

Sept. 27, 1949.

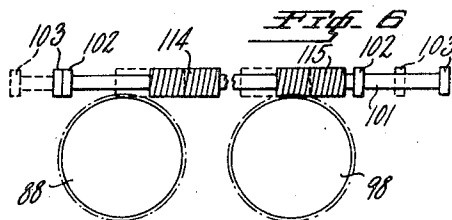
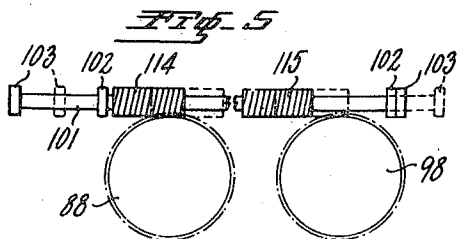
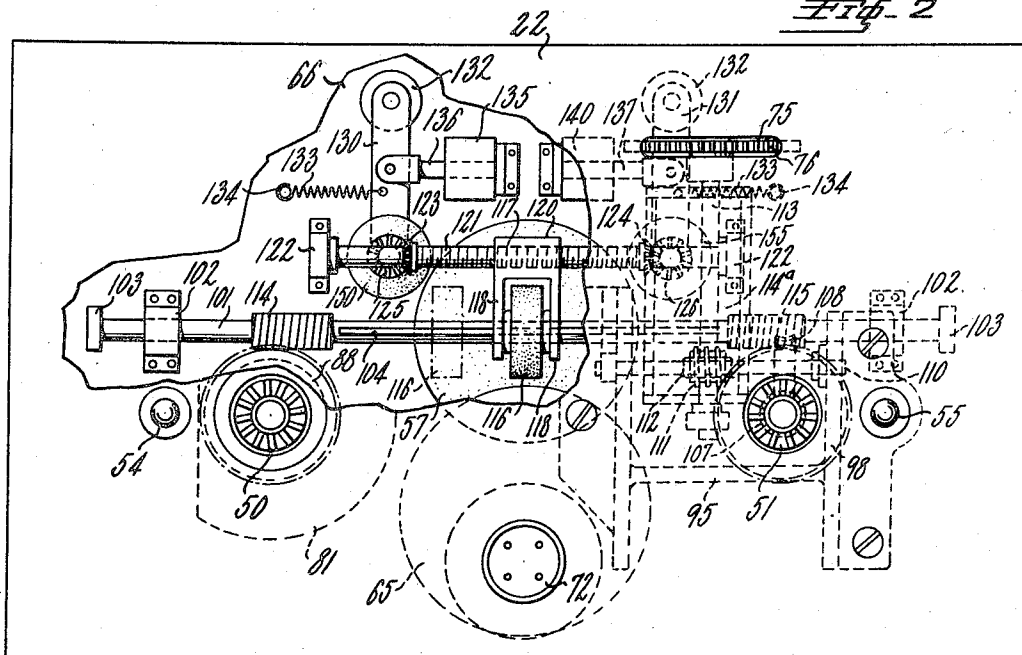
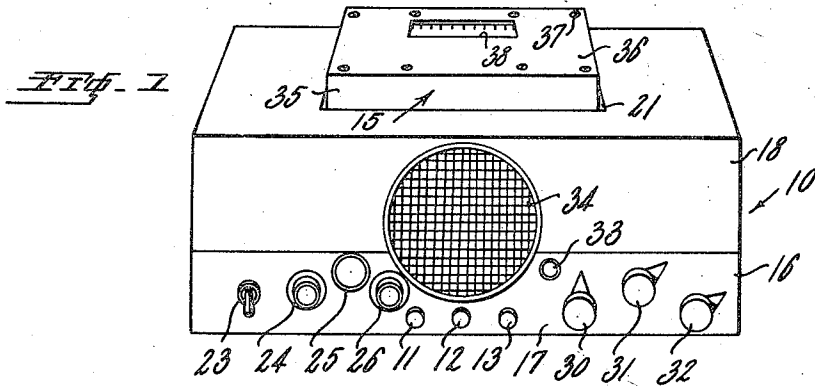
W. H. WADE

2,482,887

DRIVE SYSTEM FOR MAGNETIC RECORDERS

Filed Oct. 25, 1945

2 Sheets-Sheet 1



INVENTOR
WILLARD H. WADE
BY *Richard A. Mance*
ATTORNEY

Sept. 27, 1949.

