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SWITCH

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Fig. 1.

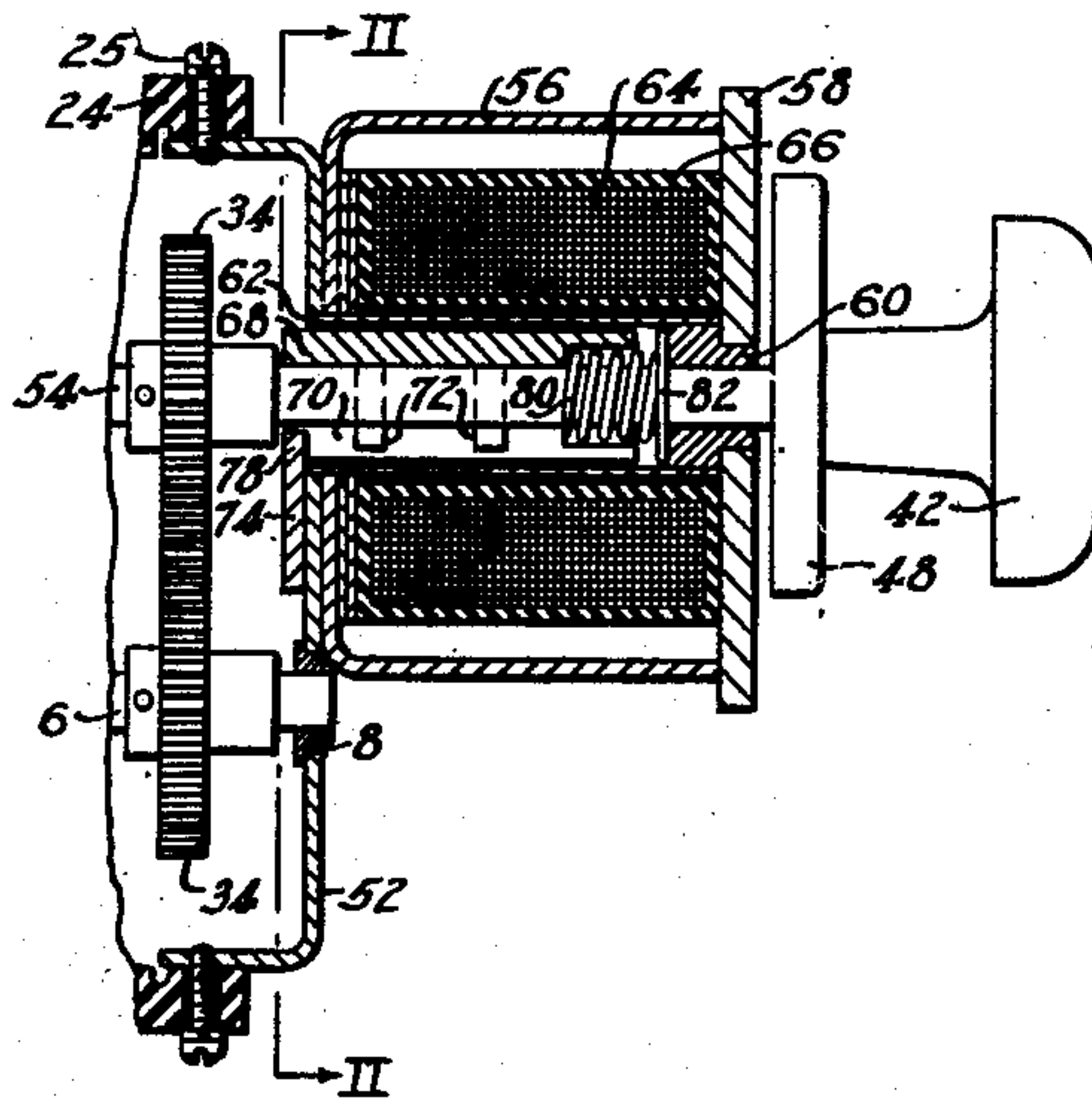
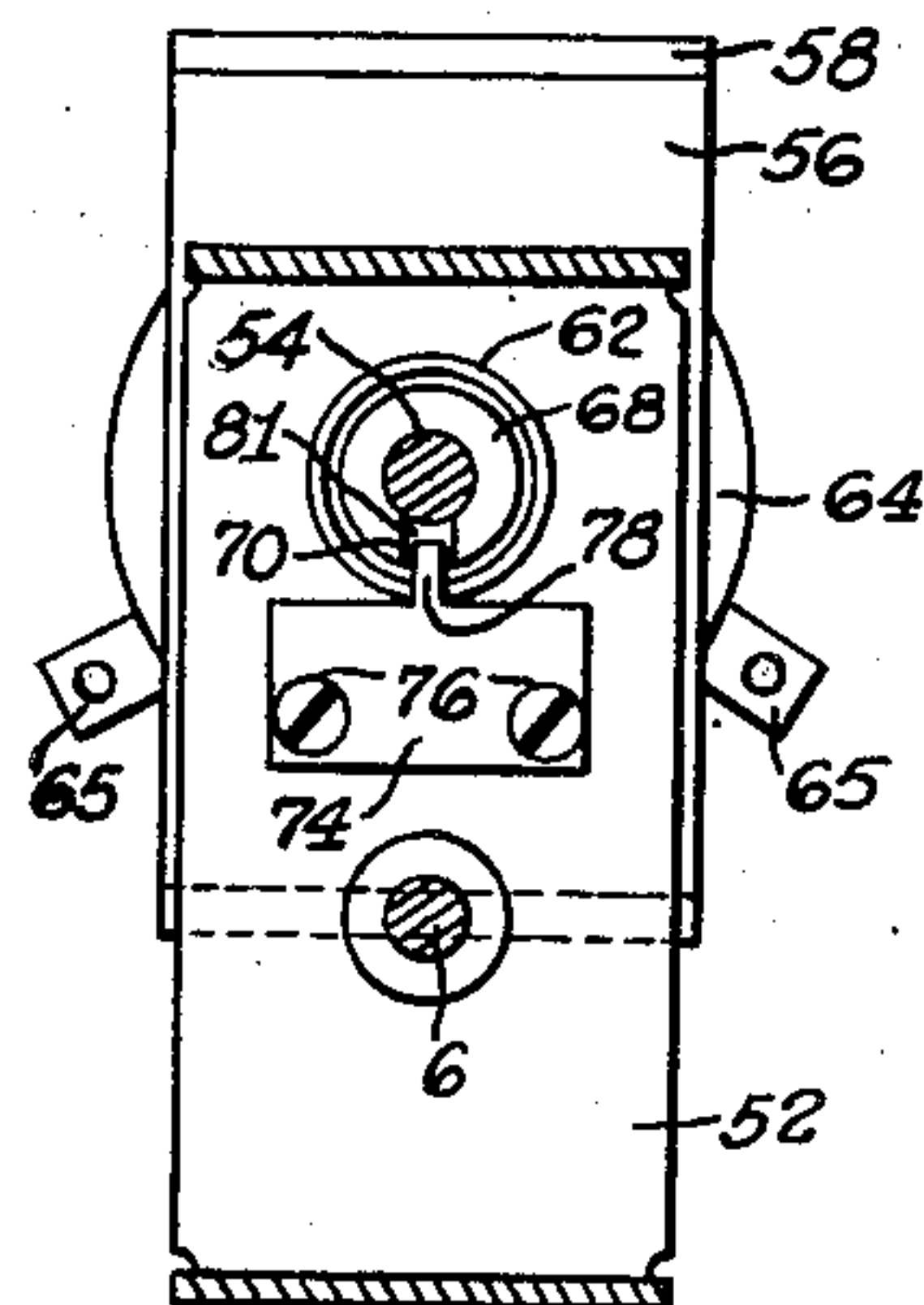


