July 21, 1953 J. L. CLOUGH 2,646,229

REEL REVERSING DRIVE

Original Filed Jan. 25, 1943 2 Sheets-Sheet 1

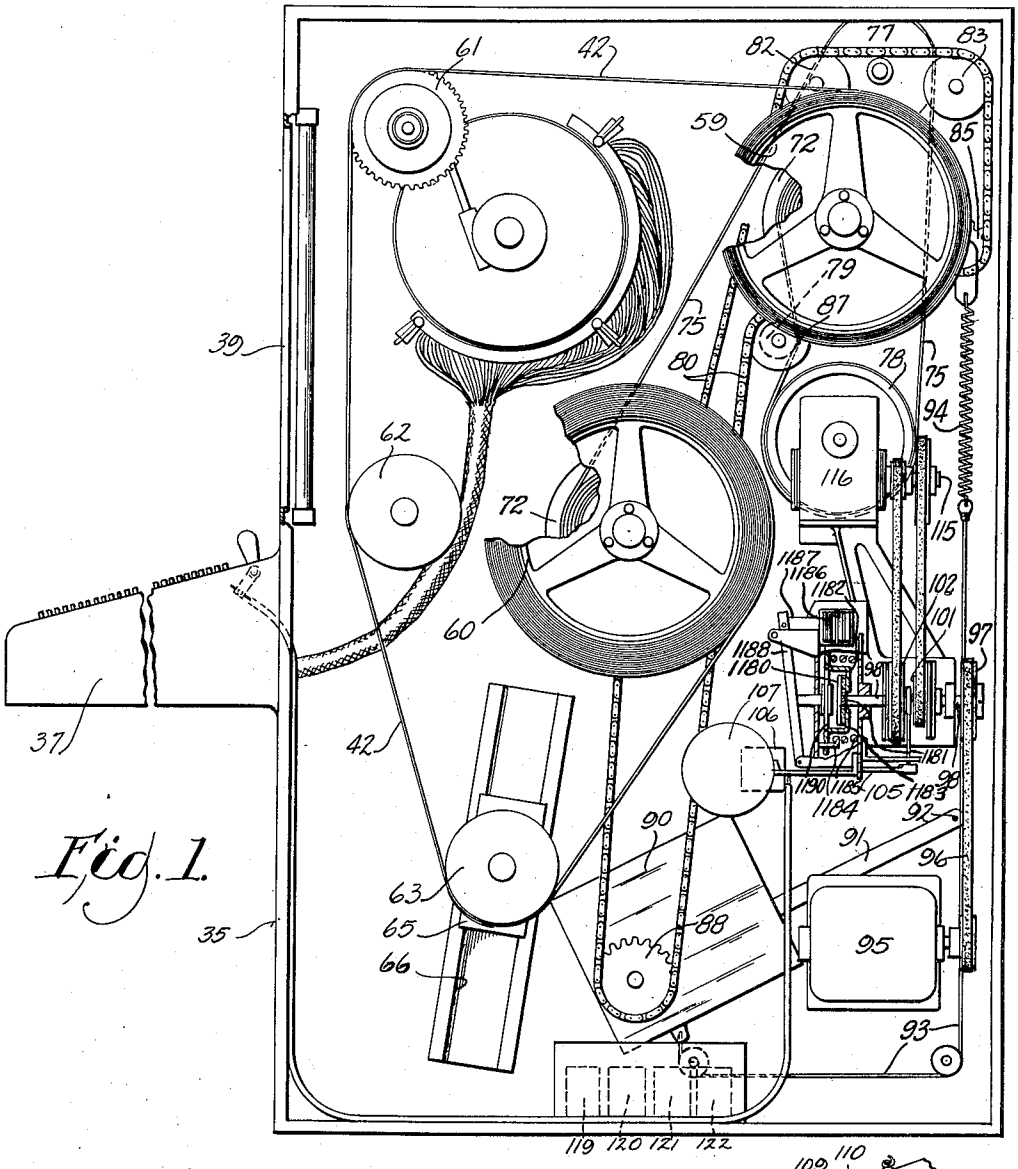



Fig. 1.