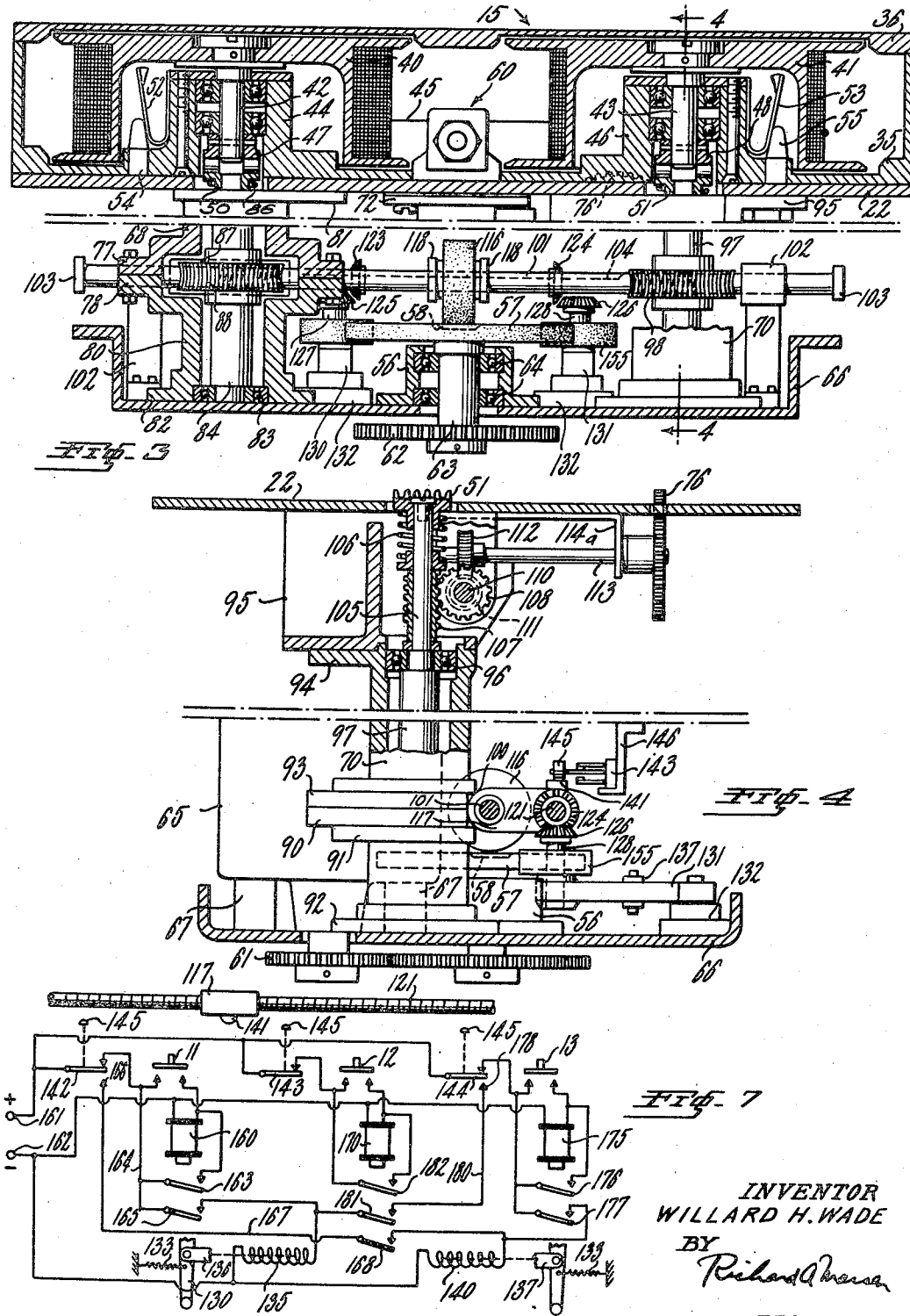
W. H. WADE

2,482,887

DRIVE SYSTEM FOR MAGNETIC RECORDERS

Filed Oct. 25, 1945

2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,482,887

DRIVE SYSTEM FOR MAGNETIC RECORDERS

Willard H. Wade, Syracuse, N. Y., assignor, by mesne assignments, to Lear, Incorporated, Grand Rapids, Mich., a corporation of Illinois

Application October 25, 1945, Serial No. 624,545

11 Claims. (Cl. 242-54)

1

This invention relates to magnetic recording systems and more particularly to a novel drive system for a magnetic sound translating unit for use in magazine type recording system.

The present sound translating unit is particularly adaptable for use with the recorder magazine described in the copending application of William P. Lear, Serial No. 593,378, filed May 12, 1945, for "Magnetic recorder," now Patent No. 2,424,856, dated July 29, 1947, and assigned to the same assignee as is this case. As described in said copending application, the magazine contains a pair of spaced reels for traversing a linear magnetic recording medium, such as a magnetic wire, with respect to a magnetic translating head, and also contains spooling mechanism for layer winding the wire onto and off of the reels.

The unit of the present invention comprises driving mechanism and electronic sound translating components cooperable respectively with the driving and spooling mechanism of such magazine and with the magnetic translating head thereof. The present unit may be used either for recording or for reproducing sound and includes novel drive mechanism for selectively conditioning the recording system for either rewinding or for sound recording or reproducing.