Fig. 2.



WITNESSES:

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SWITCH

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5 Claims. (Cl. 74—527)

1

This invention relates generally to electric switches, and more particularly to arrangements for operating one or a plurality of switches, which may include a switch locking arrangement.

One object of this invention is to provide novel means for simultaneously operating a plurality of electric switches.

Another object of this invention is to provide a novel unitary assembly of a plurality of electric switches wherein such assembly includes common actuating mechanism for the switches.

Another object of this invention is to provide a novel unitary assembly of a plurality of electric switches including common operating means having locking means for control of all of the switches.

Still another object of this invention is to provide novel locking means for a rotatable switch operating member.

These and other objects of this invention will become more apparent upon consideration of the following detailed description of preferred embodiments thereof, when taken in connection with the attached drawings, in which:

Figure 1 is a partial longitudinal section view of a switch construction embodying this invention, and

Fig. 2 is a transverse section view of the switch shown in Fig. 1, taken substantially on the line II—II of Fig. 1;

The switch construction illustrated on the drawing comprises a plurality of rotary contact-carrying shafts, each having sets of stationary contacts cooperable therewith for controlling a predetermined number of electric circuits in response to rotation of the respective shaft, with mechanism connecting these shafts for simultaneous movement. As the description of the device illustrated proceeds, it will become apparent that any desired number of rotary contact shafts may be employed, this being a matter of choice dependent upon the number of electric circuits to be controlled.

In Figs. 1 and 2 of the drawings, there is illustrated an assembly of two rotary switches which may be of the type disclosed in Sandin Patent 1,744,245, issued January 21, 1930, and assigned to the same assignee as this invention. End plates 52 are maintained in spaced relation by contact supporting plates 24 which are of an insulating material and are secured to flanges on

2

the end plates by screws 25. A contact shaft 6 is mounted in bearings 8 and geared to a contact shaft 54 through gears 34. Contact shaft 54 extends through an end plate 52 and through a rectangular supporting frame comprising a U-shaped metal supporting member 56 secured at its base to end plate 52 and having its open side closed by a plate 58 welded or otherwise secured thereto. The rectangular supporting frame is provided for supporting mechanism for locking the switches at one or more predetermined positions, in a manner to be described. Plate 58 of the supporting frame is provided with a substantially central opening for receiving the reduced outer end of a bearing sleeve 60 for contact shaft 54. The enlarged inner portion of bearing sleeve 60 is adapted to support one end of a sleeve 62 which extends through the rectangular frame and has its other end located in openings provided through the base of frame member 56 through end plate 52. A solenoid coil 64 is adapted to be supported on sleeve 62, with the coil having terminals 65 for connection to a control circuit. Solenoid coil 64 is provided with suitable insulation 66.

A locking sleeve 68 is adapted to be slidably mounted on contact shaft 54 within sleeve 62 but is held against rotation on the shaft by a pair of pins 72 secured in the shaft and extending into a longitudinal slot 70 in locking sleeve 68. The inner end of slot 70 is adapted to cooperate with a locking projection 78 formed on a bracket 74 secured to the inner side of end plate 52, as by screws 76. A coil compression spring 80 is adapted to be mounted in a recess provided in the outer end of locking sleeve 68 and reacts between the sleeve and a washer 82 bearing against sleeve 60, to normally bias the locking sleeve inwardly so that locking projection 78 will be received in slot 70 when contact shaft 54 is at the position shown in Figs. 1 and 2.

It is believed apparent that with the parts positioned as shown in Figs. 1 and 2 of the drawings, contact shafts 6 and 54 are both locked at the positions they occupy in these figures by the reception of locking projection 78 in slot 70 of the locking sleeve, the sleeve being maintained at this position by spring 80. Locking sleeve 68 is of a magnetic material so as to be attracted outwardly in a direction to compress spring 80 upon energization of solenoid coil 64, so that lock-

3

ing projection 78 is no longer received in slot 70 of the locking sleeve, and the contact shafts are then released for movement by operation of handle 42. Locking sleeve 68 may be provided with notches 81 in the inner end thereof positioned to receive locking projection 78 at other angular positions of the contact shafts, so that the shafts may be locked at such other positions and can be moved from such positions only upon energization of solenoid coil 64 to withdraw locking sleeve 68 and release the shaft for movement. It is believed apparent that the particular locking arrangement for a rotary contact shaft illustrated in Figs. 1 and 2 may be used where that shaft drives any desired number of other contact shafts, or where that shaft is the sole shaft of the switch construction. This particular locking arrangement is extremely compact in form and relatively simple to manufacture and assemble, yet is extremely positive and flexible in operation. The solenoid is easily accessible for wiring and maintenance, and it is apparent that the cross-section of the locking arrangement is limited to be substantially the same as the cross-section occupied by a single switch. Instead of the specific arrangement illustrated in Figs. 1 and 2 wherein spring 83 normally urges locking sleeve 68 to a locking position, this invention also contemplates a reversal of this arrangement wherein spring 83 is arranged to normally urge locking sleeve 68 to a released position, and solenoid coil 64 upon energization moves the locking sleeve to a locking position.