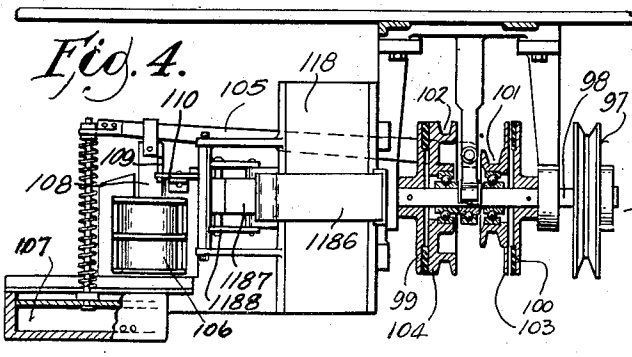



Fig. 4.

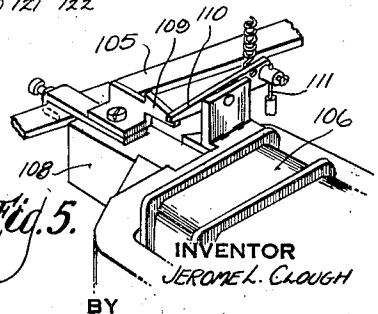



Fig. 5.

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REEL REVERSING DRIVE

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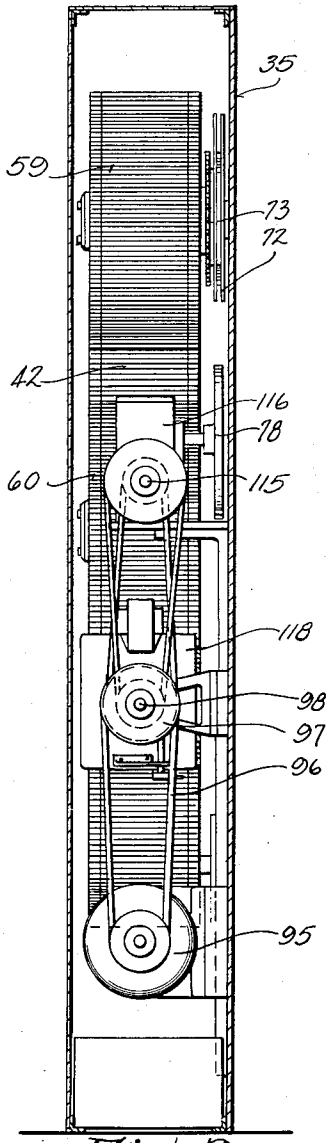



Fig. 2.

