July 29, 1947. W. P. LEAR 2,424,697

MAGNETIC RECORDER

Filed May 12, 1945 3 Sheets-Sheet 1

Fig. 1

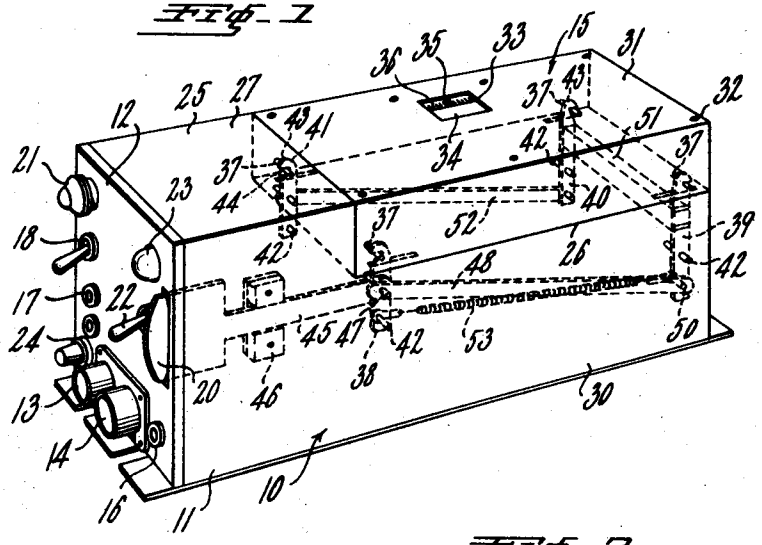
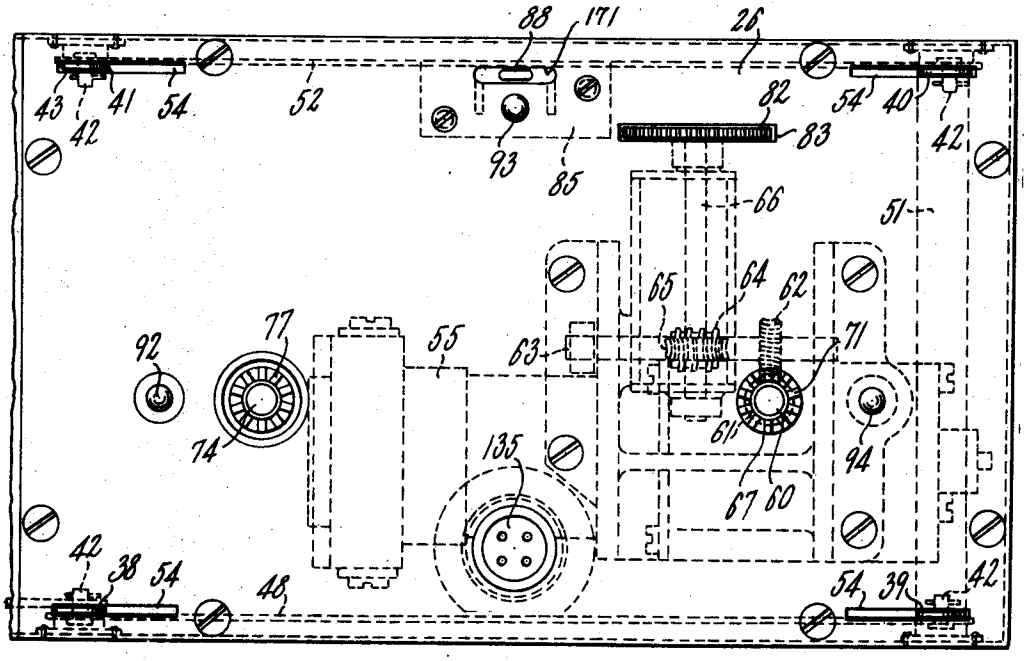


