

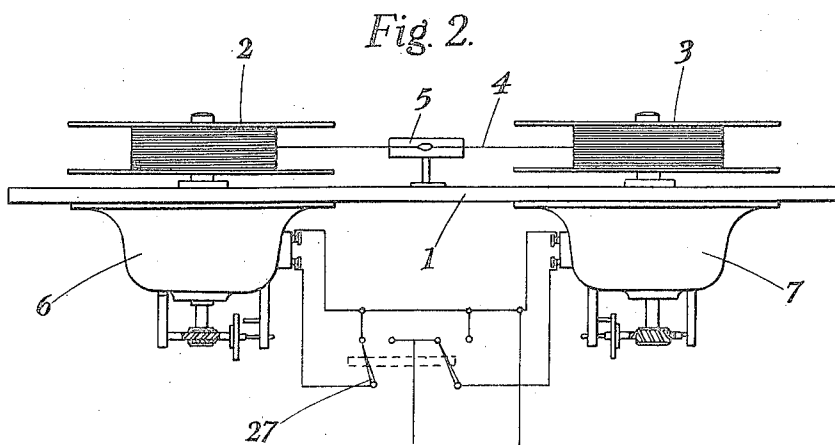
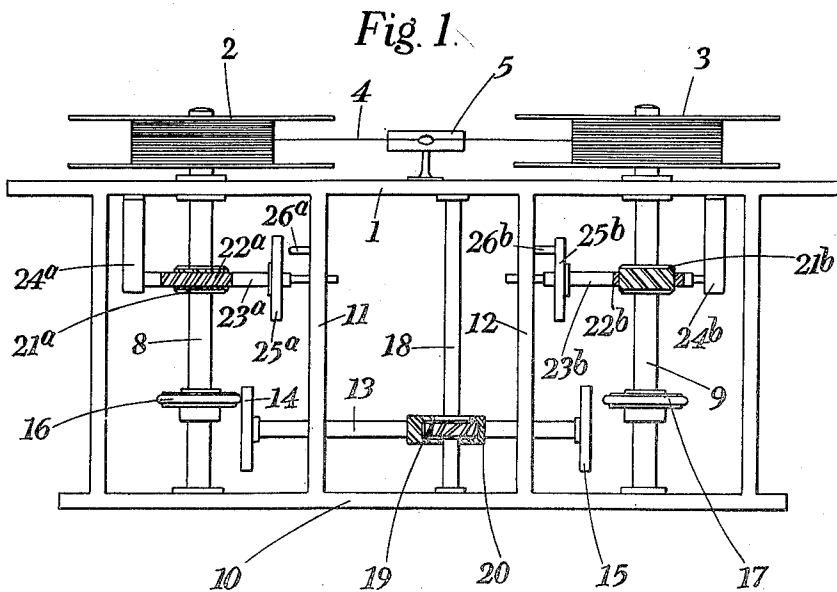
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DRIVING DEVICE FOR MAGNETIC SOUND RECORDING AND REPRODUCING APPARATUS

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DRIVING DEVICE FOR MAGNETIC SOUND
RECORDING AND REPRODUCING APPA-
RATUS

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The present invention relates to driving devices for magnetic recording and reproducing apparatus.

In such apparatus the magnetic carrier wire or strip is usually wound from one spool or drum on to another and after recording it has to be re-wound on the first spool so that the sounds will be heard in correct sequence when the wire or strip is again unwound during reproduction. In such apparatus, therefore, it is necessary to drive the magnetic carrier alternately in one direction and then in the other, and in known apparatus used up to the present this change of direction has been accomplished by the use of complicated mechanical and/or electro-mechanical couplings.

Further, when unwinding from one spool to the other, it is usual to drive the spool on which the magnetic carrier is being wound and to let the other spool unwind in accordance with the pull of the carrier. In order that the carrier may be held taut it is necessary to brake the rotating spool from which it is being unwound. This braking is particularly necessary when using a thin wire as the magnetic carrier.

The present invention has for its object to provide a simple method of braking the spool from which the magnetic carrier is being unwound.

A further object of the invention is to provide at the same time a similar method of changing over the drive to the spool on which the magnetic carrier is being wound.

According to the improved method of braking of the invention, a shaft which is rotatable in opposite directions is braked by means of a second rotatable and longitudinally movable shaft which is coupled to the first shaft through a coupling which exerts axial pressure on the longitudinally movable shaft in accordance with the direction of rotation of the first shaft, braking means being associated with the longitudinally movable shaft which is moved into and out of the operative braking position in accordance with the direction of rotation of the first shaft.

It will be seen hereinafter that such an improved braking device according to the invention is particularly applicable to magnetic sound recording and reproducing apparatus of the above type wherein the magnetic carrier wire or strip is wound and unwound between two rotatable spools either of which may be operated at will as the winding spool. To this end, in one form of the invention, to each spool there corresponds a separate braking device comprising a longitudinally movable shaft which is driven in accordance with the direction of rotation of the corre-

sponding spool through a worm wheel and worm or similar gearing or coupling which exerts an axial pressure on the shaft during rotation, the shaft being so arranged that in one end position it effects a braking action whereas in the other end position no braking action takes place. The braking may be effected by a disc mounted on the shaft engaging with a friction member or brake shoe.