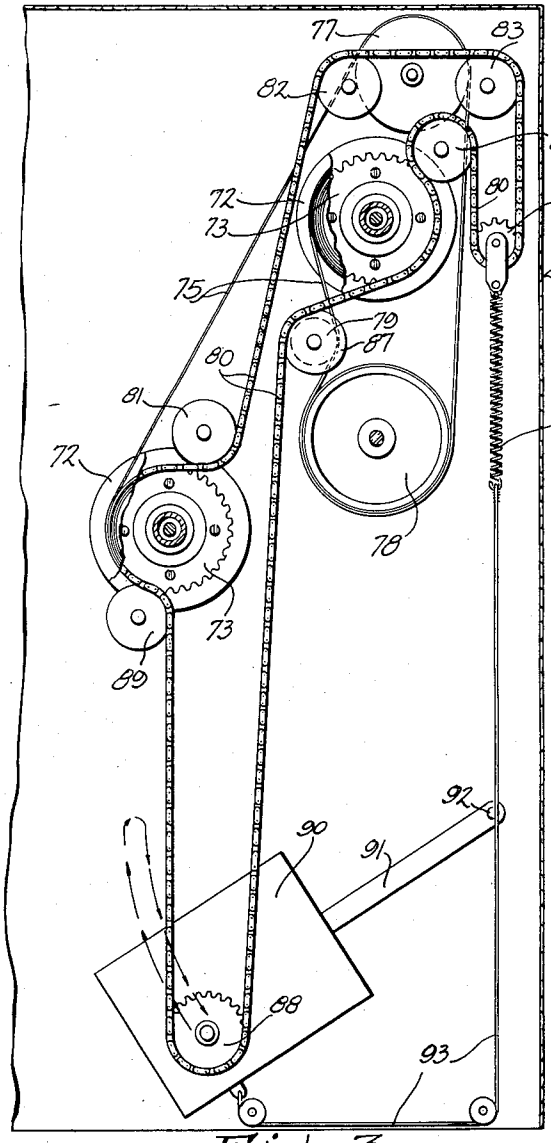



Fig. 3.

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## REEL REVERSING DRIVE

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Original application January 25, 1943, Serial No. 473,508, now Patent No. 2,521,284, dated September 5, 1950. Divided and this application February 3, 1950, Serial No. 146,042

9 Claims. (Cl. 242—55)

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This invention relates to improvements in reel reversing drive. The present application is a division of my Patent No. 2,521,284, granted September 5, 1950, entitled Authorizer.

It is the primary object of the invention to provide novel power driven means automatically operable subject to the control of an indexing selector for enabling a credit operator to determine in the shortest possible space of time the credit rating of an applicant for credit. The machine has particular utility in department stores, where persons desiring to use their charge accounts frequently have to wait while the clerk consults the credit department. It is urgently necessary to locate the customer's name and credit rating as rapidly as possible in order not to keep the customer waiting for an undue length of time.

It is a further important object of the invention to provide a compensating drive for reels between which the name belt is wound and unwound, it being desirable that the winding and unwinding reels should be operated at differing rates compensatory for the variation in effective diameter thereof so that the name belt will be unwound from one reel at substantially the same rate of linear travel at which it is wound upon the other.

Other objects and advantages of the invention will be apparent to those skilled in the art upon analysis of the following disclosure thereof.

In the drawings:

Fig. 1 is a view in side elevation of an authorizer embodying the invention as it appears with one side of the cabinet removed to expose the mechanism.

Fig. 2 is a rear elevation of the machine shown in Fig. 1 as it appears with the rear of the cabinet removed.

Fig. 3 is a detail view partially in side elevation and partially in section illustrating the compensating drive only, all other parts being eliminated.

Fig. 4 (Sheet 1) shows a fragmentary detail view in plan through the high and low speed control mechanism.

Fig. 5 is a fragmentary view in perspective of a latch used in conjunction with the mechanism shown in Fig. 4.

Like parts are identified by the same reference characters throughout the several views.

The authorizer comprises a cabinet designated by reference character 35 in Fig. 1. This cabinet has an index table 37 and a display station represented by the window 39 in Fig. 1.

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At the display station the machine selectively displays one or more names and credit ratings carried by a name belt which comprises the sectional belt 42 in the device shown in Fig. 1. The name belt is wound from one reel to another subject to the control of electrical selecting mechanism as will now be described.

Regardless of how the name belt 42 is constructed, it passes between reels 59 and 60 (Fig. 1) about sprocket pulley 61, idler pulley 62, and take-up pulley 63. It is desirable that the sprocket pulley 61 move in exact accordance with the belt because this pulley serves to correlate belt movement with the movement of the electrical control parts.

Take-up pulley 63 is mounted on a carriage 65 movable in a generally vertical direction in a guideway 66 whereby the weight of the carriage and the take-up pulley 63 keep the belt 42 taut and afford sufficient compensation to permit of day to day changes in the length of the belt occasioned by the insertion of additional names and the removal of other names. In the normal department store practice the change in belt length will be nominal over a long period of time.

