Oct. 6, 1931. M. WALKER 1,825,686

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Filed May 18, 1928 4 Sheets-Sheet 1

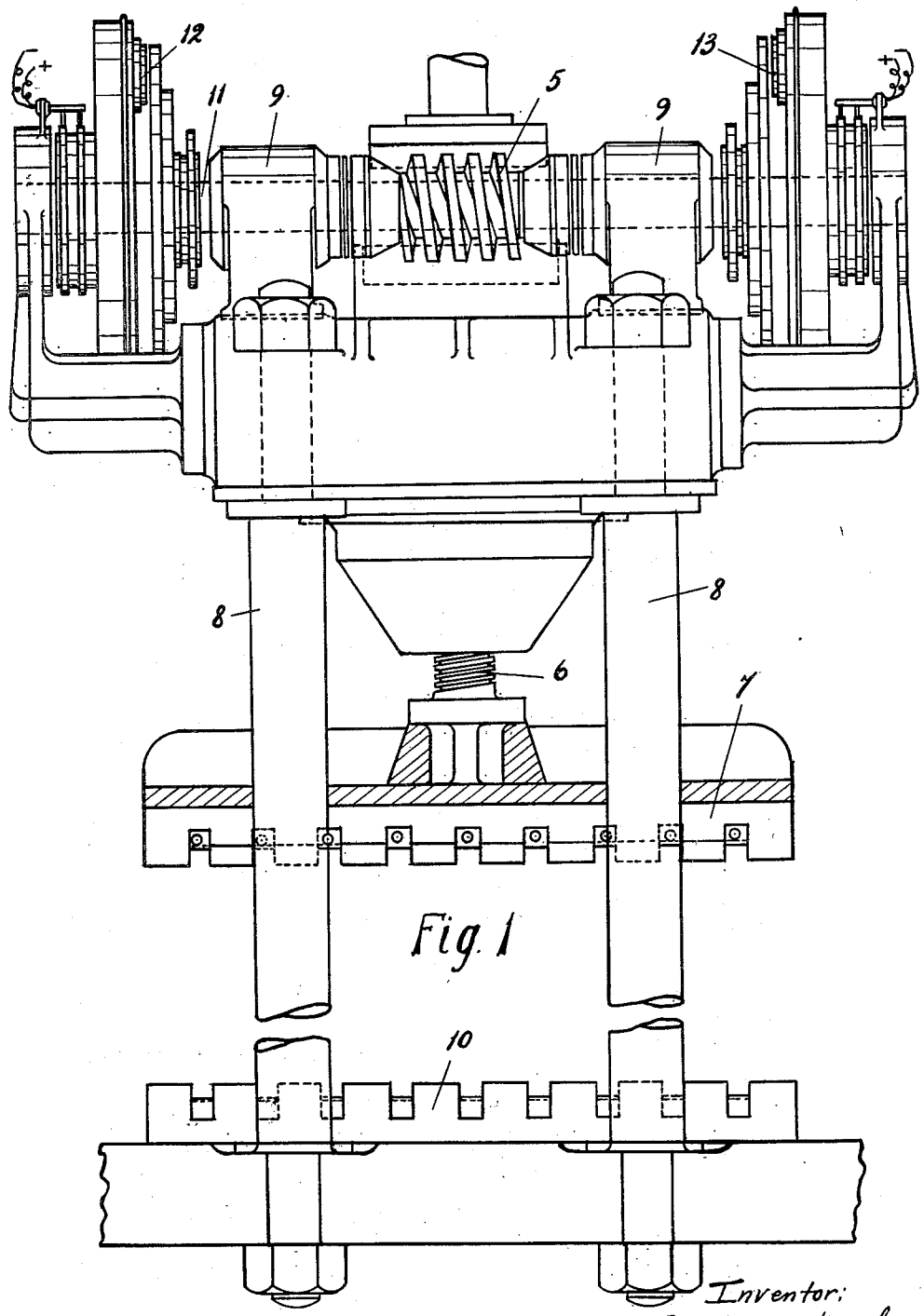



Fig. 1

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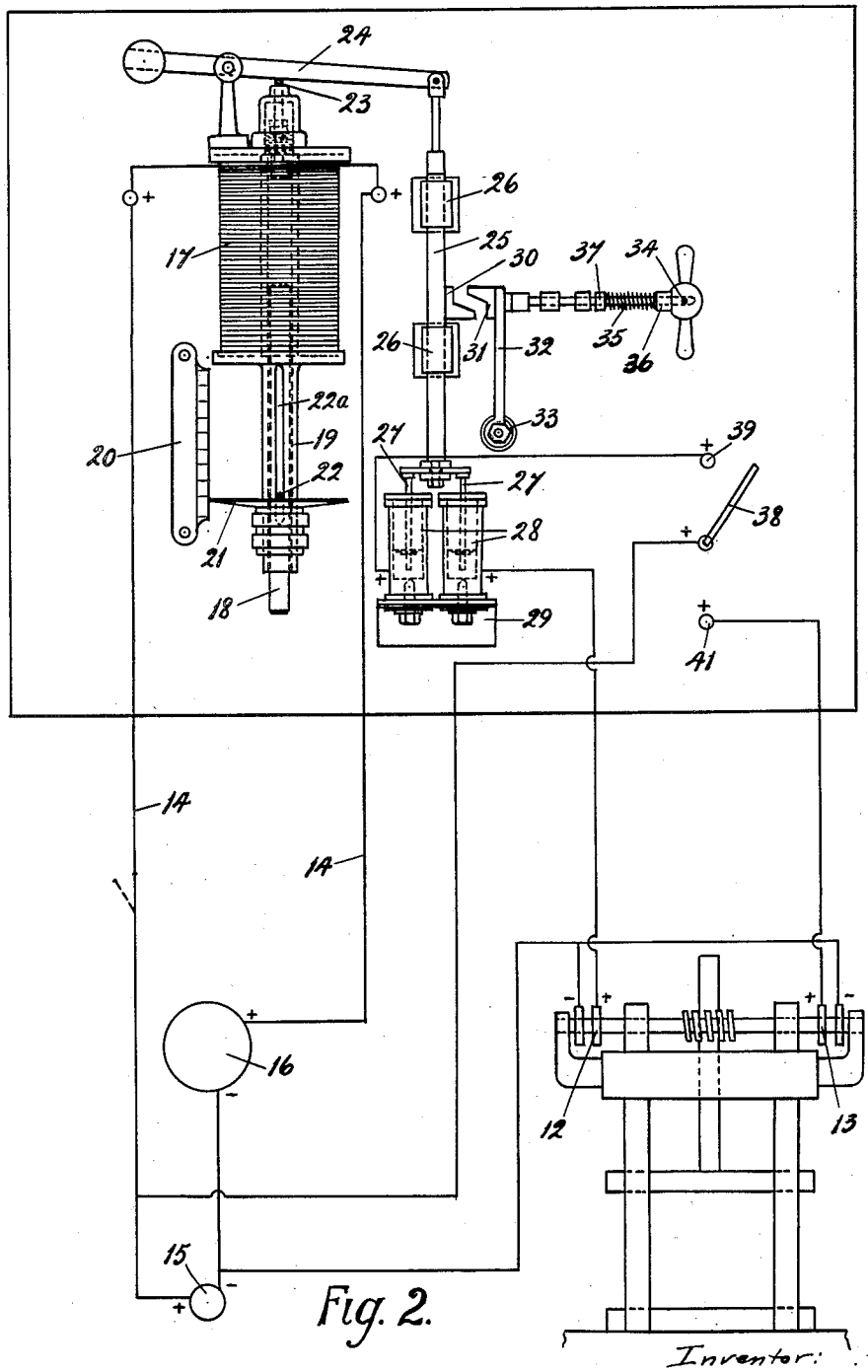



Fig. 2.