It is among the objects of this invention to provide a sound translating unit for use with a magazine type magnetic recording system; to provide such a sound translating unit interchangeably cooperative with any one of a plurality of magazines containing a magnetic recording medium and reels for traversing the same with respect to a magnetic recording head; to provide such a unit including push button means for automatically conditioning the unit either for rewinding or for recording or reproducing, and including push-button means placing the unit in a neutral or idling condition; to provide such a sound translating unit including novel drive mechanism for rotating the reels of the magazine; to provide such a translating unit including gear reduction means associated with the reel driving mechanism for operating spooling mechanism in the magazine at a reduced rate of speed with respect to the reel driving means; and to provide a simple easily serviceable light weight sound translating unit for use with a magazine type recording system.

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:

Fig. 1 is a perspective view illustrating the

2

unit of the invention having a magazine engaged therewith.

Fig. 2 is a top plan view of a portion of the translating unit of the invention.

Fig. 3 is a vertical sectional view through the translating unit of the invention and a magazine associated therewith.

Fig. 4 is an elevation view with the magazine removed, partly in section, taken substantially along the line 4-4 of Fig. 3.

Fig. 5 is a schematic plan view illustrating the driving mechanism as conditioned for rewinding.

Fig. 6 is a schematic plan view of the driving mechanism as conditioned for recording or reproducing.

Fig. 7 is a schematic wiring diagram illustrating the driving mechanism control circuit of the unit.

Referring to the drawings, the sound translating unit 10 of the invention is shown in Fig. 1 as arranged with magazine 15 in cooperative relation therewith. Unit 10 includes a base section 16, having a front panel 17, and a cover 18. Cover 18 is apertured as at 21 to expose a mounting plate 22 on which magazine 15 is placed.

Front panel 16 includes controls for the unit. These controls include a series of three push-buttons 11, 12 and 13 for electromechanically conditioning the unit, either for "Rewind"; "Neutral" (or "Idling"); or "Record/Reproduce." Further controls comprise a main control switch 23, a power connection 24, an indicating light 25, a jack 26 adapted to receive a plug connected to a microphone, knobs 30, 31 and 32 controlling operation of electrical and electronic components of the unit, and an indicating light 33. A grill 34 conceals a loud speaker incorporated in the unit.

As explained above, the embodiment of the present invention is shown in cooperation with a magazine 15 of the type illustrated in the said copending application. Referring to Figs. 1 and 3, magazine 15 includes a base 35 having a cover 36 detachably secured thereto by screws 37, and provided with an aperture 38 containing a transparent window through which indicating mechanism registering the amount of talking time available may be observed. Such indicating mechanism is described and claimed in my said copending application.

Magazine 15 contains a pair of reels 40 and 41 interchangeably receiving a magnetic recording wire 45 and secured to shafts 42 and 43 mounted on bearings in upstanding bosses 44 and 45 of base 35. On the lower end of each shaft 42, 43 is a coupling gear 47, 48, respectively

detachably engageable with coupling gears 50 and 51 of unit 15. Coupling gears 47, 48, 50 and 51 are of the type shown in said copending application. Reels 40 and 41 are restrained against rotation, when magazine 15 is disengaged from unit 10, by bowed springs 52 and 53 secured to bosses 44 and 46. Normally, these springs engage the reels to hold the same stationary, and maintain wire 45 taut. When magazine 15 is engaged with unit 10, pins 54 and 55 on the unit enter apertures in the magazine to engage springs 52 and 53 respectively and compress the same out of engagement with the reels to provide for free rotation of the latter. Reels 40 and 41 traverse wire 45 with respect to a magnetic translating head generally indicated at 60.

Unit 10 is more particularly shown in Figs. 2, 3 and 4. Base portion 16 is provided with a central recess in which is secured a base plate 66 through suitable coupling means, and on either side of the recess electric and electronic sound translating components may be mounted in the base portion. A pair of pillars 68 and 70 interconnect base plate 66 to mounting plate 22. Base plate 66, as will be described more fully hereinafter, supports the driving mechanism for rotating coupling gears 50 and 51 and also for operating a spooling drive gear for the spooling mechanism in magazine 15.

Mounting plate 22, as previously explained, supports magazine 15, and is formed with apertures through which project coupling gears 50 and 51. These gears are provided with axially extending teeth having rounded outer edges for engagement with similarly formed coupling gears 57 and 58 of magazine 15. An electrical connection member such as a socket 72 is mounted on plate 22 for engagement with a suitable mating electrical connection member in magazine 15. Near its rearward edge, as viewed in Fig. 2, plate 22 is formed with an aperture 75 providing for projection of a spooling mechanism drive gear 76 which cooperates with a similar gear in magazine 15 to operate spooling mechanism therein.

