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DRIVE FOR WINDING MECHANISM

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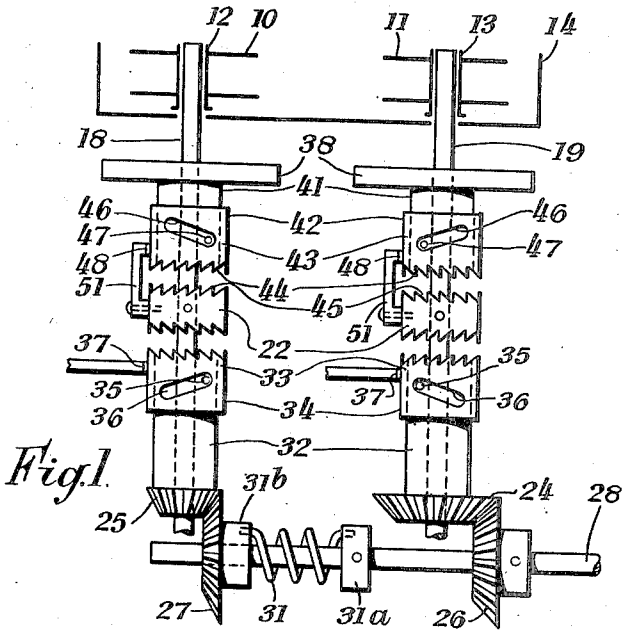


Fig. 1.

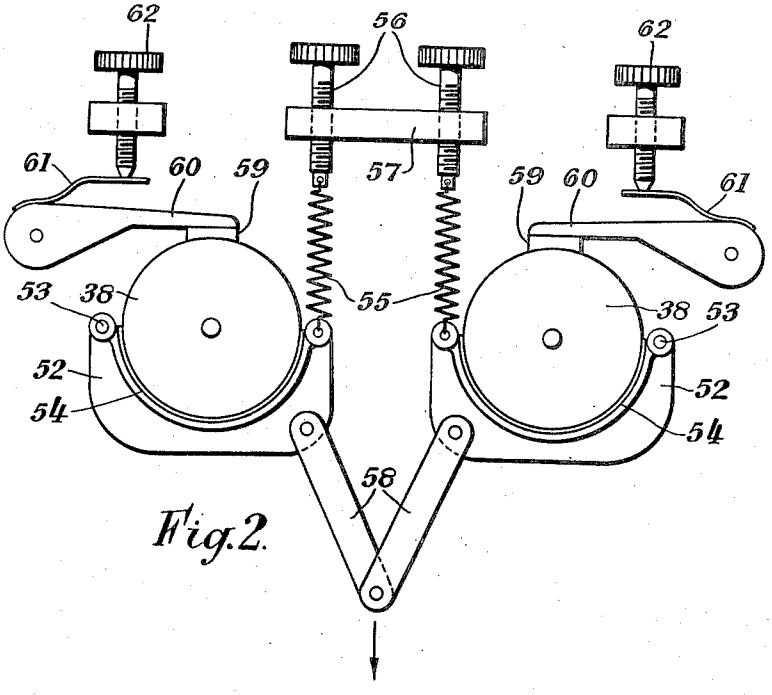


Fig. 2.

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DRIVE FOR WINDING MECHANISM

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This invention relates to winding mechanism for transferring a wire, tape, cord or like flexible member from one reel or like holder to another, and for re-winding some or all of it on the original holder, each of the holders being mounted on a spindle carrying the driven member of a disconnectible driving unit, the driving members of both units being driven continuously by a common reversible driving motor and one of said driving units being engaged automatically when the motor rotates in one direction, the other driving unit being engaged automatically when the motor rotates in the other direction, and each driving unit being automatically disengaged when the other is engaged. Winding mechanism as set forth in this paragraph is hereinafter termed "winding mechanism of the kind referred to."