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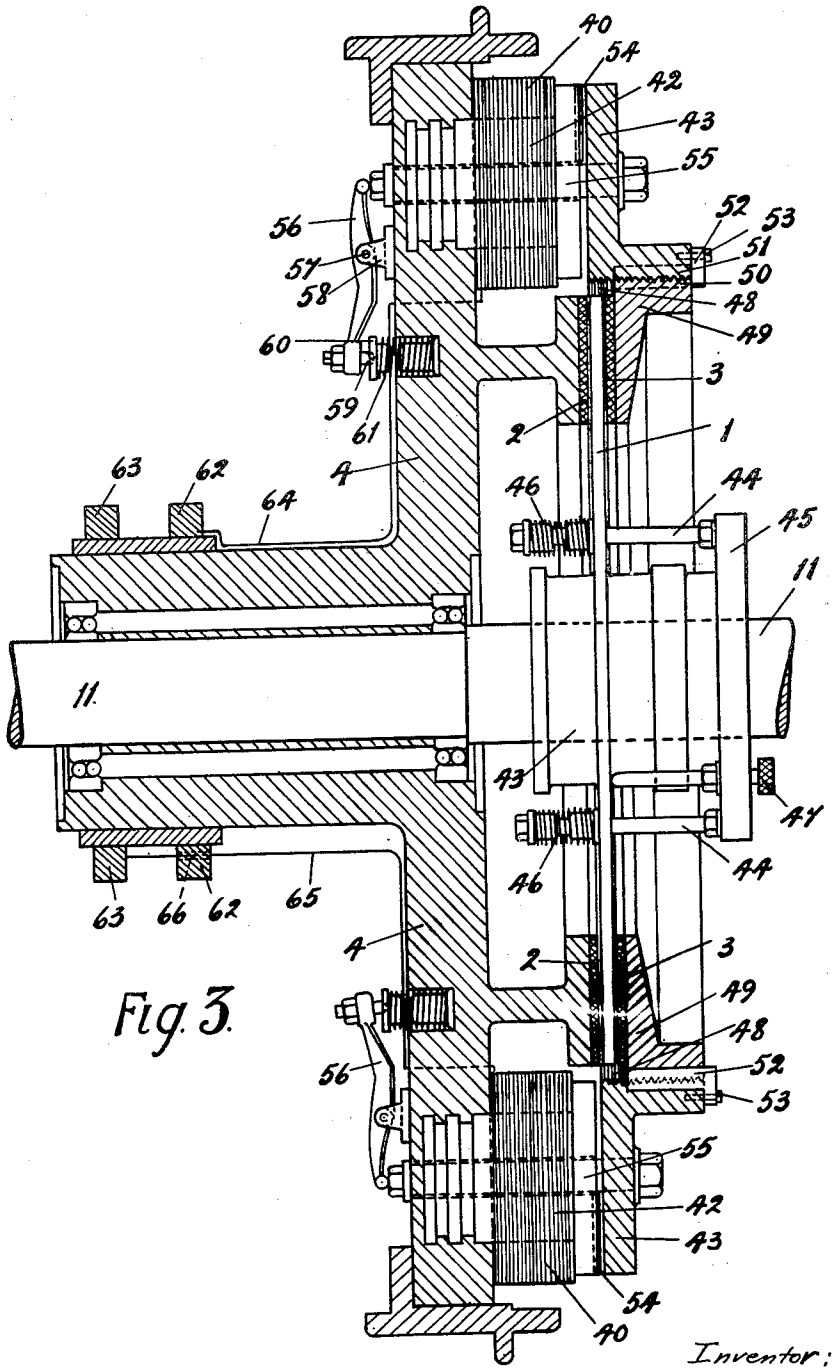



Fig. 3.