Fig. 2



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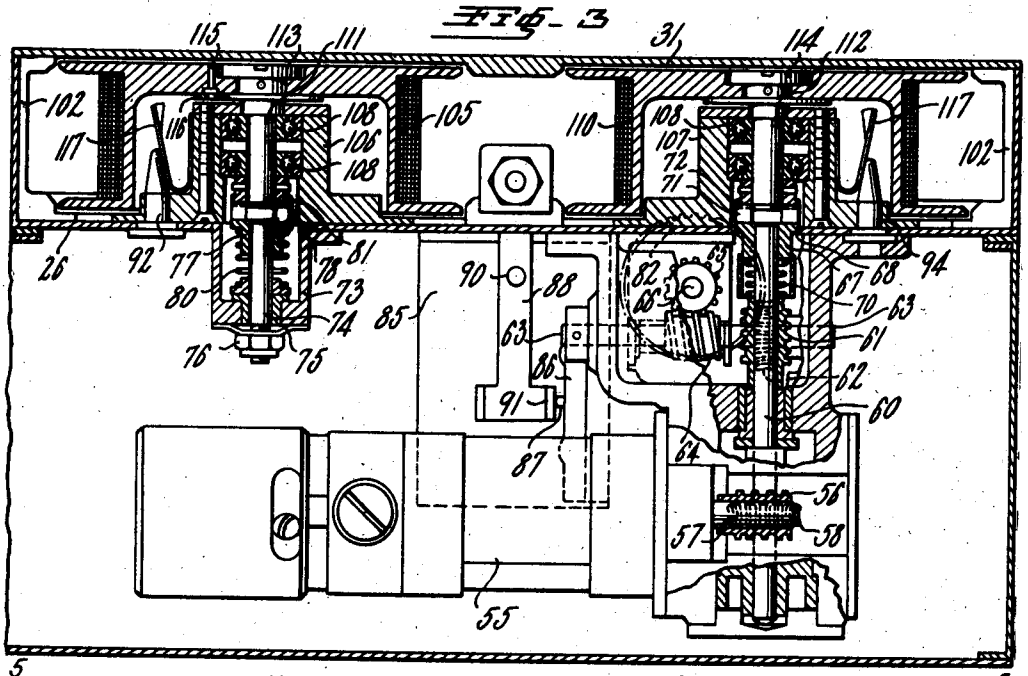
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MAGNETIC RECORDER

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Fig. 3



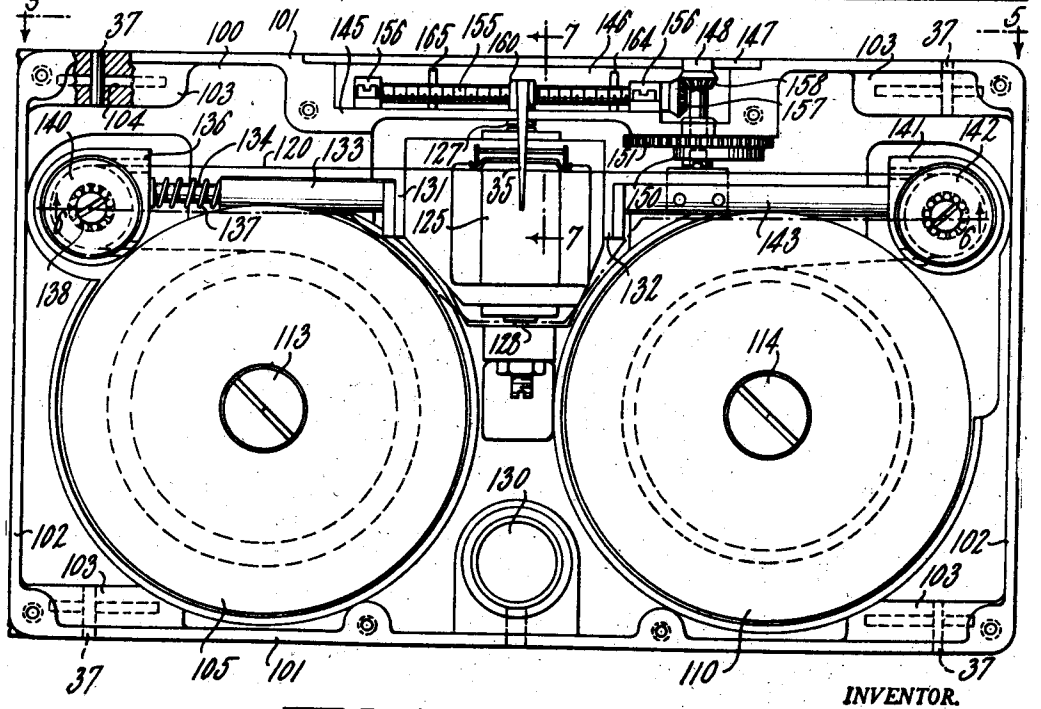


Fig. 4

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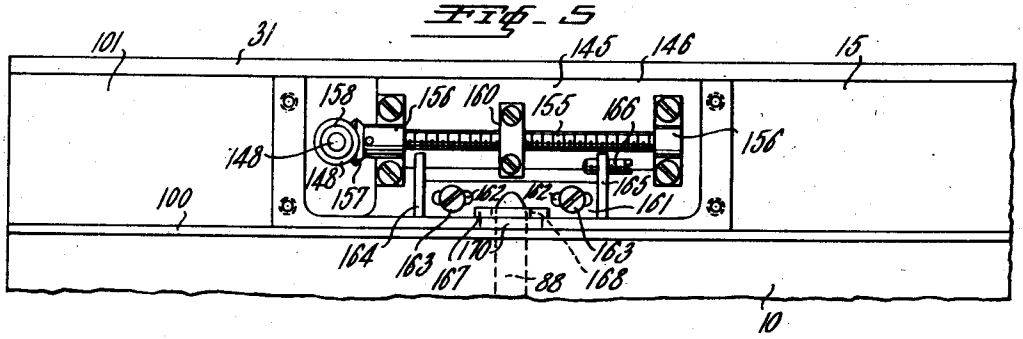
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MAGNETIC RECORDER