The invention is particularly useful in electric dictation installations in which spoken matter is recorded electromagnetically on a wire or tape, and it is desirable to be able to hear subsequently what has been said for purposes of correction or alteration, as well as for reproduction by a typist.

The object of the invention is to provide an improved winding mechanism of the kind in which the mere starting of a common driving motor automatically couples to the said motor either a receiving holder or a paying-out holder respectively according to the direction in which the motor is rotated.

According to the invention, in winding mechanism of the kind referred to the disconnectible driving units are one-way positive clutches engaged and disengaged by relative axial movement of one of their members with respect to the other, the driving members being mounted on the holder spindles for free rotation thereon when the clutches are disengaged, and the axially movable members of the two clutches being urged axially in opposite directions with respect to their mating clutch members when the motor is in operation.

Brake means may be provided which comprise braking members applied simultaneously to brake drums associated with both holders, one-way clutches being provided between the brake drums and the holders and arranged so that the brake drum associated with each holder is clutched to the said holder only when it is being rotated due to the winding of the flexible member on to the other holder.

The invention is hereinafter described with reference to the accompanying drawings, in which:

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Figure 1 is a diagrammatic side elevation of one form of mechanism according to the invention; and

Figure 2 is a diagrammatic plan view of the mechanism shown in Figure 1, showing brake mechanism for controlling the holders.

Referring to the drawings, the reels for receiving the wire, tape, cord or like flexible member are indicated at 10 and 11, being mounted on hollow spindles 12 and 13 in a removable magazine 14, 10 being the paying out reel and 11 the receiving reel. The winding mechanism is supported in a frame (not shown) parallel spindles 18 and 19 adapted to fit inside the hollow spindles 12 and 13 respectively being journaled in bearings in the said frame. The spindles 18 and 19 are splined at their upper ends to receive spring-loaded dollies or like members mounted in the hollow spindles 12 and 13, by which the drive is transmitted to the said hollow spindles. Each of the spindles 18 and 19 carries the driven member of a one-way clutch, these members being shown at 22, 22, and being fixedly mounted on the spindles. Mounted on the spindle 19 for free rotation thereon is a bevel gear 24, and similarly mounted on the spindle 18 is a bevel gear 25, the bevel gear 24 meshing with a bevel gear 26, and the bevel gear 25 meshing with a bevel gear 27, both of which are mounted on a main driving shaft 28 driven by an electric motor. The bevel gear 26 is fixedly mounted on the shaft 28, but the bevel gear 27 is free to turn on the shaft, and is driven through a spring 31, secured at one end to a collar 31a fast on the shaft 28, and at the other end to a boss 31b integral with the gear 27. The bevel gear 24 and bevel gear 25 are located axially on the spindles, and each of them is integral with a hub 32. A clutch driving member 33 is mounted on each hub 32, the driving members having sleeve portions 34 which fit over the hubs 32, and the driving members being connected to the hubs by radial pins 35 projecting from the hubs into inclined slots 36 in the sleeves. The clutch members 22 and 33 are provided with interengaging ratchet teeth, and the clutch members 33 are engaged by friction pads 37 mounted on the fixed framework of the mechanism so as to resist rotation of the said members. The two clutches are arranged to engage one in each direction of rotation, and the gear trains are so arranged that the gear wheels 24 and 25 rotate in the same direction, the slots 36 being inclined in opposite directions one to the other. Thus rotation of the shaft 28 in one direction causes engagement of one clutch, and rotation of the

shaft 28 in the opposite direction causes engagement of the other clutch, the drag of the friction pads 37 on the clutch members 33 causing the pins 35 to travel along the slots 36 and lift one clutch driving member into engagement with the corresponding driven member, whilst lowering the other clutch driving member out of engagement with the corresponding driven member.