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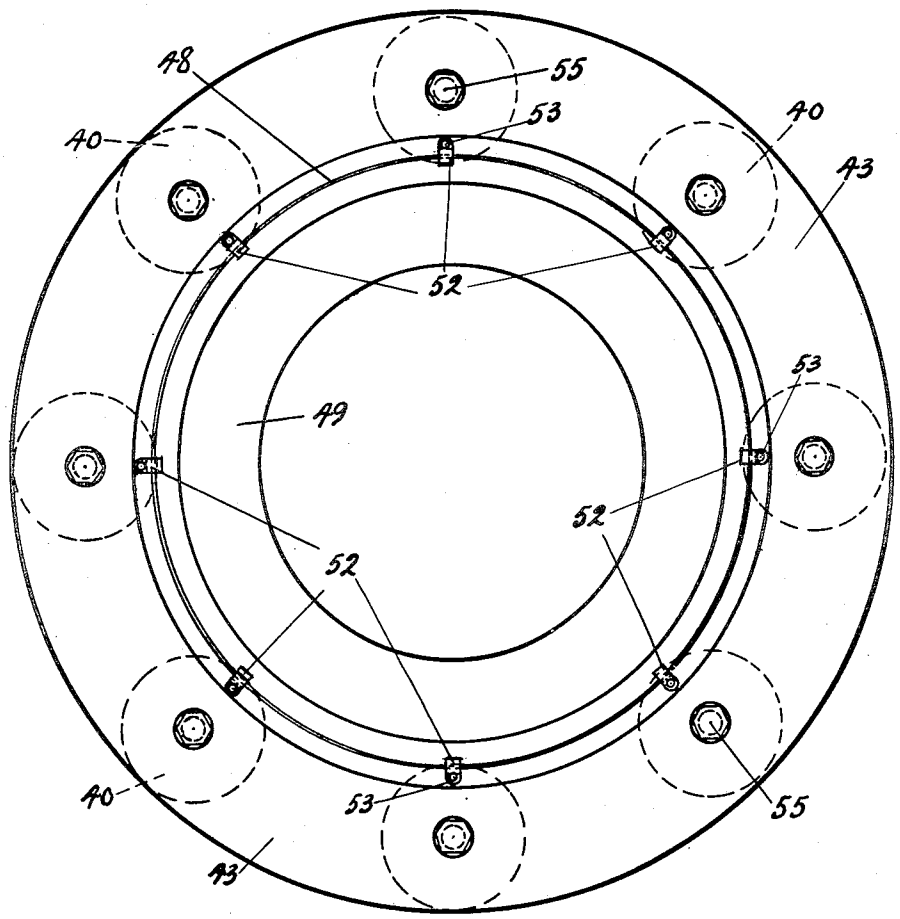



Fig. 4.

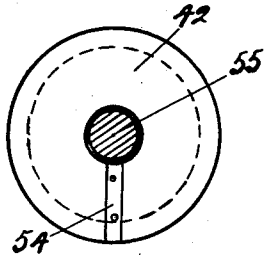



Fig. 5.

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Patented Oct. 6, 1931 1,825,686

# UNITED STATES PATENT OFFICE

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## SCREW PRESS

Application filed May 18, 1928, Serial No. 278,756, and in Great Britain May 11, 1927.

This invention relates to screw presses, such as baling presses, in which the press is operated by worm gearing from a main shaft which is usually fitted with fast and loose belt drive pulleys for rotating the shaft in either direction to advance or reverse the press platen.

According to the present invention, the belt drive pulleys on the main shaft of the screw press are replaced by a pair of electro-magnetically-actuated friction clutches for connecting the main shaft to the power transmission, one of the clutches being adapted to rotate the main shaft to advance the press platen and the other clutch being adapted to reverse the direction of rotation of the main shaft in order to return the press platen to its initial position. The power transmission includes an electric motor and inserted in or shunted across the current supply thereto is electro-magnetically controlled mechanism for disconnecting the forward-drive clutch when the load or pressure of the press platen reaches a predetermined maximum, preferably by opening a switch which controls the current supply to the driving clutch.

For this purpose, the switch may, for example, be controlled by the actuation of a solenoid in the current supply or shunt circuit. The maximum load or pressure at which the driving clutch is disconnected may be adjusted by the provision of an adjustment on the gear which controls the opening of the switch.

The magnetically-actuated friction clutches each comprise a disc disposed between a pair of friction surfaces, one of which is carried by a yoke which supports one or more electro-magnet coils adapted, when energized, to cause the core of the magnet or magnets to attract an armature ring adjustably carrying the other friction surface.

The present invention also consists in the provision of improved means for effecting adjustment between the friction surfaces in order to take up wear while enabling the air space between the armature ring and the magnet pole faces (when the magnets are not energized) to be maintained constant.