The driving mechanism in unit 10 for the reeling and spooling means of magazine 15 is motivated by a motor 65 which is mounted on base plate 66 through the medium of supporting pillars 67. The motor may be of the constant speed type customarily used for operating the turntables of electric phonographs and is provided with a driving gear 61 disposed beneath base 66. Gear 61 meshes with a gear 62 on the lower end of a shaft 63 mounted in bearings 64, 64 in a boss 56 secured substantially central of base 66. On the upper end of shaft 63 is a relatively large diameter friction driving disk 57 provided with a shallow recess 58 at its center for a purpose to be described.

Pillar 68 is a hollow generally tubular member having an enlarged portion 77 united to an enlarged portion 78 of an axially aligned pillar 80. Pillar 68 is provided with a flange 91 secured to mounting plate 22 and lower pillar 78 is provided with a flange 82 secured to base 66. Pillars 68 and 80 contain bearings, of which one is indicated at 83, rotatably supporting a shaft 84 to which coupling gear 50 is secured for rotation. Gear 50 is movable axially of shaft 84 being normally urged outwardly by a spring 86. The gear may thus move inwardly when magazine 15 is engaged with unit 10 to provide intermeshing engagement with coupling gear 47 of the magazine in the event that there may be a slight angular misalignment of the coupling gear. The rounded

edges of the axially extending teeth of the gears facilitate this intermeshing engagement.

At their junction, enlarged sections 77 and 78 of pillars 68 and 80 are formed with complementary notches forming an aperture 87, and a worm wheel 88 is secured for rotation with shaft 84 and has a portion of its periphery exposed through aperture 87. Pillar 70 is likewise tubular and has a lower enlarged portion 93 secured to an enlarged portion 90 of an aligned pillar 91 having a lower flange 92 secured to base 66. Pillar 70 has an upper flange 94 secured to a gear housing 95. Bearings in pillars 70 and 91, of which one is shown at 96, rotatably support a shaft 97 to which is secured a worm wheel 98 having a portion of its periphery projecting through an aperture 100 formed by complementary notches in flanges 90 and 93 in the same manner as described in connection with pillars 68 and 80.

The upper end of shaft 97 is reduced in diameter as indicated at 105 and coupling gear 51 is secured thereto for rotation with the shaft while being axially movable thereof. A spring 106 urges coupling gear 51 outwardly through an aperture in mounting plate 22.

Beneath gear 51, a spiral gear 107 is secured to shaft 97 and meshes with a spiral gear 108 on a shaft 110 extending at right angles to shaft 97. A worm 111 on shaft 110 engages a worm wheel 112 on a shaft 113 extending at right angles to shaft 110. Shaft 113 is suitably mounted in a bracket 114a forming part of gear housing 95. Spooling mechanism driving gear 76 is secured to the rearward end of shaft 113. Due to the speed reduction afforded by gears 107, 108, worm 111 and worm wheel 112, gear 76 is rotated at a considerably reduced rate with respect to the rate of rotation of coupling gear 51. The spooling mechanism and associated elements in magazine 15 are thus operated at a reduced rate with respect to the rate of rotation of the reels in the magazine.

A shaft 101 extends longitudinally of base 66 and is diametrically aligned with friction disk 57. Shaft 101 is mounted for axial movement in bearings 102, 102, and such axial movement is limited, for a purpose to be described, by abutments 103, 103 secured to each end of shaft 101. The shaft is formed with a keyway 104 for a considerable portion of its length on either side of the center of disk 57. Worms 114 and 115 are secured for rotation with shaft 101 adjacent worm wheels 88 and 98 respectively and, in the "idling" position of the mechanism shown in Figs. 2 and 3, are in engagement with the worm wheels maintaining the same against rotation. In turn, this maintains reels 40 and 41 against rotation and thus maintains wire 45 in a taut condition.

A friction drive roller 116 is keyed for rotation with shaft 101 by a key engaging in keyway 104, but is movable longitudinally of the shaft as indicated by dotted lines in Fig. 2. Drive wheel 116 frictionally engages driving disk 57 except when disposed over recess 58, and thus imparts rotation to shaft 101 and worms 114, 115. In accordance with its relative position diametrically of either side of center of disk 57, roller 116 will rotate shaft 101 in one direction or the other. In a manner to be described, this will effect driving of one or the other of shafts 84 or 97 and thus of reels 40 and 41.

A U-shaped bracket 117 has its arms 118 straddling roller 116 and apertured to receive

5

shaft 101. Base 120 of bracket 117 threadably engages a shaft 121 rotatably mounted in bearings 122, 122. Intermediate bracket 117 and bearings 122, shaft 121 has secured for rotation therewith beveled gears 123 and 124. Beveled gears 123 and 124 are adapted to mesh with beveled gears 125 and 126, respectively. Gears 125, 126 are secured to the upper ends of shafts 127, 128 rotatably mounted in the outer ends of arms 130 and 131.