Filed May 12, 1945 3 Sheets-Sheet 3

Fig. 5



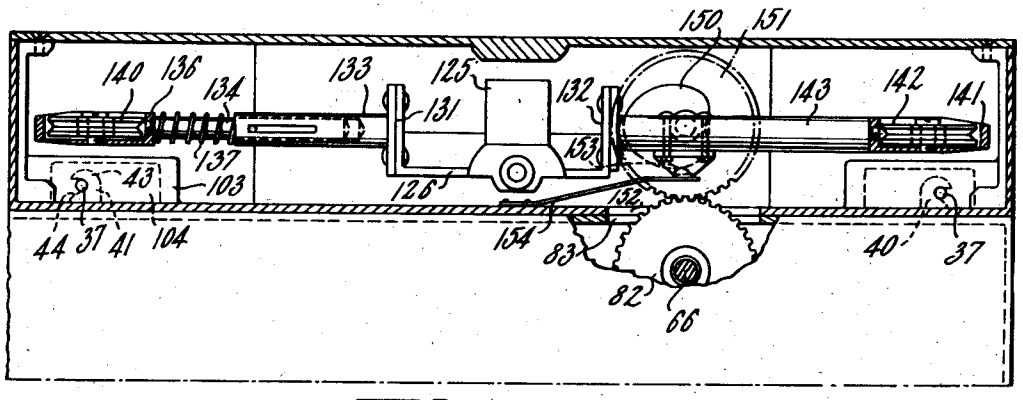


Fig. 6

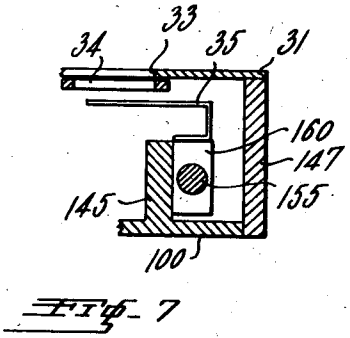


Fig. 7

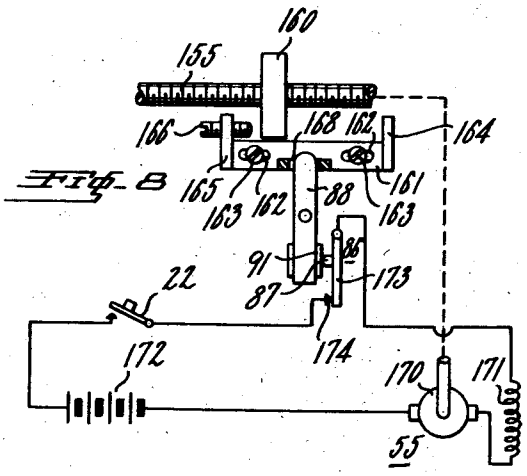


Fig. 8

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Patented July 29, 1947

2,424,697

UNITED STATES PATENT OFFICE

2,424,697

MAGNETIC RECORDER

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Application May 12, 1945, Serial No. 593,378

13 Claims. (Cl. 179—100.2)

1

This invention relates to a magazine type magnetic recording system and more particularly to a novel magazine for use therewith embodying mechanical elapsed "talking time" indicator and means for automatically interrupting recording when the "talking time" of the recording medium has been substantially fully utilized.

In magnetic recording systems of the type to which the present invention is directed, a magazine, containing the recording medium and mechanism for traversing the same relative to a magnetic translating head, is provided with coupling elements detachably engageable with mating elements on a sound translating unit with which the magazine may be interchangeably associated. Generally, the traversing means comprises a pair of spaced rotatable reels, which may be designated as "storage" and "rewind" reels. During recording or reproduction, the linear magnetic recording medium is unwound from the "rewind" reel and wound on to the "storage" reel. It is desirable to provide suitable means for indicating to the operator the amount of "talking time" remaining on the recording medium wound on the "rewind" reel. Furthermore, in order to prevent damage to the recording medium or other parts of the apparatus, the present invention provides automatic means for interrupting movement of the recording medium when the same has been substantially completely interchanged from the "rewind" reel to the "storage" reel.

It is therefore among the objects of this invention to provide a magazine type recording apparatus including a sound translating unit, a magazine interchangeably operative therewith, and releasable means for automatically latching the magazine to the unit when the magazine is placed on the unit; to provide such a system including cooperating means on the magazine and unit operable to interrupt traversing of a recording medium with respect to a magnetic translating head when the recording time on the medium has been substantially fully utilized; to provide such a system including means for indicating the amount of "talking time" remaining on the recording medium; and to provide a lightweight, inexpensive, compact and efficient magnetic sound translating apparatus including a novel sound translating unit and a novel magazine interchangeably cooperative therewith.

These and other objects, advantages and novel features of the invention will be apparent from the following description and the accompanying drawings. In the drawings:

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Fig. 1 is a perspective view of apparatus embodying the present invention.