The secondary reel 72 and sprocket 73 are connected with reels 59 and 60 to turn therewith. A tape or tension belt 75 is wound upon the secondary reels 72 of the respective main reels 59 and 60 to connect the main reels and to unwind from one of such reels and wind upon the other in the same ratio as the name belt is wound and unwound respecting such reels. In other words, there are the same number of turns of the tape upon a given secondary reel 72 as there are turns of the name belt upon the main reel connected therewith. Since the tape is preferably a steel tape having only approximately half the thickness of the fittings which make up the name belt, the secondary reel 72 will have half the diameter in order to maintain the desired ratio so that the effective diameter of the secondary reel will in each instance change in the same ratio to the thicknesses of the respective belts as the effective diameter of the main reel connected therewith. Thus the linear travel of the tape and the name belt to or from a given reel assembly will be alike at all speeds of reel rotation.

It is not necessary that the tape run directly from one reel to the other, and in the construction herein disclosed it does not do so. As clearly appears in Fig. 3, the tape 75 passes from the lower reel assembly to an idler pulley 77 from which it extends downwardly and about a driving pulley 78 and thence upwardly past another

idler 79 to the secondary reel 72 of the upper reel assembly.

It will be apparent that the tape will serve to limit the tension on the name belt. This belt or web can be virtually floated from one reel to another because all motion transmission between the two reels is effected by the tape 75.

In order to permit of motion transmission in both directions and to complete the connection between the reel assemblies to assure that neither will overrun and that each will be positively driven, there is a second connection between the reel assemblies opposed in tension to the tension of the tape 75. This is provided by the chain 80 which operates around the respective sprockets 73. Since the chain and sprocket connection does not provide compensation for changes in rate of reel rotation due to changes in effective diameter as the name belt and the tape are respectively wound and unwound therefrom, it is necessary to provide take-up at two points in the length of the chain 80. In practice it is preferred that chain 80 be an endless chain. It is guided about the idlers 81, 82, 83, 85 and 86 in one of its runs between the sprockets 73 and about the idlers 87, 88 and 89 in the other of its runs between such sprockets. Idler 87 and idler 79 are coaxial and may be connected.

Idler 88 subjects the chain to strong bias. This may be done by mounting idler 88 upon a heavy counterweight 90 guided by a lever 91 pivoted to the cabinet at 92. The action of gravity is augmented by connection of the counterweight through a cable 93 to a biasing spring 94 which is connected to the idler 85. The cable provides a connection between the bights of the chain which pass about sprockets 88 and 85 respectively. In the operation of the device it will be found that with all of the name belt on one reel or the other, the sprocket 88 will be at its most extended position, this being the lowest position of the weight as shown in Fig. 3. Conversely, the sprocket 85 will be in its least extended position (the upward position in which such sprocket is illustrated in Fig. 3). As the belt winds onto the empty reel from the full reel, the sprocket 88 will be drawn upwardly toward an intermediate point and will then move downwardly again so that when the name belt has fully passed from one reel to the other both sprockets will be restored substantially to their original positions. Since the sprocket 85 will move downwardly at substantially the same rate at which sprocket 88 moves upwardly, the cable 93 provides a movable anchorage for spring 94 with the result that the tension of spring 94 on sprocket 85 will remain substantially constant, as will the bias on sprocket 88.

The system of reels is a closed system so far as the application of motion thereto is concerned. Moreover, the name belt is not a component element of the motion transmission system. All of the controls hereinafter mentioned and all of the operations of the driving mechanism, can be carried on even if the name belt is not present in the machine except that in this particular instance the electric commutator mechanism happens to be driven from the name belt rather than from some of the other parts having correlated movement.

While the power may be applied to the system at any point, I have already indicated that in the present device it is applied through the friction surface pulley 78 to the tape 75. The power so applied is derived from motor 95 through belt 96 which drives a pulley 97 (Figs. 1 and 4) on shaft 98. This shaft carries clutch disks 99 and 100 between which a driven element comprising pulleys 101 and 102 is axially shiftable to engage with the clutch disks 99, 100 complementary disks 103 and 104 carried by the respective pulleys. A shifting lever 105 for shifting the driven clutch set so that either pulley 101 or 102 may be driven from shaft 98, is arranged to be operated by solenoid 106 (preferably provided with a dashpot 107). The armature 108 of solenoid 106 preferably carries a latch 109 which, in the inward movement of the armature, is caught by a detent 110 subject to release by a manually controlled Bowden wire 111, as will hereinafter be explained. The inward movement of the armature which is thus arrested by the detent, is the movement which clutches pulley 101 to shaft 98, this being the low speed pulley.