Arms 130 and 131 are oscillatively mounted on bearings 132, 132 secured to base plate 66 and springs 133, each extending between one of the arms and a pin 134, normally urge the arms in a direction to disengage beveled gears 125 and 126 from beveled gears 123 and 124. Movement of arms 130, 131 in the inward direction is effected by a pair of solenoids 135 and 140 each having a plunger 136 or 137 pivotally connected to arms 130 or 131 respectively.

For a purpose to be described, base 120 of bracket 117 is provided with a cam surface 141 adapted to operate snap action switches 142, 143, 144 (Figs. 4 and 7), each of which is provided with an operating roller 145. The switches are mounted on a Z-shaped bracket 146 suitably secured to mounting plate 22. These switches control the operation of solenoids 135 and 140 to effect engagement of beveled gears 123 and 125 or 124 and 126. Upon energization of solenoid 135, for instance, gear 125 is engaged with gear 123. At the same time, a friction drive roller 150 secured for rotation with gear 125 is engaged with the outer periphery of drive disk 57 which is constantly rotated by motor 65 through gears 61 and 62 whenever control switch 23 is closed.

Such engagement of these gears effects rotation of threaded shaft 121 and moves bracket 117 and friction roller 116 to the left as indicated in dotted lines in Fig. 2. The first effect of the consequent rotation of shaft 101 is to move the shaft to the left until righthand stop 103 engages righthand bracket 102, as schematically indicated in Fig. 5. This is effected by proper selection of the direction of the threads of worm wheels 88 and 98 with respect to worms 114 and 115. The threads are so directed that worm 114 tends to screw-up along worm wheel 88 as worm 115 tends to screw-out of engagement with worm wheel 88. The lengths of the worms are so selected, with relation to the distance of abutments 103 from the brackets 102, that one of the worms will continue to remain in engagement with its associated worm wheel while the other worm is disengaged from its worm wheel.

When shaft 101 can move no further to the left, worm 114 imparts driving engagement to worm wheel 88 and thus to shaft 84 to rotate reel 40 and wind wire 45 thereon. During such rewinding of wire 45 on reel 40, the spooling mechanism in magazine 15 is operated due to the rotation of reel 41 effected by the unwinding of wire 45 therefrom. Such rotation of reel 41 operates shaft 97 which, through worm 107, worm wheel 108, worm 111, worm wheel 112, shaft 113, and spur gear 76, effects operation of the spooling mechanism of the magazine.

Should solenoid 140 be energized, gears 124 and 126 would be engaged, and friction roller 155 secured for rotation with gear 126 would be moved into engagement with friction disk 57. This would effect rotation of threaded shaft 121 in the opposite direction. As shown in Fig. 6, shaft 101 would move to the right until left-hand stop 103 abuts left-hand bracket 102 disengaging worm

6

114 from worm wheel 88 while maintaining engagement of worm 115 with worm wheel 98. Consequently, reel 41 will be rotated through shaft 97 and the associated coupling gears to wind wire 45 thereon when operation of spooling mechanism spur gear 76 is being effected in the manner previously described.

The control of the operation of the mechanism by push-buttons 11, 12 and 13 will be clear from a reference to Fig. 7. Normally, when the apparatus is in the idling position, switches 142, 144 occupy the position shown in Fig. 7 and switch 143 occupies the position opposite to that shown in Fig. 7. When "Rewind" push-button 11 is depressed, it closes an energizing circuit for a relay 160 from terminal 161 through switch 142 and push-button 11 to terminal 162. Relay 160 picks up and its armature 163 closes a holding circuit for the relay through conductor 164 connected in parallel with switch 11. Relay 160 will thus remain energized until switch 142 opens.

Armature 165 of relay 160 closes a circuit through conductor 164 for solenoid 135 which is connected to terminal 162. Solenoid 135 is thus energized to effect movement of shaft 101 in a left-hand direction as previously described. As bracket 117 travels along shaft 121, its cam surface 141 engages the roller diagrammatically indicated at 145, of switch 142 when driving roller 116 reaches the position shown in dotted lines in Fig. 2. Switch 142 is thus opened and breaks the holding circuit for relay 160 which thereupon opens deenergizing solenoid 135 and thus disconnecting the gearing so that the shaft 140 is no longer rotated. When in the depressed position, switch 142 closes a circuit to terminal 161 through its back contact 166 which is connected by a conductor 167 to an armature 168 of "idling" relay 170.

When "Record/Reproduce" push-button 13 is depressed, it closes a circuit from terminal 161 through switch 144 and push-button 13 for relay 175. Through its armature 176 relay 175 closes a holding circuit for itself in parallel with push-button 13 and through its armature 177 closes an energizing circuit for solenoid 140. This engages gears 124, 126 for rotation of shaft 121 in a direction to move bracket 117 to the right as viewed in Fig. 2. When roller 116 reaches a position to the right of disk 57 corresponding to that indicated at the left in dotted lines, cam surface 141 depresses roller 145 of switch 144 to break the holding circuit for relay 175 and thus effect deenergization of solenoid 140 and consequent stopping of shaft 121. Switch 144 then engages its back contact 178 which is connected by a conductor 180 to armature 181 of relay 170.