In order that the invention may be more clearly understood various embodiments thereof will now be described by way of example with reference to the accompanying drawing, in which

Fig. 1 shows an embodiment of the invention by way of example

Fig. 2 shows the braking device according to the invention applied to a magnetic sound recording or reproducing apparatus wherein the spools are adapted to be driven at will from individual electric motors.

In Figure 1 of the drawing the driving apparatus comprises a mounting board 1 carrying the two spools or drums 2 and 3 on which the magnetic wire 4 is wound and unwound. In its path from one drum to the other, the wire passes through the magnetic recording or reproducing head 5 of known construction.

The spools 2 and 3 are mounted on shafts 8 and 9 respectively, which are journaled between the mounting board 1 and another board 10 spaced therefrom by spacing walls 11, 12.

Journaled in apertures in these walls 11, 12 is a driving shaft 13 which is capable of a slight longitudinal movement. The driving shaft carries at its two ends driving discs 14 and 15 which are adapted to engage with the friction discs 16, 17 carried by the shafts 8 and 9 respectively. When the driving shaft is in its left-hand position, as shown, the disc 14 engages with the friction wheel 16 and vice versa when the driving shaft is in its right-hand position the disc 15 engages with the friction wheel 17. The friction wheels may have peripheral surfaces of rubber or other friction material.

The driving shaft 13 is in its turn driven from the motor spindle 18 through a worm wheel 19 and a worm 20. It will be readily understood that when the motor is rotated in one direction, the driving shaft will be moved towards the left to complete the drive to the spool 2 and disconnect it from spool 3, whereas when the motor is rotated in the opposite direction, the drive will be completed to the spool 3 and disconnected from the spool 2. Thus by simply reversing the direction of the driving motor (not shown) driv-

ing connection with one spool and disconnection from the other spool may be automatically effected. The driving motor is preferably a reversible electric motor.

Fig. 1 also illustrates one form of the improved braking device of the invention. The shaft 8 drives through a worm wheel 21a and worm 22a a spindle 23a which is journaled in the wall 11 and a bracket 24a. This shaft also has a limited axial movement and as has been described above the axial position of the spindle will be determined by the direction of rotation of the shaft 8. Also carried by the spindle 23a is a disc 25a which, when the shaft is in or near its right-hand end position, engages with a friction member or braking shoe 26a carried by the wall 11.

A similar braking mechanism is associated with the shaft 9, the parts thereof being designated by the same numerals as the braking mechanism associated with the shaft 8 except that the suffix b is used. Further, the spindle 23b is located on the remote side of shaft 9 (looking at the drawing) instead of on the near side as is the case with spindle 23a.

The worm wheels 21 and worms 22 are so arranged that when the shaft 8 is being driven by the motor, the spindle 23a is moved towards the left so that the disc 25a is out of engagement with the braking shoe 26a and at the same time the spindle 23b is in its left-hand end position, the disc 25b thereof engaging with the braking shoe 26b and thus braking the movement of the spool 3. Conversely when the spindle 9 is being driven by the motor the spindles 23a and 23b will be in their right-hand positions and the spool 2 will be braked.

Fig. 2 illustrates the application of the braking device of the invention to driving apparatus employing separate driving motors for the individual spools. The apparatus comprises the mounting board 1 carrying the spools 2 and 3 for the wire 4. Each of the spools is driven by a separate electric driving motor 6 and 7, which in the example shown are mounted directly below the spools, the spools actually being mounted on the motor spindles. It will be understood, of course, that the spools could, however, be mounted on separate spindles driven from the motor spindles. To wind the wire from one spool to the other, say from spool 2 to spool 3, the motor 7 is started, the wire pulling round the spool 2 and its associated motor 6 which latter serves to a certain extent as a brake and holds the wire taut. When it is desired to rewind the wire back on to the spool 1, current is fed to the motor 6 and cut off from the motor 7 so that the drive is effected by the motor 6 and the motor 7 then acts to a certain extent as a brake.

The actual braking is effected, however, by means of the brakes 28 and 29 mounted on the motor shafts in the manner illustrated and the constructions and method of operation of which are exactly the same as the brakes described above with reference to Fig. 1. Each motor shaft carries a worm wheel which drives through a worm a braking shaft which is provided with a limited axial movement, the axial position of which will be determined by the direction of rotation of the motor shaft. The braking shaft carries a braking disc which, when the shaft is in one of its end positions, engages with a friction member or braking shoe carried by the motor casing. In the example illustrated, the brake associated with the motor 6 is in the inoperative position while the brake associated with the motor

7 has been moved into its end operative position where it serves to brake the spool 3.

It will be understood that various modifications of the above examples of improved driving and braking devices of the invention may be made without departing from the scope of the invention as defined by the appended claims.