Fig. 2 is a plan view of a portion of a sound translating unit forming part of the invention.

Fig. 3 is a partially longitudinal sectional view through the sound translating unit and a magazine cooperable therewith.

Fig. 4 is a plan view of a magazine forming part of the invention.

Fig. 5 is an elevational view of the magazine taken substantially along the line 5—5 of Fig. 4.

Fig. 6 is an elevation view, partly in section, on the line 6—6 of Fig. 4.

Fig. 7 is a transverse sectional view on the line 7—7 of Fig. 4.

Fig. 8 is a schematic wiring diagram illustrating a switch operating mechanism forming part of the invention.

According to the present invention, magnetic sound translating apparatus is provided including a magnetic sound translating unit and a magazine interchangeably engaged therewith. The sound translating unit includes electronic sound translating means, driving mechanism operated by an electric motor, a switch controlling the energization of the motor and having a projecting operating arm, mechanical coupling means connected to the driving mechanism and an electrical coupling means in electric circuit connection with the sound translating means. The unit likewise includes releasable latching elements adapted to automatically engage latching means on the magazine when the latter is placed in operative relation with the unit.

The magazine includes a pair of reels for interchangeably receiving a magnetic recording medium and traversing the same with respect to a magnetic translating head, mechanical coupling elements for connecting the reels to the driving mechanism of the unit, spooling mechanism for layer winding the magnetic recording medium onto and off of the reels, indicating means for indicating the amount of "talking time" remaining on the recording medium, an operating member for the motor controlling switch, mechanism for operating the indicator and the switch operating member, and a mechanical coupling element for connecting the spooling mechanism and such operating mechanism to reduction gearing associated with the driving mechanism of the unit. The magazine is provided with spaced latching means automatically cooperative with the latching elements of the unit for maintaining the magazine in stable relation with the unit when disposed thereupon. Preferably,

the magazine includes a substantially flat rectangular base containing the aforementioned elements, and a rectangular cover detachably secured to the base and having a window for viewing the magazine indicating means.

Referring more particularly to Fig. 1 of the drawings, the recording apparatus is shown as comprising a magnetic translating unit 10 having a magazine 15 interchangeably cooperable therewith. Translating unit 10 comprises a casing 11 to which is secured a control panel 12. The illustrated recording apparatus is adapted for use aboard aircraft, and for this purpose is made light in weight and compact. Control panel 12 is provided with a socket 13 to which a power supply may be connected, a socket 14 which may be connected to a remote control arrangement, a plug 16 adapted to receive a jack connected to the intercommunication system of the aircraft, another plug 17 for receiving a jack connected to a microphone, a main control switch 18 with which is associated the indicating light 21, a motor circuit control switch 22, a lamp 23 for indicating when the unit is recording and a fuse 24 mounted for ready accessibility in the event a replacement is needed. A knob 20 is mounted on the control panel and associated with releasable latching means for automatically latching magazine 15 to unit 10. The operation of knob 20 will be described more in detail hereinafter.

Casing 11 includes a forward section 25 which may contain suitable electronic means for sound translating purposes. The casing likewise includes a rearward section 30 containing drive mechanism for magazine 15 and provided with an upper panel or surface 26 for receiving and supporting magazine 15. It will be noted that surface 26 is at a lower level than the top wall 27 of section 25, so that when magazine 15 is engaged with unit 10, a uniform rectangular complete unit is provided.

Magazine 15 is detachably engageable with surface 26 of unit 10. The magazine includes a base and cover 31 detachably connectible thereto by screws 32. Cover 31 is provided with an aperture 33 which may contain a transparent member 34 having suitable indicia 36 cooperative with an indicating needle 35 for indicating the amount of "talking time" remaining on the magnetic recording medium.

Magazine 15 is releasably latched to unit 10. For this purpose, the magazine is provided with latching pins 37 adjacent each corner thereof which are engageable with latching elements 38, 39, 40 and 41 pivoted on pins 42 mounted in translating unit 10. Each of the latching elements comprises a bar having a rounded upper end 43 below which is a notch 44. Knob 20 is secured to or is integral with a bar 45 slidably mounted in a bearing 46 secured in forward section 25 of casing 11. The rear end of bar 45 is pivoted to a pin 47 mounted in element 38. A link 48 connects pin 47 to a pin 50 in the lower end of element 39. A channel shaped member 51 rigidly interconnects elements 39 and 40. Elements 40 and 41 are pivotally interconnected by a link 52. A spring 53 extending between pivot pin 42 of element 38 and pin 50 secured to element 39 normally urges the elements to their inward or locking position. The elements are oscillatable in slots 54 adjacent each corner of surface 26, and each element has its notch 44 facing outwardly with respect to surface 26.