My invention also includes mounting the friction surface which is carried by the armature ring upon an externally screw-threaded adjustable hub member screwed into a central screw-threaded aperture in the armature ring.

In order that the invention may be more clearly understood reference is hereinafter made to the accompanying drawings in which Fig. 1 is an elevational view of a screw press fitted with a pair of electro-magnetically actuated friction clutches and Fig. 2 is a detail of the switch gear and showing also a diagrammatic view of the wiring arrangement.

Fig. 3 is a part sectional view through the clutch mechanism, Fig. 4 is a face view of the back of the armature ring and hub of the clutch to a reduced scale and Fig. 5 is a face view of one of the magnet pole shoes.

The press is comprised of the usual main shaft 11, worm gearing 5, screwed spindle 6, press platen 7, pillars or supports 8, shaft brackets 9 and bottom platen 10. At one end of the shaft 11 of the worm gear 5 is fitted an electro-magnetically actuated friction clutch 12 for connecting the shaft 11 to the power transmission, and adapted to rotate the shaft 11 to advance the press platen 7. On the other end of the shaft 11 another electro-magnetically actuated friction clutch 13 is fitted, adapted to reverse the direction of the shaft 11 in order to return the press platen 7 to its initial position.

To disconnect the forward drive clutch 12 when the load or pressure of the press reaches a predetermined maximum, an electro-magnetically controlled mechanism is inserted in or shunted across the current supply 14 from the current generator 15 to the electric motor 16 which drives the press. The electro-magnetically controlled mechanism comprises a solenoid 17 which attracts a core rod 18 working in a guide or casing 19 fitted to the bottom cap of the solenoid 17. At the side of the guide 19 is fitted a scale 20 upon which are marked the different pressures and cooperating with the scale is a disc 21 adjustable upon the guide 19, said

disc adjusting the core rod 18 by engaging a pin 22 on the rod 18, the pin 22 protruding through a slot 22*a* in the guide 19. In the end cap of the solenoid 17 is fitted a movable pin 23 which cooperates with a weighted lever 24, the end of which is connected to a rod 25 moving in guides 26 and provided at its lower end with two forks or prongs 27 which project down into two mercury cups 28 fitted upon a bracket 29. Fitted upon the rod 25 is a small lug 30 which, when the rod 25 is raised by means of the lever 24, rests upon the top of another lug 31 fitted upon a support 32 pivoted at 33. A handle 34 is connected to the back of the support 32 which is held in an upright position by means of a spring 35 inserted on the handle, between a guide bracket 36 and a collar 37 upon the handle 34.

The mechanism operates as follows:—

On moving a switch 38 into contact with a contact member 39, current passes through the mercury cups 28 to the advancing clutch 12 on the press. When the required pressure has been attained, the current passing through the solenoid causes the latter to attract the core rod 18 which lifts the pin 23, thereby moving the lever 24 which raises the prongs 27 out of the mercury and thus breaks the circuit of the advancing clutch 12. The prongs 27 are held up by means of the lug 30 now resting upon the top of the lug 31 and cannot descend until the handle 34 is pulled against the action of the springs 35. To reverse the platen to its initial position, the switch 38 is turned into contact with a connection 41 which connects the reversing clutch 13 of the press with the current supply. On opening the switch 38, the lug 30 may be released by pulling the handle 34, thereby allowing the prongs 27 to enter the mercury cups 28 in readiness for completing the circuit again through the forward clutch 12 on again moving the switch 38 into contact with the contact member 39.

The reversing clutch 13 may be brought into operation after a predetermined time lag by the provision of clockwork mechanism adapted to electro-magnetically or otherwise close a switch for the supply of current to the field magnets of the reversing clutch 13 and a device may be provided for automatically opening the switch 38 of the reversing clutch 13 when the press platen has returned to its initial position.

The friction clutches 12 and 13 each comprise, as shown in Figs. 3–5, a friction disc 1 disposed between a pair of friction surfaces 2 and 3, the friction surface 2 being carried by a yoke 4, freely mounted on the shaft 11, and supporting a number of electro-magnet coils 40, adapted, when energized, to cause the core 42 of the magnets to attract an armature ring 43 carrying the other friction surface 3.