The respective low speed and high speed pulleys 101 and 102 are belt connected with complementary pulleys on the shaft 115 of a speed reducer 116 through which the driving pulley 78 is actuated to operate the reel assemblies as above described.

I provide at 118 a brake for shaft 98 which is self-applying and electromagnetically released. As shown in Fig. 1, the brake 118 may comprise a brake disk 1180 fixed on the end of shaft 98. Coacting therewith through the intervening lining 1181 is a stationary disk 1182 comprising the bottom of a pan-shaped member 1183 guided for reciprocation axially of the shaft by means of one or more pins 1184 fixed to the casing. The compression spring 1185 acts on such member in a direction to engage the stationary disk 1182 with the brake lining 1181 to arrest the movement of shaft 98. Whenever the motors which actuate the respective reels are energized, however, the brake is released electromagnetically by the energization of the solenoid 1186, the armature 1187 of which is connected to the lever 1188. The link 1189 pivoted to such lever extends into the brake housing and is connected with the cross bar 1190 of pan-shaped member 1183 so that energization of the solenoid will release the brake. Whenever the solenoid is deenergized, the spring 1185 will reengage the brake. A set of relays 119, 120, 121 and 122 at the bottom of the cabinet control the forward and reverse direction of operation of the motor 95, the high and low speed positions of the driving clutches, and the functioning of the brake. See the wiring diagram in Fig. 26. The relays enable me to use low voltage in my electrical control and indexing system as now to be described.

As will be observed in Fig. 1, the keyboard 37 projects from the front of the cabinet at a convenient point to be immediately above the operator's lap when the operator sits directly before the display station 39.

It may be stated here that the keyboard shown is a simplified form of keyboard which, in actual practice, may preferably be replaced by any self-clearing keyboard such as is used in a calculator machine.

From the rock shaft 135 another arm 136 connects to the Bowden wire 111, as shown in Fig. 1, for the release of the detent 110 shown and described in connection with Fig. 6. The detent which holds the low speed clutch in engagement is not essential but, in case it is used, the Bowden wire connection will provide for its release when

the keyboard is cleared preliminary to another selecting operation.

I claim:

1. A closed driving system which includes a pair of reels, a flexible connecting means having its ends wound upon the respective reels for the transmission of motion from one to the other and a second connecting means opposed as to tension to the connecting means first mentioned and extending between said reels for the transmission of motion therebetween, said second connecting means comprising an endless flexible member in substantially positive driving connection to each of the reels and having two runs therebetween, and take-up devices about which said member passes in each of said runs, each of said runs having sufficient slack to accommodate changes in relative rates of reel operation as the member first mentioned is wound from one to the other and said take-up devices being subject to bias in a direction and sufficiently strong to take up all slack in the respective runs of said second flexible member, whereby to draw the first flexible member taut between said reels under substantially all operating conditions; together with reversible power driving connections to said system for the operation of said reels reversibly.

2. A driving organization comprising the combination with a pair of reels and a tape having its ends wound upon the respective reels to be wound and unwound thereon for the transmission of motion therebetween, sprockets connected with the respective reels to partake of such motion, an endless chain operating over the sprockets and provided with separate runs between said sprockets with sufficient slack in each run to accommodate relative movement of said reels as said tape winds and unwinds with respect thereto, take-up sprockets in the respective runs of said chain, a biasing element connected with one of the take-up sprockets for removing slack from a run of said chain and for maintaining said tape taut between said reels, said take-up sprockets having opposite movement in the operation of said reels as the slack of one of said runs decreases while the slack of the other increases, and a connection from said biasing element to the other take-up sprocket comprising a spring, the reaction of which supplements the action of the biasing element and provides bias on the other take-up sprocket.

