

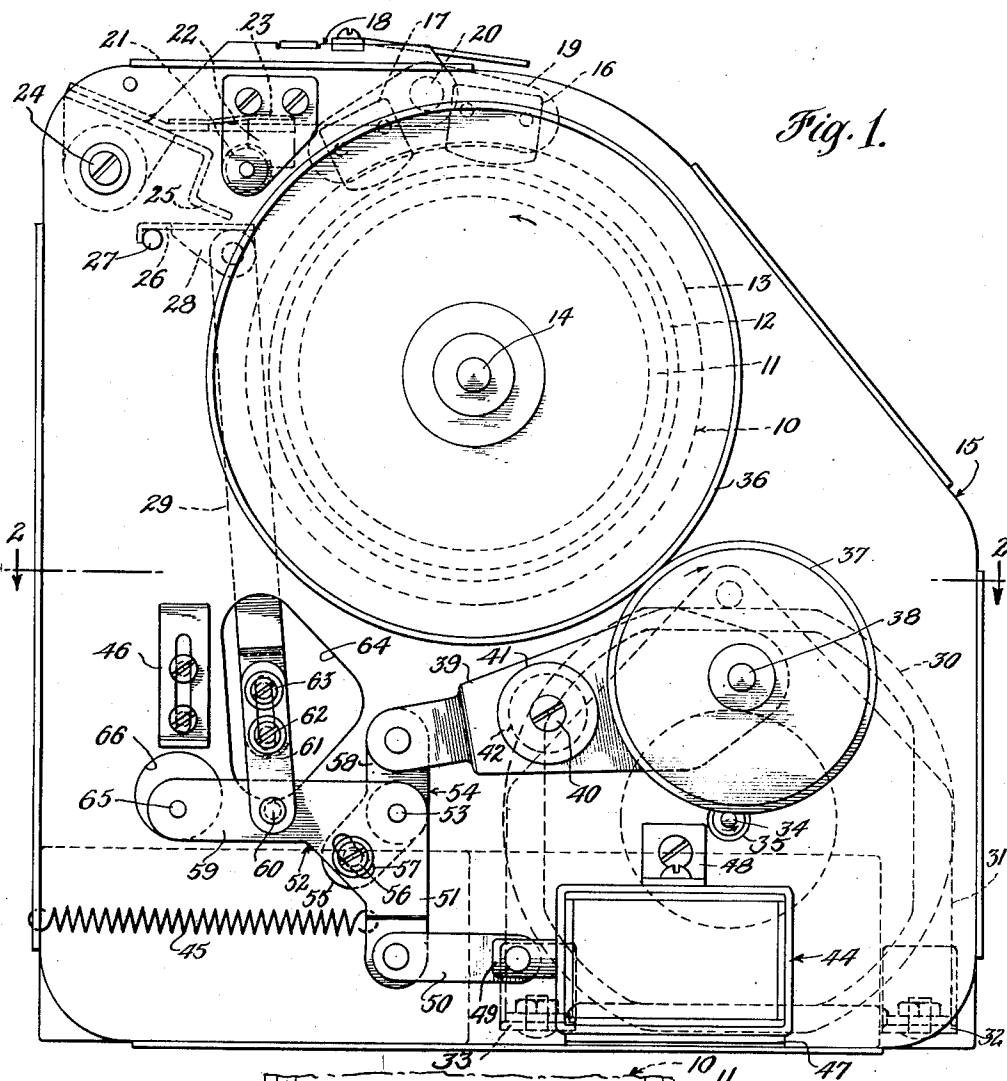
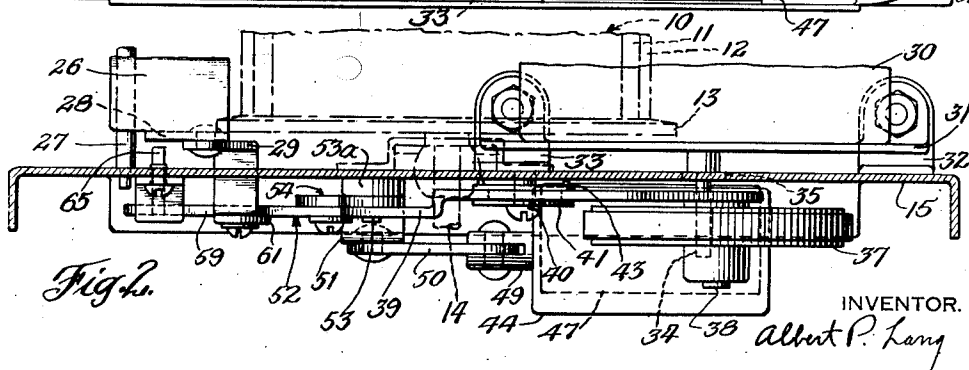
Dec. 28, 1954