When "Idling" push-button 12 is depressed, it closes a circuit through switch 143 for relay 170 which picks up and closes its own holding circuit through its armature 182. Relay 170 likewise engages its armatures 181 and 168 and, dependent upon which one of switches 142 or 144 is engaged with its back contact, will energize one or other of solenoids 135 or 140 to effect movement of bracket 117 and roller 116 from either the left or right position, relative to Fig. 2, to the central position. When the roller reaches the central position, cam 141 engages roller 145 of switch 143 to open this switch, deenergizing relay 170 and effecting deenergization of whichever one of solenoids 135 or 140 was previously energized.

The described mechanism comprises a simple and effective driving arrangement for a mag-

netic recording apparatus. The worm and worm gear arrangements provide an effective block for maintaining the reels against rotation when the apparatus is in the neutral position, and thereby maintain the magnetic recording wire taut between the reels. A significant feature of the drive mechanism is the slow pick-up or acceleration of the spooling drive due to the preliminary disengagement of one of the worms from its worm wheel while the other worm is picking up the drive of its worm wheel. Such slow pick-up prevents any excessive starting shock being imposed on the magnetic recording wire, thereby preventing damage to the wire and prolonging its life. Due to the operation of both the selector mechanism and the reel drive from the same driving member, the driving disk, the mechanism is considerably simplified over that hitherto considered necessary for magnetic recorders.

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. Mechanism for interchanging a linear element between a pair of spaced rotatable reels comprising, in combination, a longitudinally shiftable rotatable shaft; a pair of coupling means each normally coupling said shaft to one of the reels; a driven member effective to rotate said shaft in reverse directions; said driven member normally being inoperative to rotate said shaft and such rotation of said shaft effecting longitudinal movement thereof to disengage one coupling means while maintaining engagement of the other coupling means to effect selective driving of one of the reels; a driving member effective to rotate said driven member in reverse directions; said driven member being shiftable relatively to said driving member from a neutral position to either one of a pair of driving positions; means selectively operable by said driving member to shift said driven member between such positions; mechanism effective to engage such shifting means with said driving member; and means operable automatically when the driven member reaches the selected position to disengage the shifting means from said driving member.

2. Mechanism for interchanging a linear element between a pair of spaced rotatable reels comprising, in combination, a longitudinally shiftable rotatable shaft; a pair of coupling means each normally coupling said shaft to one of the reels, each coupling means comprising a worm rotatable with said shaft and a worm wheel rotatable with one of the reels; a driven member effective to rotate said shaft in reverse directions; said driven member normally being inoperative to rotate said shaft whereby said coupling means will lock the reels against rotation; such rotation of said shaft effecting longitudinal movement thereof to disengage one coupling means while maintaining engagement of the other coupling means to effect selective driving of one of the reels; a driving member effective to rotate said driven member in reverse directions; said driven member being shiftable relatively to said driving member from a neutral position to either one of a pair of driving positions; means selectively operable by said driving member to shift said driven member between such positions; mechanism effective to engage such shifting means with said

driving member; and means operable automatically when the driven member reaches the selected position to disengage the shifting means from said driving member.

3. Mechanism for interchanging a linear element between a pair of spaced rotatable reels comprising, in combination, a longitudinally shiftable rotatable shaft; a pair of coupling means each normally coupling said shaft to one of the reels, each coupling means comprising a worm rotatable with said shaft and a worm wheel rotatable with one of the reels; a driven member effective to rotate said shaft in reverse directions; said driven member normally being inoperative to rotate said shaft whereby said coupling means will lock the reels against rotation; such rotation of said shaft effecting longitudinal movement thereof to disengage one coupling means while maintaining engagement of the other coupling means to effect selective driving of one of the reels; a driving member effective to rotate said driven member in reverse directions; said driven member being shiftable relatively to said driving member from a neutral position to either one of a pair of driving positions; means selectively operable by said driving member to shift said driven member between such positions; mechanism effective to engage such shifting means with said driving member; means operable automatically when the driven member reaches the selected position to disengage the shifting means from said driving member; and abutment means limiting the longitudinal movement of said shaft.

4. Mechanism for interchanging a linear element between a pair of spaced rotatable reels comprising, in combination a longitudinally shiftable rotatable shaft; a pair of coupling means each normally coupling said shaft to one of the reels; a driven member effective to rotate said shaft in reverse directions; said driven member normally being inoperative to rotate said shaft and such rotation of said shaft effecting longitudinal movement thereof to disengage one coupling means while maintaining engagement of the other coupling means to effect selective driving of one of the reels; a driving member effective to rotate said driven member in reverse directions; said driven member being shiftable relatively to said driving member from a neutral position to either one of a pair of driving positions; means selectively operable by said driving member to shift said driven member between such positions; mechanism effective to engage such shifting means with said driving member; solenoid means selectively energizable to actuate said mechanism; and means operable automatically when the driven member reaches the selected position to deenergize said solenoid means to disengage the shifting means from said driving member.