3. The combination with a pair of reels adapted to receive a web for winding from one to the other, of means for driving said reels in both directions irrespective of the presence or absence of such web at a rate such as to maintain an approximately constant linear rate of movement for the web if present, said means comprising secondary reels connected with the respective reels first mentioned to operate in accordance therewith, a flexible tension element having its ends connected upon the respective secondary reels to be wound and unwound therefrom at the same linear rate at which the web winds and unwinds respecting the reels first mentioned, the effective diameter of the secondary reels with the said tension element wound thereon being variable at a rate proportioned to the rate of variation of effective diameter of the reels first mentioned when said web is wound thereon, and a second connection between said reels comprising a tension member having its tension opposed to the tension of said flexible element and provided with means for taking up slack in the



operation of said reels, whereby said member and said element and the several reels constitute a closed motion transmitting system which may be driven in either direction from power applied at any point.

4. The combination with a record conveyor and a pair of reels upon which said conveyor is wound for movement from one reel to the other, of tension means connecting said reels to relieve the conveyor of strain, said tension means comprising secondary reels on the respective reels and a flexible tension member wound upon the respective reels for movement from one reel to the other in accordance with the movement of the conveyor from one reel to the other, the radii of the respective reels being proportioned to the radii of their associated reels in the same ratio as the proportion of the thickness of the tension member to that of the conveyor.

5. The combination with a conveyor and a plurality of rotatable supports therefor, of driving means for actuating each support primarily, said driving means being adapted to actuate said supports in opposite directions, driving connections from one support to the other for secondarily actuating the respective supports in directions opposite to that in which they are respectively actuated by the driving means first mentioned, whereby both of the supports are positively driven independently of the conveyor in both directions of operation, the conveyor being floated without driving load therebetween.

6. The combination with a conveyor and a pair of reels to which the ends of the conveyor are connected, whereby said conveyor may be wound from either of said reels onto the other, separate driving means for primarily actuating the respective reels in opposite directions, and secondary driving means between the two reels for driving the other reel from the reel primarily actuated, said secondary driving means including mechanism for proportioning the rate of secondary reel operation to the conveyor file upon the respective reels whereby the conveyor is substantially floated between said reels without substantial driving stress.

7. The combination in mechanism for reproducing a record from a strip, of reels upon which the ends of said strip are wound, supplemental reels connected with said first mentioned reels, respectively, a tape having its ends wound upon the supplemental reels, said tape and supplemental reels being so proportioned dimensionally as to maintain coils upon the supplemental reels proportionate in diameter to the coils of said strip upon the reels first mentioned, and supplemental driving connections between said reels for the transmission to each reel of motion from the other reel when such other reel is primarily actuated, said supplemental driving connections including slack take-up mechanism, and driving connections operable upon said tape for the actuation of said reels.

8. In a device of the character described, the combination with reels for a feature carrying strip, of supplemental reels respectively connected with the reels first mentioned for movement therewith, a flexible member wound upon the supplemental reels, the supplemental reels and said member being dimensionally proportioned so that the ratio of coils of said member upon the respective supplemental reels corresponds to the ratio of coils of said strip upon the reels first mentioned, sprockets connected with the respective pairs of reels for rotation there-

with, an endless chain operable over the respective sprockets and having idler means for taking up slack in portions of said chain between said sprockets, and means operable upon said member for driving the respective pairs of reels and associated sprockets and thereby advancing said strip from one of the reels first mentioned to the other, said driving means being reversible.

9. Driving connections, comprising the combination with a winding shaft and an unwinding shaft, of reels upon the respective shafts, a flexible connector having its ends connected with the respective reels and wound upon at least one thereof, and means for driving the assembly of reels, shafts and connector, said means including a counterconnection between the respective shafts comprising rotors upon the respective



shafts, an endless flexible member passing above one of said rotors and below the other and having intervening flights, each of which includes slack, together with means for taking up the slack in each of said flights.

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