The friction disc 1 carried by a bush 43 loose on the shaft 11, is adjustable, in known manner, to enable it to be centrally disposed between the friction surfaces 2 and 3 on each side thereof, by loosely mounting the disc 1 upon spindles 44, carried by a flange 45 fixed to the shaft 11 and having springs 46 thereon, and by adjusting the pressure of the disc 1 against the springs 46 by means of adjusting screws 47.

The armature ring 43 is made with a central screw-threaded aperture 48 to receive an externally screw-threaded hub member 49 which carries the friction surface 3 on one side thereof. The hub member 49 and the armature ring 48 are securely locked together in adjusted position by any convenient device, preferably as shown, by forming the hub 49 with a number of grooves 50 across its screw-thread, and by forming corresponding grooves 51 in the armature ring to receive locking keys or feathers 52 for locking the two parts together.

Adjustment of the friction surface is effected by removing the locking keys 52 and rotating the hub member 49 so as to adjust it towards the friction disc 1 until the grooves 50 in the hub member 49 again register with the grooves 51 in the armature ring 43, enabling the keys 52 to be reinserted. The keys 52 may be locked in place by the provision of locking pins or studs 53 or other locking devices.

Each pole shoe is provided with a copper or other non-magnetic strip 54 across the face thereof and protruding slightly therefrom in order to prevent contact between the pole shoes and the armature 43 when the magnets are energized.

To disengage the clutch parts when the magnets are not energized, the central movable rod or spindle 55, of each magnet coil 40, is connected at one end to the armature ring 43 and at its other end to a lever 56 pivoted at 57 on a bracket 58 fitted on the yoke 4. The other end of the lever 56 is provided with a pin 59 in contact with a disc 60 which is connected to a spring 61 embedded in the yoke 4. When the magnets are energized, the armature ring 43 moves towards the magnet shoes and moves the spindles 55 with it. The springs 61 are thus compressed through the action of the levers 56 and therefore as soon as the current is cut-off from the magnets, the springs 61 force the levers 56 back to their original positions, the levers 56 at the same time forcing the armature ring 43, by means of the spindle 55, away from the magnet shoes, thus disengaging the clutch parts. The current is supplied to the magnets through the slip rings 62 and 63, the current being supplied thereto in the usual manner

through brushes. From the slip ring 62 is led a conducting wire 64 to one of the magnet coils 40, the other coils being connected to each other in turn around the yoke 4 and the last coil being connected by a conducting wire 65 to the other slip ring 63, passing through an insulated hole 66 in the slip ring 62. By thus connecting the magnet coils a complete circuit is obtained which, when the current is supplied, energizes all the magnets simultaneously.

Claims:

1. In a press having a press platen, a main shaft, mechanism for operating said platen from said shaft, a pair of electro-magnetically actuated friction clutches on said shaft, a driving pulley carried by each clutch, a driving motor, means for rotating said pulleys in opposite directions from said motor, an adjustable electro-magnet device in the current supply to the motor, and mechanism operated by said device at a predetermined moment to interrupt the current supply to the clutch of the forward-drive belt pulley, when the pressure of the press platen has reached a predetermined maximum.

2. In a device as claimed in claim 1 in which the current supply to the clutch of the forward-drive belt pulley is controlled by the provision of a switch in said current supply, a solenoid in the current supply to the motor, mechanism for operating said switch from said solenoid, and means for adjusting the moment at which said solenoid opens said switch.

3. In a press having a press platen, a main shaft, and mechanism for operating said platen from said shaft, in combination a pair of electro-magnet friction clutches, a pair of pulleys, one or other of which is adapted to be coupled to said shaft when one or other of said clutches is energized, an electric current generator supplying current to said clutches, an electric motor supplied with current from said generator and adapted to drive said pulleys in opposite directions, a solenoid in the current supply to said motor, said solenoid having an adjustable core, a switch in the current supply to the clutch of the forward-drive pulley, mechanism operated by the attraction of the core of said solenoid to open said switch, means for automatically retaining said switch in open position, and a manually-operated device for releasing said means to close the switch.

In testimony whereof I affix my signature.

MALCOLM WALKER.