5. Mechanism for interchanging a linear element between a pair of spaced rotatable reels comprising, in combination, a longitudinally shiftable rotatable shaft; a pair of coupling means each normally coupling said shaft to one of the reels, each coupling means comprising a worm rotatable with said shaft and a worm wheel rotatable with one of the reels; a driven member effective to rotate said shaft in reverse directions; said driven member normally being inoperative to rotate said shaft whereby said coupling means will lock the reels against rotation; such rotation of said shaft effecting longitudinal movement thereof to disengage one coupling means while maintaining engagement of the other coupling

means to effect selective driving of one of the reels; a driving member effective to rotate said driven member in reverse directions; said driven member being shiftable relatively to said driving member from a neutral position to either one of a pair of driving positions; means selectively operable by said driving member to shift said driven member between such positions; mechanism effective to engage such shifting means with said driving member; solenoid means selectively energizable to actuate said mechanism; means operable automatically when the driven member reaches the selected position to deenergize said solenoid means to disengage the shifting means from said driving member; and abutment means limiting the longitudinal movement of said shaft.

6. Magnetic recording apparatus for traversing a linear magnetic recording medium between a pair of spaced rotatable reels and in operative relation with a magnetic translating head comprising, in combination, a pair of rotatable shafts each effective to rotate one of the reels; a longitudinally shiftable rotatable drive shaft; a pair of coupling means each normally coupling said drive shaft to one of the reel shafts; a driven member effective to rotate said drive shaft in reverse directions; said driven member normally being inoperative to rotate said drive shaft and such rotation of said drive shaft effecting longitudinal movement thereof to disengage one coupling means while maintaining engagement of the other coupling means to effect selective driving of one of the reels; a driving member effective to rotate said driven member in reverse directions; said driven member being shiftable relatively to said driving member from a neutral position to either one of a pair of driving positions; means selectively operable by said driving member to shift said driven member between such positions; mechanism effective to engage such shifting means with said driving member; and means operable automatically when the driven member reaches the selected position to disengage the shifting means from said driving member.

7. Magnetic recording apparatus for traversing a linear magnetic recording medium between a pair of spaced rotatable reels and in operative relation with a magnetic translating head comprising, in combination, a pair of rotatable shafts each effective to rotate one of the reels; a longitudinally shiftable rotatable drive shaft; a pair of coupling means each normally coupling said drive shaft to one of the reel shafts; each coupling means comprising a worm rotatable with said shaft and a worm wheel rotatable with one of the reel shafts; a driven member effective to rotate said drive shaft in reverse directions; said driven member normally being inoperative to rotate said drive shaft whereby said coupling means will lock the reel shafts against rotation; such rotation of said drive shaft effecting longitudinal movement thereof to disengage one coupling means while maintaining engagement of the other coupling means to effect selective driving of one of the reels; a driving member effective to rotate said driven member in reverse directions; said driven member being shiftable relatively to said driving member from a neutral position to either one of a pair of driving positions; means selectively operable by said driving member to shift said driven member between such positions; mechanism effective to engage such shifting means with said driving member; and means operable automatically when the driven

member reaches the selected position to disengage the shifting means from said driving member.

8. Magnetic recording apparatus for traversing a linear magnetic recording medium between a pair of spaced rotatable reels and in operative relation with a magnetic translating head comprising, in combination, a pair of rotatable shafts each effective to rotate one of the reels; a longitudinally shiftable rotatable drive shaft; a pair of coupling means each normally coupling said drive shaft to one of the reel shafts; each coupling means comprising a worm rotatable with said shaft and a worm wheel rotatable with one of the reel shafts; a driven member effective to rotate said drive shaft in reverse directions; said driven member normally being inoperative to rotate said drive shaft whereby said coupling means will lock the reel shafts against rotation; such rotation of said drive shaft effecting longitudinal movement thereof to disengage one coupling means while maintaining engagement of the other coupling means to effect selective driving of one of the reels; a driving member effective to rotate said driven member in reverse directions; said driven member being shiftable relatively to said driving member from a neutral position to either one of a pair of driving positions; means selectively operable by said driving member to shift said driven member between such positions; mechanism effective to engage such shifting means with said driving member; solenoid means selectively energizable to actuate said mechanism; manual control means selectively operable to energize said solenoid means to shift said driven member to a preselected one of such positions; and means operable automatically when the driven member reaches the selected position to disengage the shifting means from said driving member.