When magazine 15 is placed on surface 26, pins 37 engage the rounded upper ends 43 of the latching elements to swing the same inwardly, as a unit, with respect to surface 26 after which the pins snap into notches 44 to automatically latch magazine 15 on unit 10. When it is desired to disengage the magazine from the unit, knob 20 is moved inwardly or depressed. This pivots the latching elements, as a unit, inwardly of surface 26 and permits magazine 15 to be lifted from unit 10.

Translating unit 10 and the parts of magazine 15 cooperating therewith are more clearly shown in Figs. 2 and 3. As shown, casing section 30 contains an electric motor 55 supported from mounting plate 26. A spiral gear 56 on the outer end of motor armature shaft 57 engages a spiral gear 58 on the lower end of a vertically extending shaft 60. Another spiral gear 61 secured in an intermediate position on shaft 60 drives a spiral gear 62 on a horizontally extending shaft 63. A spiral gear 64 on shaft 63 drives a spiral gear 65 secured to a shaft 66. The several spiral gears 62, 64 and 65 form a reduction gearing associated with motor 55 for a purpose to be described hereinafter.

A mechanical coupling element 67 is slidably secured to the upper end of shaft 60 and is urged outwardly through an aperture 68 in mounting plate 26 by a spring 70. Coupling element 67 comprises a gear having axially extending teeth 71 with rounded outer edges, and is cooperable with a similar coupling element 72 of magazine 15. A bracket 73 secured to mounting plate 26 supports a shaft 74 rotation of which is frictionally resisted by a spring 75 disposed between a nut 76 on shaft 74 and the lower side of bracket 73. The upper end of shaft 74 carries a coupling element 77, identical with coupling element 67, and urged outwardly through an aperture 78 in plate 26 by a spring 80. Coupling element 77 is cooperable with a mating coupling element 81 in magazine 15.

The rearward end of shaft 66 carries a spur gear 82 extending upwardly through a slot 83 in plate 26. Spur gear 83 is operated at a reduced rate with respect to coupling element 67 and 77 due to the aforementioned reduction gearing. An angular bracket 85 secured near the rear edge of plate 26 (as viewed in Fig. 2) supports a switch 86 controlling the energization of motor 55. Switch 86 is preferably of the "snap action" type operated by a plunger 87. An operating arm 88 is pivotally mounted at 90 on bracket 85 and is formed with an ear or flange 91 adapted to engage plunger 87. The operation of arm 88 in controlling switch 86 is described more clearly hereinafter with particular reference to Fig. 5. Pins 92, 93 and 94 are secured to mounting plate 26 to project thereabove to enter apertures in the base of magazine 15 to properly locate the magazine on surface 26.

Referring to Figs. 3 through 7, magazine 15 comprises a base 100, which is preferably a casting having oppositely disposed side walls 101, 101 and end walls 102, 102. Adjacent each end wall, each of the side walls is formed with a protuberance 103, with each protuberance having a slot 104 therein across which extend latching pins 37. Slots 104 receive the upper ends of latching elements 38, 39, 40 and 41 of unit 10 when base 100 is engaged with plate 26, and, as described, pins 37 enter notches 44 of the latching elements to lock the magazine to the translating unit.

A pair of reels 105 and 110 are rotatably mounted on base 100. For this purpose, base 100 is formed with vertical bushings 106, 107 con-

taining bearings 108 rotatably supporting shafts 111 and 112. Studs 113, 114 detachably secure reels 105, 110 to shafts 111, 112. Pins 115 extend through a flange 116 on each shaft and through the associated reel to secure the reels for rotation with the shafts. Coupling elements 72 and 81 are secured to the lower ends of shafts 111, 112 respectively, for coupling the reels to coupling elements 67 and 81 of unit 10, respectively. To maintain reels 105, 110 against rotation when magazine 15 is removed from unit 10, springs 117, 117 are secured to bushings 106, 107 and normally engage reels 105, 110. As shown in Fig. 3, when magazine 15 is disposed on surface 26, pins 92, 94 enter through apertures in base 100 and engage springs 117, 117 to spring the same inwardly and disengage each spring from its associated reel. The reels are thereby released for rotation under the control of the mechanism in unit 10.

Reel 105 is the "rewind" reel and reel 110 is the "storage" reel. In advance of a recording or reproduction operation, substantially all of a linear magnetic recording medium, such as a magnetic wire 120 is wound on "rewind" reel 105. During recording or reproduction, "storage" reel 110 is rotated by motor 55 through the associated gearing and coupling elements, to traverse wire 120 with respect to a magnetic translating head 125. During such operation, washer 75 exerts a frictional drag on shaft 74 connected to "rewind" reel 105 to maintain wire 120 taut between the reels.

Base 100 supports an electrical coupling element such as a socket 130 detachably engageable with a plug 135 mounted on plate 26 of unit 10. Socket 130 is electrically connected to magnetic translating head 125. Head 125, as seen more clearly in Figs. 4 and 6, is mounted on a plate 126 pivotally supported by bearings 127, 128 for oscillation about an axis perpendicular to the axes of rotation of reels 105, 110. Plate 126 is provided with flanges 131, 132. An arm 133 is secured to flange 131 and has telescopically related therewith an arm 134 on the outer end of which is a casing 136. A spring 137 normally urges casing 136 outwardly away from plate 126 and toward reel 105. Casing 136 is provided with bearings 138 rotatably supporting grooved pulley 140. A similar casing 141 rotatably supporting a grooved pulley 142 in a like manner is secured to an outer end of an arm 143 fastened to flange 132 of plate 126.