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2,698,183

DRIVE CONTROL MECHANISM FOR MAGNETIC RECORDING APPARATUS

Filed May 3, 1948



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2,698,183

DRIVE CONTROL MECHANISM FOR MAGNETIC RECORDING APPARATUS

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Application May 3, 1948, Serial No. 24,827

7 Claims. (Cl. 274-17)

This invention relates to office dictating machines, and, more particularly, has to do with office dictating machines of the type comprising a cylindrical record-supporting mandrel mounted for rotation on a horizontal axis, and a transducer-supporting carriage adapted to be translated in a scanning path parallel to the mandrel axis.

Certain aspects of the invention are specifically directed to office dictating machines of the type described in which the mandrel is adapted to support a magnetizable record and in which the carriage supports a magnetic-electrical transducer.

The invention is particularly concerned with mechanism for driving the mandrel and carriage of dictating machines of the type above mentioned, and with mechanism for controlling the transmission of driving energy to the mandrel and carriage translating mechanism.

In addition, the invention relates to the assembly of office dictating machines, with particular reference to the assembly or partial assembly of the drive and control section of an office dictating machine prior to the assembly of the complete machine.

Accordingly, the invention is concerned with the construction and arrangement of an extremely simple unitary mechanism for supplying and controlling driving force to the record-scanning mechanism of an office dictating machine.

A general object of the invention is to provide a mechanism of the type described which will occupy a minimum of space in the complete dictating machine.

A further object of the invention is to provide a mechanism of the type described which may be unitarily incorporated in an office dictating machine.

Yet another object of the invention is a unique arrangement of the components of a dictating machine drive section which is of particular merit when used in conjunction with mechanism adapted to magnetically scan records carrying magnetizable material. More specifically, this phase of the invention has as an object the arrangement of the scanning and driving components in a minimum of space while maintaining the transducer in electromagnetic and electrostatic isolation relative to the electric driving motor.

According to another aspect of the invention, several elements of the driving mechanism are disposed in substantially the same plane, preferably in the plane normal to the mandrel axis. It is a further object of this aspect of the invention to confine both the drive-transmitting forces and the drive-engaging forces to a common plane, to eliminate or substantially reduce axial and oblique thrusts on the journals, shafts and pivots of the drive mechanism.

Still further, the invention has as an object the provision of means for accommodating slight variations in the dimensions of components of the driving and control mechanism, and also to provide for alignment of the drive and control members with the elements of the scanning mechanism at the points of interengagement between the two mechanisms.

How the foregoing and other objects are attained will be more readily understood upon reference to the description which follows herebelow, and the drawings, in which:

Figure 1 is an elevational view of a dictating machine drive and control mechanism arrangement in accord-

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ance with the invention and including in dotted outline certain elements of the scanning mechanism; and

Figure 2 is a sectional view of portions of the mechanism of Figure 1 taken along the line 2-2 of Figure 1.

It should be pointed out that other features of the dictating machine with reference to which the invention is herein described, are disclosed and claimed in copending application Serial No. 11,993, filed February 28, 1948, and assigned to the assignee of the present invention.

As is set forth in said copending application, the dictating machine illustrated in part in Figure 1 comprises a rotatable mandrel generally indicated at 10, said mandrel being made up of a core indicated at 11, a resilient cushion 12, and a pair of end flanges, one of which is designated by the reference numeral 13. The mandrel 10 is mounted for rotation with a shaft 14, which shaft extends beyond both ends of the mandrel and is journaled at each end in an end plate, one of which is generally indicated at 15.

During recording and reproducing, a flexible record sheet carrying finely divided magnetizable material, is temporarily supported by the surface of cushion 12 and is engaged by magnetic erasing head 16 and magnetic recording-reproducing head 17, which heads are supported by a carriage 18 through the intermediation of an equalizer bar 19 pivotally secured to the carriage by a pin 20. Carriage 18 is adapted to be translated in a path parallel to shaft 14 by a lead screw 21 and a half-nut 22 which is mounted on carriage 18 by means of resilient member 23. Lead screw 21 may advantageously be driven from shaft 14, as is disclosed in the copending application to which reference has already been made. A way 24 comprising a circular rod supports carriage 18 with freedom for oscillatory movement about the axis of the rod and for movement parallel to shaft 14.