9. Magnetic recording apparatus for traversing a linear magnetic recording medium between a pair of spaced rotatable reels and in operative relation with a magnetic translating head comprising, in combination, a pair of rotatable shafts each effective to rotate one of the reels; a longitudinally shiftable rotatable drive shaft; a pair of coupling means each normally coupling said drive shaft to one of the reel shafts, each coupling means comprising a worm rotatable with said shaft and a worm wheel rotatable with one of the reel shafts; a friction wheel rotatable with said drive shaft; a friction driving disk effective to engage and rotate said wheel; said wheel being shiftable relatively to said disk from a neutral position to either one or a pair of driving positions; said roller normally being in the neutral position where it is disengaged from said disk whereby said coupling means will lock the reel shafts against rotation; such rotation of said drive shaft effecting longitudinal movement thereof to disengage one coupling means while maintaining engagement of the other coupling means to effect selective driving of one of the reels; shifting means, including a pair of friction rollers selectively engageable with said disk, effective to shift such wheel between such positions; mechanism effective to selectively engage one of said rollers with said disk to operate said shifting means; solenoid means selectively energizable to actuate said mechanism; manual control means selectively operable to energize said solenoid means to shift said wheel to a preselected one of such positions; and means operable auto-

11

matically when the wheel reaches the selected position to deenergize said solenoid means to disengage the shifting means from said disk.

10. A magnetic sound translating unit interchangeably cooperable with magazines each containing a pair of spaced reels for traversing a linear magnetic recording medium with respect to magnetic translating head, said unit comprising, in combination, a pair of spaced rotatable reel operating shafts; a coupling element on each shaft detachably cooperative with a magazine coupling element connected to the associated reel; a longitudinally shiftable rotatable drive shaft; a pair of coupling means each normally coupling said drive shaft to one of the reel operating shafts, each coupling means comprising a worm rotatable with said shaft and a worm wheel rotatable with one of the reel operating shafts; a friction wheel rotatable with said drive shaft; a friction driving disk effective to engage and rotate said wheel; said wheel being shiftable relatively to said disk from a neutral position to either one of a pair of driving positions; said wheel normally being in the neutral position where it is disengaged from said disk whereby said coupling means will lock the reel shafts against rotation; such rotation of said drive shaft effecting longitudinal movement thereof to disengage one coupling means while maintaining engagement of the other coupling means to effect selective driving of one of the reels; shifting means, including a pair of friction rollers selectively engageable with said disk, effective to shift such wheel between such positions; mechanism effective to selectively engage one of said rollers with said disk to operate said shifting means; solenoid means selectively energizable to actuate said mechanism; manual control means selectively operable to energize said solenoid means to shift said wheel to a preselected one of such positions; and means operable automatically when the wheel reaches the selected position to deenergize said solenoid means to disengage the shifting means from said disk.

11. A magnetic sound translating unit interchangeably cooperable with magazines each containing a pair of spaced reels for traversing a linear magnetic recording medium with respect to a magnetic translating head and spooling mechanism effective to layer wind the medium onto and off of the reels, said unit comprising, in combination, a pair of spaced rotatable reel operating shafts; a coupling element on each shaft detachably cooperative with a magazine coupling

12

element connected to the associated reel; a coupling gear detachably cooperative with a magazine coupling element connected to the spooling mechanism; reduction gearing connecting one of said shafts to said coupling gear for operating the spooling mechanism at a reduced rate relative to the reel rotation rate; a longitudinally shiftable rotatable drive shaft; a pair of coupling means each normally coupling said drive shaft to one of the reel operating shafts, each coupling means comprising a worm rotatable with said shaft and a worm wheel rotatable with one of the reel operating shafts; a friction wheel rotatable with said drive shaft; a friction driving disk effective to engage and rotate said wheel; said wheel being shiftable relatively to said disk from a neutral position to either one of a pair of driving positions; said wheel normally being in the neutral position where it is disengaged from said disk whereby said coupling means will lock the reel shafts against rotation; such rotation of said drive shaft effecting longitudinal movement thereof to disengage one coupling means while maintaining engagement of the other coupling means to effect selective driving of one of the reels; shifting means, including a pair of friction rollers selectively engageable with said disk, effective to shift such wheel between such positions; mechanism effective to selectively engage one of said rollers with said disk to operate said shifting means; solenoid means selectively energizable to actuate said mechanism; manual control means selectively operable to energize said solenoid means to shift said wheel to a preselected one of such positions; and means operable automatically when the wheel reaches the selected position to deenergize said solenoid means to disengage the shifting means from said disk.

WILLARD H. WADE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,482,802	Lewis	Feb. 5, 1924
1,499,521	Hagemann	July 1, 1924
1,665,784	Hornauer	Apr. 10, 1928
2,069,595	Thomas	Feb. 2, 1937
2,248,790	Stapelfeldt	July 8, 1941
2,369,017	Camras	Feb. 6, 1945