable to close the energizing circuit to the said driving motor, the driving motor when so energized by the closing of the second switch acting to drive the said members a sufficient distance to disengage the said switching arm and thereby close the first mentioned switch, and means for then opening the said second mentioned switch.

7. In a sound reproducer of the type utilizing a wire having magnetically recorded thereon the desired intelligence, a magnetic pickup head, a driving motor for driving the wire over the pickup head, a pair of switches connected in parallel in the energizing circuit of the driving motor, a switching arm associated with one of the said switches and operative to open the said switch, means mounted upon the said wire to engage the said switching arm at the completion of the reproduction of the intelligence so as to open the said one switch, and means for closing the other switch so as to energize the driving motor and disengage the said first mentioned means from the said switching arm.

8. In an automatic sound reproducer of the type utilizing a magnetic pickup head, a closed loop recording wire having recorded thereon the desired intelligence, a magnetic pickup head, a driving motor for driving the wire over the pickup head, a pair of switches connected in parallel in the energizing circuit of the driving motor, a switching arm associated with one of the said switches and operative to open the said switch, means mounted upon the said wire to engage the said switching arm at the completion of the reproduction of the intelligence so as to open the said one switch, additional means associated with said first mentioned means to engage the said switching arm and thereby to maintain the said one switch in its open position, and means for closing the other switch so as to energize the driving motor and disengage the said second mentioned means from the said switching arm.

9. In an automatic sound reproducer, a magnetic pickup head, a driving motor, a recording wire, a spring, beads joining the said recording

wire and spring in a closed loop, a switch, a switching arm attached to the said switch and extending into the path of travel of the said recording wire, the said spring operating to engage the said switching arm and to thereby arrest the movement of the recording arm through the magnetic pickup head after the recorded intelligence on the said wire has been once reproduced by opening the said switch and thereby cutting off the source of power to the driving motor.

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