Accordingly, it will be understood that while heads 16 and 17 will be maintained in contact with a record on mandrel 10 and half-nut 22 in contact with lead screw 21 by gravity, the application of a torque moment to carriage 18 about way 24 will lift the heads clear of the record and will also disengage half-nut 22 from lead screw 21.

In the dictating machine under consideration, such moments are adapted to be applied to a tab 25 extending downwardly and forwardly from carriage 18 by a tilt bar 26 extending parallel to shaft 14 beneath the path of movement of tab 25, which tilt bar is secured to a rod 27 journaled in end plate 15.

Tilt bar 26 is provided with an ear 28, to which is secured a link 29 extending downwardly to the drive control mechanism, as will appear more fully hereinafter.

It will therefore be understood that the scanning mechanism, by which term is meant the general assembly comprising the mandrel 10, carriage 18 and the components supported by it, and carriage driving mechanism, including lead screw 21, are all supported by and between the end plates 15.

The drive and control mechanism, which will now be described, is also supported by the end plate 15 which appears in the drawings, the driving motor 30 being disposed on the same side of end plate 15 as mandrel 10 and the other elements of the mechanism being supported on the outside of the end plate. Despite the sensitivity of magnetic recording-reproducing head 17 to external magnetic fields, the location of motor 30 between the end plates is permissible in the organization disclosed because of the location of the heads above mandrel 10, whose full diameter is thus interposed between the heads and the motor, a potential source of extraneous magnetic influences. I have found that this separation is effective to insure freedom from hum and related problems. Since the motor is preferably arranged with its shaft parallel to the mandrel shaft, as will appear, the location of the motor between the end plates rather than outside the end plate 15 makes possible a considerable reduction in the overall size of the machine.

According to the invention, motor 30 is secured to a bracket 31 which in turn is secured to end plate 15 by a pair of angle brackets 32 and 33. Shaft 34 of motor 30

extends through an oversize aperture 35 in end plate 15. A driven wheel 36 is mounted on the mandrel shaft 14 on the outside of end plate 15.

Driving interconnection between motor shaft 34 and wheel 36 is adapted to be selectively established by shifting intermediate wheel 37 into and from a position of peripheral engagement with both shaft 34 and driven wheel 36. According to the invention, intermediate wheel 37 is rotatably journaled on a pin 38 which is supported by a link 39. Link 39 is secured to end plate 15 with freedom for movement parallel thereto by means of a screw 40 passing through a first washer 41, an oversized hole 42 in link 39, a spacing washer 43, and thence into a tapped hole in end plate 15.

It will be seen that upon shifting link 39 leftwardly as viewed in the figures, intermediate wheel 37 will be brought into a position of peripheral engagement with both shaft 34 and wheel 36, and, furthermore, that the points of contact between wheel 37 and both shaft 34 and wheel 36 will lie in the same plane, with the result that there will be no tendency to cock wheel 37 about any axis normal to its axis of rotation.

It is appropriate to point out at this time that the speed of rotation of mandrel 10 is determined by the ratio of the diameter of driven wheel 36 to the diameter of motor shaft 34. In the machine disclosed herein, where the maximum size of wheel 36 is limited, the diameter of shaft 34 may be required to be as small as $\frac{1}{20}$ th of an inch in order to drive mandrel 10 at a sufficiently low speed. With a shaft of this diameter, the magnitude of the radial thrusts imposed on the shaft becomes significant. It is pertinent in this connection to point out that, according to the invention, no radial thrust is ever imposed upon shaft 34 except when the shaft is rotating, and, accordingly, the possibility of permanently deforming the shaft either by the imposition of a static load when the machine is at rest, or as the result of a shock, for example, during shipment, is eliminated.

The position of wheel 37 is determined by linkages interconnecting member 39 with a solenoid generally indicated at 44, a spring 45, and an adjustable stop member 46, the geometry of the linkage being such that spring 45 urges wheel 37 to the disengaged position as determined by stop 46 when solenoid 44 is not energized. When solenoid 44 is energized, however, the tension of spring 45 is overcome and wheel 37 is drawn into the driving position.