Casings 136 and 141 in cooperation with pulleys 140 and 142 guide wire 120 between head 125 and reels 105, 110. The wire passes around each of the pulleys and toward the associated casings and is reversed in direction for winding on either of the reels, as shown more clearly in Fig. 4. Through oscillation of plate 126 about its axis, in a manner to be described more fully hereinafter, wire 120 is layer wound onto and off of reels 105 and 110.

One of the side walls 101 of base 110 is offset inwardly as at 145 to provide a recess 146 closed by removable plate 147. Wall 145 and plate 147 rotatably support a shaft 148, on the inner end of which is secured a reentrant cam 150. Next to cam 150, a spur gear 151 is secured to shaft 148 and is adapted to engage spur gear 82 of unit 83. For this purpose, base 100 is provided with a slot 152 (Fig. 6) which is aligned with a slot 83 in plate 26. Cam 150 is engaged by a cam follower 153 extending from plate 126 and urged into continuous engagement with cam 150 by a

leaf spring 154 secured to base 100. Rotation of cam 150, through the interengagement of gears 82 and 151, oscillates plate 126 to layer wind wire 120 onto and off of reels 105, 110.

A pair of pillow blocks 156, 156 (Figs. 4 and 5) secured to the outer surface of wall 145, rotatably support a threaded shaft 155 having on one end a bevel gear 157 meshing with a bevel gear 158 on shaft 148. Rotation of gear 151 will thus effect rotation of shaft 155. A travelling nut 160 is threadedly engaged with shaft 155 and held against rotation thereon by sliding engagement with wall 145 (Fig. 7). Nut 160 carries the needle 35 cooperable with the indicia on transparent plate 34 visible through aperture 33 in cover 31 of magazine 15.

A vertical bar 161 is provided with a pair of slots 162, 162 through which extend studs 163, 163 slidably supporting the bar with relation to wall 145. Bar 161 is provided with vertical flanges 164, 165 which project into the path of nut 160. A stud 166 is adjustably mounted in flange 165 for predetermining the point of effective engagement of nut 160 with bar 161. Bar 161 is also provided with a horizontal ear or flange 167 provided with a slot 168 aligned with an aperture 170 in base 100, which is in turn aligned with an aperture 171 in plate 26 in unit 10, through which projects the upper end of operating arm 88 for switch 86.

The operation of the indicating and switch operating mechanism is as follows. During energization of motor 55, shaft 66 is rotated by the gear reduction unit associated with the motor. This correspondingly rotates spur gear 82 in correspondence with the rotation of coupling elements 67 and 77 of unit 10. Thus, spur gear 151 of magazine 15 is rotated in correspondence with the rotation of reels 105 and 110 of the magazine. Such rotation of spur gear 151, through cam 150 and cam follower 153, effects oscillation of plate 126 about its pivot to layer wind wire 120 onto and off of the reels. At the same time, through bevel gears 157, 158, threaded shaft 155 is rotated to cause nut 160 to travel therealong. Movement of nut 160 moves indicating needle 35 with respect to indicia 36 on transparent member 34, so that the operator is apprised of the relative amounts of wire 120 on each of the reels.

The direction of the threads on shaft 155 is such that nut 160 travels to the right, as viewed in Fig. 5 (or to the left as viewed in Fig. 4) during a recording or reproducing operation. Accordingly, when substantially all of the "talking time" on wire 120 has been utilized, which means that the wire is substantially completely unwound from "rewind" reel 105 and wound on to "storage" reel 110, nut 160 abuts tappet 166 to move bar 161 to the right (Fig. 5) and thus to swing arm 88 in a counter-clockwise direction (Fig. 3) to depress button 87 of switch 86 to open the switch and break the energizing circuit for motor 55. This interrupts travel of recording medium 120. If desired, a second switch could be mounted on bracket 85 for operation of swinging movement of arm 88 in the opposite direction during a rewinding operation to interrupt the energization of motor 55 when the wire has been substantially all rewound on reel 105.

Fig. 8 diagrammatically illustrates the operation of the magazine elements in controlling the energization of motor 55. In this figure, motor 55 is illustrated as comprising an armature 170 and a series field winding 171. However, motor 55 may be a shunt or compound wound motor, if de-

sired. The energization of motor 55 is controlled from a suitable source of power 172, indicated for reference purposes as a battery, through main switch 22 and snap action switch 86. Switch 86 is provided with a switch blade 173 having an operating button 87 engaged by the flange 91 on arm 68. As travelling nut 160 moves to the left in Fig. 8, it engages tappet 166 to slide bar 161 to the left pivoting arm 88 counter-clockwise to depress button 87 disengaging switch arm 173 from contact 174 to break the energizing circuit for motor 55.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the principles thereof, it will be understood that the invention may be otherwise embodied, without departing from such principles.