I claim:

1. A magnetic sound recording and reproducing apparatus comprising two spools, a magnetic carrier adapted to be wound from one spool on to the other, a worm wheel driven by each of said spools, two rotatable and longitudinally movable shafts, a worm mounted on each of said shafts and engaging respectively with said worm wheels, and braking means associated with said longitudinally movable shafts which come into action only when the shafts are in one of their end positions.

2. A magnetic sound recording and reproducing apparatus comprising two spools, a magnetic carrier adapted to be wound from one spool on to the other, a reversible driving means and means for coupling the driving means to either of the spools in accordance with the direction of rotation of the driving means, a worm wheel driven by each of said spools, two rotatable and longitudinally movable shafts, a worm mounted on each of said shafts and engaging respectively with said worm wheels, braking means associated with said longitudinally movable shafts which come into action only when the shafts are in one of their end positions, and means for driving said spools and worm wheels so that only one shaft is braked at any time.

3. A magnetic sound recording and reproducing apparatus comprising two spools, a magnetic carrier adapted to be wound from one spool on to the other, rotatable shafts connected to said spools and arranged substantially parallel to one another, a rotatable and longitudinally movable driving shaft mounted between said shafts and movable in one direction to engage with and drive one spool and in the other direction to engage with and drive the other spool, a worm mounted on said driving shaft, a driving means, a worm wheel driven by said driving means and engaging with said worm, a worm wheel mounted on each of said spool shafts, two rotatable and longitudinally movable braking shafts, a worm mounted on each of said braking shafts and engaging respectively with said worm wheels mounted on the spool shafts, and braking means associated with said longitudinally movable shafts which come into action only when the shafts are in one of their end positions, the whole being so arranged that when one spool is being driven by the driving means, the other spool is being braked.

4. In combination, two spools for unwinding and winding a material, each of said spools being mounted on a rotatable spool shaft, driving means for driving either of said spools at will to function as the winding spool while the other functions as the unwinding spool, a rotatable and axially movable shaft coupled to each spool shaft through a coupling which exerts axial pressure on said axially movable shaft in accordance with the direction of rotation of the corresponding spool shaft, and braking means associated with each of said axially movable shafts, said axially movable shafts being movable into and out of operative braking position to brake the corresponding spool shaft in accordance with the direction of rotation of said spool shaft.

5. In combination, two spools for unwinding and winding a material, each of said spools being mounted on a rotatable spool shaft, driving means for driving either of said spools at will to function as the winding spool while the other functions as the unwinding spool, a worm wheel on each of said spool shafts, two rotatable and axially movable shafts, each having a worm thereon co-operating with the worm wheel of a different one of said spool shafts, whereby axial pressure is exerted on the axially movable shafts in accordance with the direction of rotation of the corresponding spool shaft, and braking means associated with each of said axially movable shafts, said axially movable shafts being movable into and out of the operative braking position to brake the corresponding spool shaft in accordance with the direction of rotation of said spool shaft.

6. In combination, two driving motors, each having a motor shaft rotatable in opposite directions, a rotatable spool associated with each of said motor shafts, said spools co-operating to function as winding and unwinding spools for a material in accordance with the direction of rotation of said spools, a rotatable and axially movable shaft coupled to each of said motor shafts through a coupling which exerts axial pressure on said axially movable shaft in accordance with the direction of rotation of the corresponding motor shaft, and braking means associated with each of said axially movable shafts, said axially movable shafts being movable into and out of operative braking position to brake the corresponding motor shaft in accordance with the direction of rotation of said motor shaft.

7. In combination, two driving motors each having a motor shaft rotatable in opposite directions, a rotatable spool associated with each of said motor shafts, said spools co-operating to function as the winding and unwinding spools for a material in accordance with the direction of rotation of said spools, a worm wheel on each of said motor shafts, two rotatable and axially

movable shafts each having a worm thereon, each of said axially movable shafts being driven from a different one of said motor shafts through the co-operation of the corresponding worm and worm wheel, whereby axial pressure is exerted on said axially movable shafts in accordance with the direction of rotation of the corresponding motor shaft, and braking means associated with each of said axially movable shafts, said axially movable shafts being movable into and out of operative braking position to brake the corresponding motor shaft in accordance with the direction of rotation of said motor shaft.

8. In combination, two spools each mounted on a rotatable shaft, said spools co-operating as unwinding and winding spools for a material, a rotatable and longitudinally movable driving shaft mounted between said spool shafts and capable of a limited axial movement, a reversible driving means, a coupling between said driving means and said axially movable driving shaft which exerts axial pressure on said driving shaft in accordance with the direction of rotation of said driving shaft, to move said driving shaft in one or the other direction to drive one or the other of said spools, a further individual axially movable shaft associated with each of said spool shafts, a coupling between each of said spool shafts and said further axially movable shaft which exerts axial pressure on said further axially movable shaft in accordance with the direction of rotation of the corresponding spool shaft, and braking means associated with each of said further axially movable shafts for braking the corresponding spool shaft in accordance with the direction of rotation thereof, the arrangement being such that when said axially movable driving shaft drives either one of said spools as the winding spool, the direction of rotation of the corresponding spool shaft is such that the associated braking means is maintained out of the operative braking position.

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