Turning now to the details of the control system, it will be observed that solenoid 44 rests on and is secured to a bracket 47 which is secured to end plate 15, and by a second bracket 48, which is also secured to end plate 15.

Considering now the linkage interconnecting the solenoid and member 39, it will be seen that solenoid 44 comprises an armature 49, pivotally secured to a link 50, which in turn is connected to the lower leg 51 of a bell crank generally indicated at 52. Bell crank 52 is mounted for oscillation about a pivot 53 let into end plate 15. A second bell crank, generally indicated at 54, is also mounted for oscillation on pivot 53. Since pivot 53 provides the principal reaction point for several of the control forces, it is desirable that the pivot be securely mounted on end plate 15. Preferably, as I have illustrated in the drawings, this is accomplished by journalling pivot 53 in a journal 53-a which is securely peened or staked to the end plate. The lower leg 55 of bell crank 54 is adapted to be secured to bell crank 52 in a plurality of positions of angular adjustment by a screw 56, which passes through an arcuate slot 57 in bell crank 52 and thence to a tapped hole in lower leg 55 of bell crank 54. The upper leg 58 of bell crank 54 is pivotally connected to link 39.

It will be seen that when screw 56 is tightened, leg 58 of crank 54 and leg 51 of crank 52 effectively comprise a lever fulcrumed on pivot 53, and, accordingly, it will be seen that the moment imposed upon the lower end of this lever by spring 45 is such as to urge wheel 37 rightwardly as viewed in Figure 2, and thus out of engagement with wheel 36; while the moment imposed upon energization of solenoid 44 is such as to draw wheel 37 into engagement with wheel 36. As may be seen, the mechanism is illustrated with the parts in the position they occupy with solenoid 44 energized.

Returning now to bell crank 52, it will be seen that the horizontal arm 59 of bell crank 52 is pivotally interconnected by a pin 60 with a link 61, which is adjustably

secured to link 29 by means of screws 62 and 63, and thus interconnects the control mechanism with tilt bar 26 discussed above.

As may be seen upon inspection of Figure 1, the portion of the linkage consisting of links 61 and 29 passes through an aperture 64 in end plate 15. The connection between the control mechanism and tilt bar 26 is such as to lower the tilt bar from engagement with tab 25 when solenoid 44 is energized and intermediate wheel 37 is in engagement with driven wheel 36. Accordingly, it will be understood that the drives to the mandrel and to the carriage are simultaneously controlled by solenoid 44.

The mechanism shown is adapted to control, in addition to the mandrel and carriage drives, another function of the dictating machine which occurs in timed relationship with the initiation and termination of the scanning operation. For example, this mechanism is adapted to control an output silencing switch, as is disclosed and claimed in said copending application Serial No. 11,993. In the dictating machine illustrated in the drawings, an actuating pin 65 of insulating material is let into horizontal arm 59 of bell crank 52. As disclosed in the said copending application, pin 65 extends horizontally through an aperture 66 in end plate 15, in a manner to engage a switch or other mechanism disposed inside the end plate.

Assembly and adjustment of the mechanism of the invention is accomplished in two steps. First, the sub-assembly is completed by mounting motor 30, solenoid 44, armature 48, link 50, bell cranks 52 and 54, spring 45, links 39 and 61, and adjustable stop 46 on an end plate 15. Second, after the scanning mechanism has been mounted between two end plates, wheel 36 is secured to shaft 14. With the solenoid "bottomed" and screw 56 loosened, link 39 is drawn leftwardly until intermediate wheel 37 is in driving engagement with driven wheel 36. While maintaining link 39 and wheel 37 in this position, screw 56 is tightened. It should be noted that the direction of rotation of shaft 34 is such as to contribute a "self-energizing" effect to the drive, which despite the small diameter of the motor shaft, is sufficient to maintain the necessary intimacy of contact between the several drive elements, once initial contact has been made. The solenoid is now released and stop member 46 adjusted to limit the rightwardly motion of intermediate wheel 37, the adjustment being such that wheel 37 is at all times in contact with motor shaft 34. The interconnection between links 61 and 29 is now adjusted by means of screws 62 and 63, so that tilt bar 26 will just clear tab 25 with the solenoid energized. The geometry of bell crank 52 and its interconnection with link 61 is such that the upward movement of the tilt bar corresponding to proper movement of wheel 37 is sufficient to lift half-nut 22 clear of lead screw 21 and to carry heads 16 and 17 out of engagement with a record supported on cushion 12.