A brake drum 38 is mounted on each of the spindles 18 and 19 and is free to turn thereon, each brake drum 38 having a hub portion 41 fitting within a sleeve 42 constituting an intermediate member 43 similar to the clutch driving member 33, the members 43 being formed with ratchet teeth 44 to co-operate with similar teeth 45 on the upper faces of the clutch driven members and being formed with inclined slots 46 into which project radial pins 47 projecting from the hubs 41 of the brake drums. The slot 46 in each intermediate member is oppositely inclined with respect to the slot in the clutch driving member on the same spindle, and friction pads 48 carried by resilient arms 51 secured to the clutch driven members 22 bear on the intermediate members, tending to drag them round with the clutch driven members. Thus, when one of the spindles is driven by the motor, the brake drum on that spindle is freed by the action of the pin-and-slot device, but when one of the spindles is rotated in the opposite direction to that in which it is driven by the motor, as when the wire, tape, cord or the like is being drawn off it, the brake drum thereon is coupled to the spindle, and rotates with it.

Each brake drum 38 co-operates with a brake shoe 52 pivotally mounted at 53 in the frame of the mechanism, and carrying a lining 54 of friction material to engage the drum. Each shoe is urged into contact with the appropriate drum by a tension spring 55 secured at one end to the shoe 52 and at the other end to an adjusting screw 56 mounted in a part 57 of the frame. The brake shoes 52 are connected by links 58 to a common pull-off device (not shown) which may be a solenoid which is controlled simultaneously with the electric motor, the solenoid being energized to release the brakes when the electric motor is started, and de-energized to apply the brakes when the electric motor is stopped. Thus, both brake shoes are applied to the drums, or released, at the same time, but only one is effective, as only one brake drum is clutched to its spindle at any given time. Each brake drum 38, in addition to being acted on by the brake shoe 52, is acted upon constantly by a pad 59 carried by a pivoted arm 60 and urged against the drum by a spring 61 the stress in which can be adjusted by means of a screw 62. Thus, wherever the wire, tape, cord or the like is being drawn off one of the holders, that holder is subjected to a frictional drag even when the brake is "off" and so is prevented from overrunning the other holder and slackening the wire, tape, cord or the like. Only one holder is subjected to the frictional drag at any one time, as only one drum 38 is clutched to its spindle.

The bevel gear trains which connect the clutch driving members 33 to the driving shaft 28 are shown merely for convenience, and may be replaced by other gear trains, such as worm and worm-wheel or skew gears. Where a large difference in the rate of winding in the two directions is required, one clutch driving member may be driven through worm gearing and the other through skew gearing.

The spring 31 serves two functions. It serves as a shock absorber to reduce the shock produced by engagement of the driving clutch on the spindle 18, which is driven more rapidly than the spindle 19 in order to speed up the rewinding of the flexible member, and it also provides a degree of lost motion which ensures, on reversal of the drive, that the clutch driving one spindle is released before the clutch driving the other spindle is engaged.

I claim:

1. A winding mechanism having, in combination, two rotatable winding-holder spindles, a driven clutch member fixed to each spindle, driving clutch members slidable upon the respective spindles to engaging positions in which they are respectively engaged with the respective driven clutch members and to disengaging positions in which they are respectively disengaged from the respective driven clutch members, means for simultaneously rotating the driving clutch members selectively in one direction or the reverse direction, and means operable upon the commencement of the rotation of the rotating means in the one direction for slidably actuating one of the driving clutch members into its engaging position and the other driving clutch member into its disengaging position, and operable upon the commencement of the rotation of the rotating means in the reverse direction for slidably actuating the said one driving clutch member into its disengaging position and the said other driving clutch member into its engaging position.

2. A winding mechanism of the character described in claim 1 and in which driving means are provided for causing the rotating means to rotate the driving clutches simultaneously at different speeds, the driving means associated with the more rapidly rotated driving clutch being provided with a shock-absorbing lost-motion device.