The embodiment of the invention described and illustrated herein relates to a novel unitary assembly of a plurality of switch units, wherein each unit is adapted to control a plurality of electric circuits. Moreover, this novel assembly includes as part of the unit an operating mechanism for effecting simultaneous operation of the several switch units, and may further include novel locking mechanism, with the latter being also adapted for the control of a single switch unit. The design disclosed has few parts and is relatively simple and economical to manufacture and assemble; this latter advantage is important when it is considered that this type of switch is generally mounted on switchboards and control panels with a great deal of other control and related equipment, and where the space factor is, consequently, of exceeding importance.

Having described a preferred embodiment of this invention in accordance with the patent statutes, it is desired that the invention be not limited to the particular construction disclosed, inasmuch as it will be apparent, particularly to persons skilled in the art, that many changes and modifications in the particular structure may be made, some of which have been pointed out above, without departing from the broad spirit and scope of this invention. Accordingly, it is desired that the invention be interpreted as broadly as possible and that it be limited only as required by the prior art.

We claim as our invention:

1. Locking means for a rotatable shaft journaled in a supporting frame having spaced end plates, said shaft extending through said plates, said means comprising a fixed locking part on said frame, an integral solenoid core and locking sleeve slidably mounted on said shaft for movement into and out of engagement with said locking part, a longitudinal slot in said sleeve, projecting means on the shaft disposed in said slot to prevent rotation of the sleeve on the shaft,

4

said sleeve being biased for sliding movement in one direction, and a solenoid coil disposed between said end plates and surrounding said sleeve for moving the sleeve in the opposite direction against said bias.

2. Locking means for a rotatable shaft journaled in a supporting frame having spaced end plates, said shaft extending through said plates, said means comprising a fixed locking part on said frame, an integral solenoid core and locking sleeve slidably mounted on said shaft for movement into and out of engagement with said locking part, a longitudinal slot in said sleeve, projecting means on the shaft disposed in said slot to prevent rotation of the sleeve on the shaft, resilient means disposed on the shaft for biasing said sleeve in one direction, and a solenoid coil disposed between said end plates and surrounding said sleeve for moving the sleeve in the opposite direction.

3. Locking means for a rotatable shaft journaled in a supporting frame having spaced end plates, said shaft extending through said plates, said means comprising a fixed locking part on said frame, an integral solenoid core and locking sleeve slidably mounted on said shaft for movement into and out of engagement with said locking part, a longitudinal slot in said sleeve, projecting means on the shaft disposed in said slot to prevent rotation of the sleeve on the shaft, resilient means biasing said sleeve in a direction to engage said locking part to hold said shaft at a predetermined position, and a solenoid coil disposed between said end plates and surrounding said sleeve for moving the sleeve in the opposite direction to release said shaft for movement.

4. Locking means for a rotatable shaft journaled in a supporting frame having spaced end plates, said shaft extending through said plates, said means comprising a fixed-locking part on one of said end plates, a tubular solenoid core which constitutes a locking sleeve slidably mounted on said shaft for movement into and out of engagement with said locking part, a longitudinal slot in said sleeve, a projection on the shaft disposed in said slot to prevent rotation of the sleeve on the shaft, a recess in one end of the sleeve, spring means disposed in said recess to bias said sleeve in one direction, and a solenoid coil mounted in said frame between said end plates for moving said sleeve in the opposite direction against the biasing spring means.

5. Locking means for a rotatable shaft journaled in a supporting frame having spaced end plates, said shaft extending through said plates, said means comprising a fixed-locking part on one of said end plates, a tubular solenoid core which constitutes a locking sleeve slidably mounted on said shaft for movement into and out of engagement with said locking part, a longitudinal slot in said sleeve, projecting means on the shaft disposed in said slot to prevent rotation of the sleeve on the shaft, a recess in one end of the sleeve, resilient means disposed in said recess to bias said sleeve in a direction to engage said locking part to hold said shaft at a predetermined position, and a solenoid coil mounted in said frame between said end plates for moving said sleeve in the opposite direction to release said shaft for rotative movement when the coil is energized.

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5

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6

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