Accordingly, it will be seen that the drive and control mechanism of the invention comprises a simple unitary sub-assembly in which the elements are mounted in substantially the same plane, and in which the drive-transmitting and drive-engaging forces are confined to a single plane, and furthermore, that the entire assembly is adapted to be incorporated in a dictating machine in an exceedingly simple manner.

I claim:

1. An office dictating machine comprising a record-supporting mandrel having a shaft, a driving motor for said mandrel, a drive train for selectively connecting and disconnecting said motor and said shaft, a member actuable to selectively engage and disengage said train, a transducer adapted to scan a record supported by said mandrel, mechanism for propelling said transducer in a scanning path, a second member actuable to selectively engage and disengage said mechanism, a bell crank comprising a first leg connected to said second actuable member, a second bell crank secured to the first and comprising a first leg connected with said first actuable member and a second leg adapted to be secured to said first bell crank in a plurality of positions, and a control device connected to a second leg of said first bell crank.

2. A construction in accordance with claim 1 in which oscillation of said first bell crank responsive to energization of said control device engages said drive train and said mechanism.

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3. A construction in accordance with claim 2 and further including resilient means associated with said first bell crank in a manner to oppose the action of said control device and to thereby effect disengagement of said drive train upon deenergization of said control device.

4. An office dictating machine comprising a record-supporting mandrel having a shaft, a driving motor for said mandrel, a drive train for selectively connecting and disconnecting said motor and said shaft, a first member actuable to selectively engage and disengage said train, a transducer adapted to scan a record supported by said mandrel, a second member actuable to shift the transducer toward and away from a record supported by said mandrel, an actuating member, linkage interconnecting the first and second actuable members and the said actuating member, the linkage including pivotal linkage parts relatively movable to different angular positions varying the relative positions of the first and second actuable members, and fastening means for fixing said pivot linkage parts in different relative positions.

5. Equipment for use in scanning magnetic records, comprising a rotatable record support, a driven wheel rotative with the record support, a drive motor having a power shaft, a drive train for transmitting power from the motor shaft to said driven wheel and including a rotatable intermediate drive wheel and a displaceable mount for the intermediate drive wheel having a range of displacement between positions in which the intermediate drive wheel engages and disengages the drive, a magnetic scanning head, a displaceable mount for the scanning head having a range of displacement between positions in which the head engages and disengages a record supported on the support, a displaceable common control member for displacing said displaceable mounts, and linkages connecting each of said mounts with the control member and providing for concurrent displacement of the wheel mount toward the position of drive engagement and of the head mount toward the position of record engagement, at least one of said linkages including linkage parts relatively movable to change the effective length of that linkage, and fastening means for fixing said linkage parts in different relative positions, to thereby provide for shift of the range of displacement of one of said mounts with respect to the other upon a given displacement of said control member.

6. Equipment for use in scanning magnetic records, comprising a rotatable record support, a driven wheel rotative with the record support, a drive motor having a power shaft, a drive train for transmitting power from the motor shaft to said driven wheel and including a

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rotatable intermediate drive wheel and a displaceable mount for the intermediate drive wheel having a range of displacement between positions in which the intermediate drive wheel engages and disengages the drive, a magnetic scanning head, a carriage for the scanning head shiftable to carry the head over the surface of a record on the record support, drive mechanism for shifting the carriage including a drive element displaceable to disengage the drive, a displaceable common control member for displacing the wheel mount and said drive element, and linkages connecting the wheel mount and said displaceable drive element with the control member and providing for concurrent displacement of the wheel mount toward the position of drive engagement and of the displaceable drive element toward its position of drive engagement, at least one of said linkages including linkage parts relatively movable to change the effective length of that linkage; and fastening means fixing said linkage parts in different relative positions, to thereby provide for relative shift of the range of displacement of the wheel mount and of the displaceable drive element upon a given displacement of said control member.

7. An office dictating machine comprising a record-supporting mandrel having a shaft, a driving motor for said mandrel, a drive train for selectively connecting and disconnecting said motor and said shaft, a first member actuable to selectively engage and disengage said train, a transducer adapted to scan a record supported by said mandrel, a second member actuable to control mechanism for shifting the transducer relative to a record supported by said mandrel, an actuating member, linkages connecting each of said actuable members to said actuating member, at least one of said linkages including linkage parts relatively movable to change the effective length of that linkage, and fastening means for fixing said linkage parts in different relative positions.

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