What is claimed is:

1. A magazine adapted for interchangeable latching engagement with a magnetic sound translating unit, said magazine comprising a base formed with a bottom wall and rectangularly disposed side and end walls, and containing a linear magnetic recording medium and means for traversing said medium with respect to a magnetic translating head; each side wall being formed with a protuberance adjacent each end wall, said protuberances being formed with slots adapted to receive latching bars on the unit; a pin extending across each slot and automatically engageable with the unit latching bars when the magazine is engaged with the unit to retain the magazine and unit in stable cooperative relationship; and a cover detachably secured to said base.

2. A magnetic sound translating unit adapted for interchangeable cooperation with a magazine containing a linear magnetic recording medium and means for traversing the medium with respect to a magnetic translating head, said unit comprising a casing formed with a surface adapted to receive and support the magazine; spaced pairs of latching elements pivotally mounted in said casing and projecting above said surface for automatic engagement with latching means on the magazine when the latter is placed on said surface to retain the magazine and unit in stable cooperative relationship; and means for operating said elements to disengage the magazine latching means to provide for disengagement of the magazine from said unit.

3. A magnetic sound translating unit adapted for interchangeable cooperation with a magazine containing a linear magnetic recording medium and means for traversing the medium with respect to a magnetic translating head, said unit comprising a casing formed with a substantially rectangular flat surface adapted to receive and support the magazine; latching elements pivotally mounted in said casing and projecting above said surface adjacent each corner thereof for automatic engagement with latching means on the magazine when the latter is placed on said surface to retain the magazine and unit in stable cooperative relationship; means interconnecting said elements for operation as a unit; and manually operable means connected to said elements and operable to disengage the same from the magazine latching means to provide for disengagement of the magazine from said unit.

4. A magnetic sound translating unit adapted for interchangeable electrical and mechanical cooperation with a magazine containing a linear magnetic recording medium and means for traversing the medium with respect to a magnetic translating head, said unit comprising a casing having a front control panel, a forward section containing sound translating apparatus, and a rearward section containing driving mechanism and formed with a substantially rectangular flat surface adapted to receive and support the magazine; a first pair of latching bars pivotally mounted in said rearward section adjacent the rear corners of said surface and projecting thereabove; means rigidly interconnecting said first pair of bars; a second pair of latching bars pivotally mounted in said rearward section adjacent the forward corners of said surface and projecting thereabove; a link pivotally connecting each bar of said second pair to a bar of said first pair; said bars automatically engaging latching means on the magazine when the latter is placed on said surface; spring means maintaining said bars in the latching position; and a release bar slidably mounted in said forward section, projecting beyond said panel and pivotally connected to a bar of said second pair, depression of said release bar pivoting said latching bars to disengage the magazine latching means.

5. A magazine adapted for interchangeable cooperation with a magnetic sound translating unit containing sound translating means and driving mechanism, said magazine comprising reels for traversing a linear magnetic recording medium with respect to a magnetic translating head; coupling elements associated with said reels for mechanically coupling the same to the unit driving mechanism; indicating means for indicating the progress of the medium relative to the translating head; spooling mechanism for layer winding the medium onto and off of said reels; and a coupling element commonly associated with both said indicating means and said spooling mechanism for disengageably mechanically coupling the same to the unit driving mechanism.

6. A magazine adapted for interchangeable cooperation with a magnetic sound translating unit containing sound translating means, driving mechanism, an electric motor for the mechanism, a switch controlling the motor, and an operator for the switch, said magazine comprising means for traversing a linear magnetic recording medium with respect to a magnetic translating head; coupling elements associated with said traversing means for mechanically coupling the same to the unit driving mechanism; a member adapted to engage the switch operator of the unit to operate the switch to deenergize the motor; mechanism operable in synchronism with said traversing means to operate said member; and a disengageable coupling element associated with said mechanism for independently mechanically coupling the same to the unit driving mechanism.

7. A magazine adapted for interchangeable cooperation with a magnetic sound translating unit containing sound translating means, driving mechanism, an electric motor for the mechanism, a switch controlling the motor, and an operator for the switch, said magazine comprising reels for traversing a linear magnetic recording medium with respect to a magnetic translating head; coupling elements associated with said reels for mechanically coupling the same to the unit driving mechanism; spooling mechanism for layer winding the medium onto and off of said reels; a member adapted to engage the switch operator of the unit to operate the switch to deenergize the motor; operating mechanism for said member; and a coupling element commonly connected

to both of said spooling and operating mechanisms for disengageably mechanically coupling the same to the unit driving mechanism.