3. A winding mechanism having, in combination, two rotatable winding-holder spindles, a driven clutch member fixed to each spindle, rotatable elements mounted upon the respective spindles, driving clutch members, friction means for producing a drag on each driving clutch member, means for mounting the driving clutch members upon the rotatable elements so as to permit a limited relative rotation therebetween upon rotation of the rotatable elements accompanied by a corresponding limited sliding movement of the driving clutch members along the spindles into engaging positions in which the driving clutch members are respectively engaged with the respective driven clutch members or to disengaging positions in which the driving clutch members are respectively disengaged from the respective driven clutch members, means for simultaneously rotating the rotatable elements selectively in one direction or the reverse direction, and means whereby the commencement of the rotation of the rotating means in the one direction slidably actuates one of the driving clutch members into its engaging position and the other driving clutch member into its disengaging position, and the commencement of the rotation of the rotating means in the reverse direction slidably actuates the said one driving clutch member into its disen-

gaging position and the said other driving clutch member into its engaging position.

4. A winding mechanism of the character described in claim 3 and in which the rotatable elements are provided with pins and the mounting means are provided with oppositely inclined helical slots for receiving the pins.

5. A winding mechanism having, in combination, two rotatable winding-holder spindles, a driven clutch member fixed to each spindle, driving clutch members slidable upon the respective spindles to engaging positions in which they are respectively engaged with the respective driven clutch members and to disengaging positions in which they are respectively disengaged from the respective driven clutch members, means for simultaneously rotating the driving clutch members selectively in one direction or the reverse direction, and means operable upon the commencement of the rotation of the rotating means in the one direction for slidably actuating one of the driving clutch members into its engaging position and the other driving clutch member into its disengaging position, and operable upon the commencement of the rotation of the rotating means in the reverse direction for slidably actuating the said one driving clutch member into its disengaging position and the said other driving clutch member into its engaging position, braking means for each spindle, passive clutch members slidably mounted upon the respective spindles to engaging positions in which they are respectively engaged with the respective driven clutch members to couple the braking means to the spindles and to disengaging positions in which they are respectively disengaged from the respective driven clutch members to uncouple the braking means from the spindles, and means operable upon the engagement of each driven clutch member with the corresponding driving clutch member for slidably actuating the corresponding passive clutch member to its disengaging position in order to permit unbraked rotation of the corresponding spindle, and operable upon the disengagement of each driven clutch member from the corresponding driving clutch member for actuating the corresponding passive clutch member to its engaging position in order to brake the corresponding spindle.

6. Winding mechanism according to claim 1, wherein the driving clutch member for each driven clutch is mounted for limited rotation on a part rotatable on the holder spindle, the drive from the rotating means being transmitted to the driven clutch through the said part, the driving clutch member being constrained to slide along the spindle during such relative rotation, friction means being provided which produce a drag on the said driving clutch member and cause it to rotate with respect to the part on which it is mounted in one direction or the other, depending on the direction of rotation of the rotating means.

7. Winding mechanism according to claim 6, wherein each slidable driving clutch member has a pin-and-slot connection with the part which carries it, the slots being helical so that relative rotation of the parts is accompanied by relative slidable movement.

8. Winding mechanism according to claim 1, wherein brake means are provided which comprise braking members applied simultaneously to brake drums associated with both holder spindles, one-way clutches being provided between the brake drums and the holder spindles and arranged so that the brake drum associated with each holder spindle is clutched to the said holder spindle only when the other holder spindle is being rotated by the rotating means.

9. Winding mechanism according to claim 8, wherein the brake means are controlled in common with the rotating means so that the braking members are applied to the drums when the rotating means is stopped and released from the drums when the rotating means is started.

10. Winding mechanism according to claim 8, wherein the driving clutch members between the brake drums and the holder spindles comprise interengaging toothed members one of which has rotary lost motion on the part which carries it and is constrained to move axially during such lost motion, said one toothed member being frictionally coupled to the other toothed member so as to be moved thereby with respect to the part which carries it, and thus slidably displaced to engage or disengage the driven clutch depending on the direction of the relative rotation between the toothed member and the part which carries it.

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