8. A magazine adapted for interchangeable cooperation with a magnetic sound translating unit containing sound translating means and driving mechanism including reduction gearing, said magazine comprising reels for traversing a linear magnetic recording medium with respect to a magnetic translating head; coupling elements associated with said reels for mechanically coupling the same to the unit driving mechanism; indicating means for indicating the progress of the medium relative to the translating head; spooling mechanism for layer winding the medium onto and off of said reels; and a coupling element commonly associated with both said indicating means and said spooling mechanism for disengageably mechanically coupling the same to the unit reduction gearing for operation at a reduced rate relative to said reels.

9. A magazine adapted for interchangeable cooperation with a magnetic sound translating unit containing sound translating means, driving mechanism, including reduction gearing, an electric motor for the mechanism, a switch controlling the motor, and an operator for the switch, said magazine comprising reels for traversing a linear magnetic recording medium with respect to a magnetic translating head; coupling elements associated with said reels for mechanically coupling the same to the unit driving mechanism; spooling mechanism for layer winding the medium onto and off of said reels; a member adapted to engage the switch operator of the unit to operate the switch to deenergize the motor; operating mechanism for said member; and a coupling element commonly connected to both of said spooling and operating mechanisms for disengageably mechanically coupling the same to the unit reduction gearing for operation at a reduced rate relative to said reels.

10. A magazine adapted for interchangeable cooperation with a magnetic sound translating unit containing sound translating means, driving mechanism, an electric motor for the mechanism, a switch controlling the motor, and an operator for the switch, said magazine comprising means for traversing a linear magnetic recording medium with respect to a magnetic translating head; coupling elements associated with said traversing means for mechanically coupling the same to the unit driving mechanism; indicating means for indicating the progress of the medium relative to the translating head; a member adapted to engage the switch operator of the unit to operate the switch to deenergize the motor; operating mechanism commonly connected to both said member and said indicating means; and a disengageable coupling element associated with said operating mechanism for independently mechanically coupling the same to the unit driving mechanism.

11. A magazine adapted for interchangeable cooperation with a magnetic sound translating unit containing sound translating means, driving mechanism, an electric motor for the mechanism, a switch controlling the motor, and an operator for the switch, said magazine comprising reels for traversing a linear magnetic recording medium with respect to a magnetic translating head; coupling elements associated with said reels for mechanically coupling the same to the unit driving mechanism; spooling mechanism for layer winding the medium onto and off of said reels;

indicating means for indicating the progress of the medium relative to the translating head; a member adapted to engage the switch operator of the unit to operate the switch to deenergize the motor; operating mechanism commonly connected to both said member and said indicating means; and a coupling element commonly connected to both of said spooling and operating mechanisms for disengageably mechanically coupling the same to the unit driving mechanism.

12. A magazine adapted for interchangeable cooperation with a magnetic sound translating unit containing sound translating means, driving mechanism, including reduction gearing, an electric motor for the mechanism, a switch controlling the motor, and an operator for the switch, said magazine comprising reels for traversing a linear magnetic recording medium with respect to a magnetic translating head; coupling elements associated with said reels for mechanically coupling the same to the unit driving mechanism; spooling mechanism for layer winding the medium onto and off of said reels; indicating means for indicating the progress of the medium relative to the translating head; a member adapted to engage the switch operator of the unit to operate the switch to deenergize the motor; operating mechanism commonly connected to both said member and said indicating means; and a coupling element commonly connected to both of said spooling and operating mechanisms for disengageably mechanically coupling the same to the unit reduction gearing for operation at a reduced rate relative to said reels.

13. A magazine adapted for interchangeable cooperation with a magnetic sound translating unit containing sound translating means, driving mechanism, including reduction gearing, an electric motor for the mechanism, a switch controlling the motor, and a pivotally mounted projecting operating arm for the switch, said magazine comprising a pair of reels mounted adjacent either end of said magazine for interchangeably receiving a linear magnetic recording medium; coupling elements associated with said reels for mechanically coupling the same to the unit driving mechanism; a member pivotally mounted between said reels for oscillation about an axis perpendicular to the axes of said reels; a magnetic translating head mounted on said member; elements projecting from said member toward each of said reels for guiding said medium between said head and said reels; a reentrant cam rotatably mounted in said magazine; a cam follower secured to said member and engaging said cam to oscillate said member to layer wind the recording medium onto and off of said reels; a threaded shaft rotatably mounted in said casing; a travelling nut operatively associated with said shaft; a bar slidably mounted in said casing adjacent said shaft, said bar having an aperture adapted to receive the projecting end of the switch operating arm and arms projecting into the path of said nut; gearing connecting said cam and said shaft; a coupling element secured to said cam for mechanically coupling said cam and said shaft to the unit reduction gearing for operation at a reduced rate relative to said reels; and an indicator movable with said nut for indicating the relative amounts of recording medium on each of said reels; said nut sliding said bar to swing the switch operating arm to open the switch to deenergize said motor when sub-

stantially all of said recording medium has been transferred from one of said reels to the other.

WILLIAM P. LEAR.

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