

Nov. 22, 1960

L. J. WHITE ET AL
MASTER ACTUATING MECHANISM FOR OPERATING
CELL DOORS KEYLESS LOCKS

2,961,076

Filed June 11, 1958

4 Sheets-Sheet 1

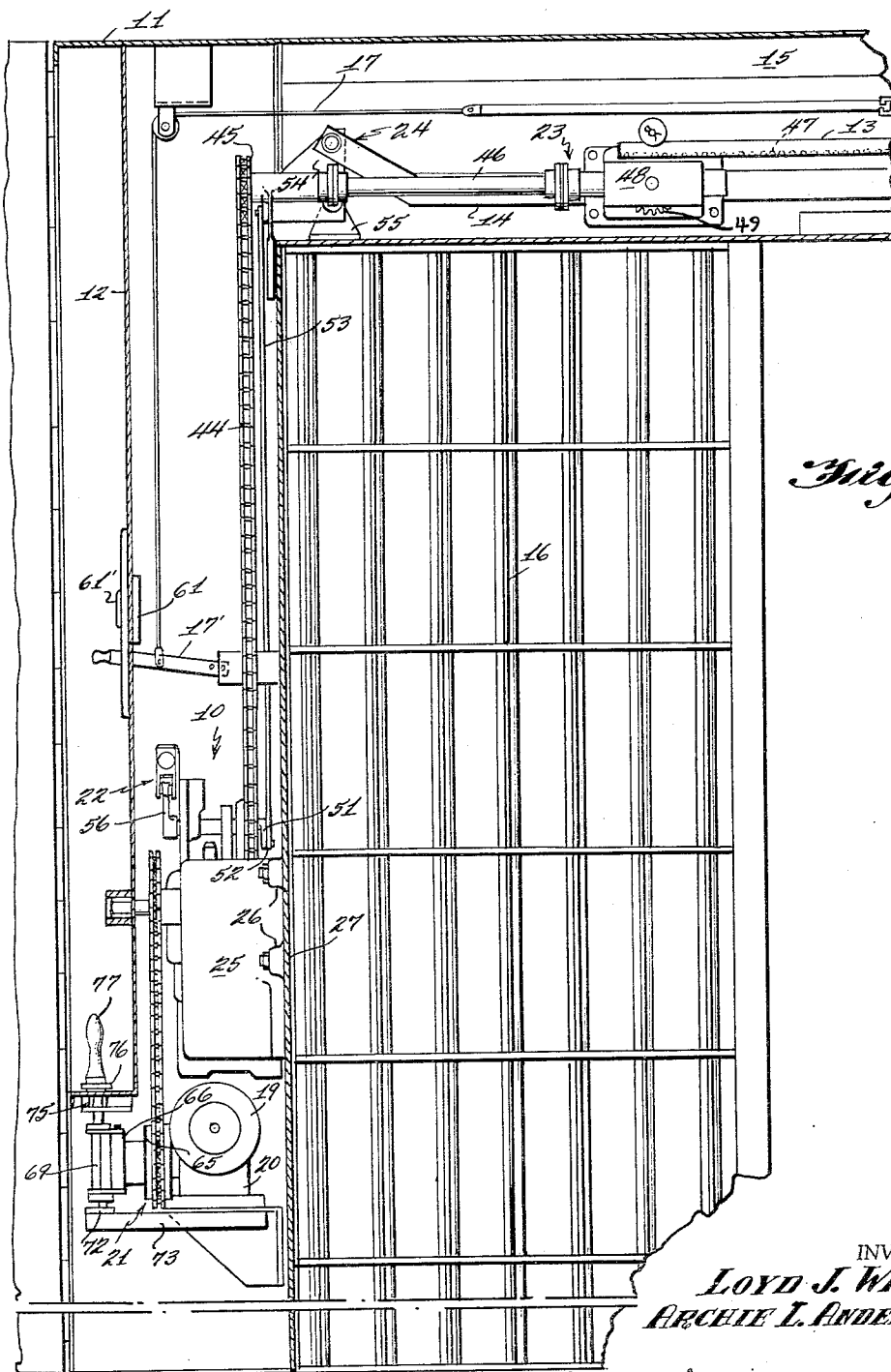


Fig. 1

INVENTORS
LOYD J. WHITE
ARCEIE L. ANDERSON

BY

Adam & Bush

ATTORNEY

Nov. 22, 1960

L. J. WHITE ET AL
MASTER ACTUATING MECHANISM FOR OPERATING
CELL DOORS KEYLESS LOCKS

2,961,076

Filed June 11, 1958

4 Sheets-Sheet 2

Fig. 2

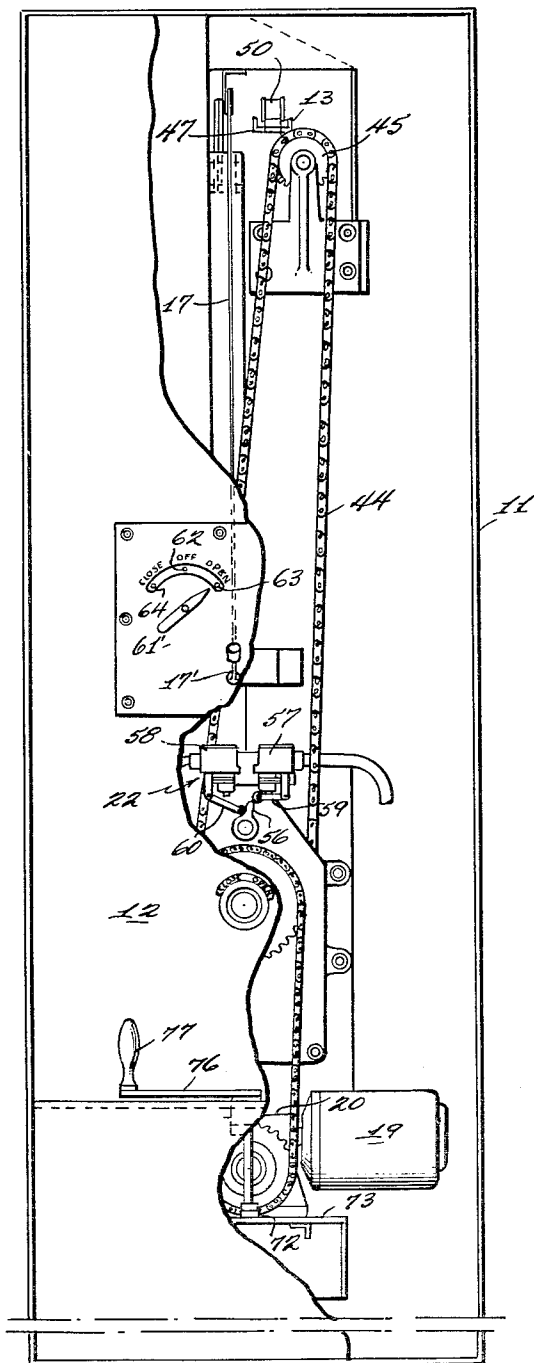
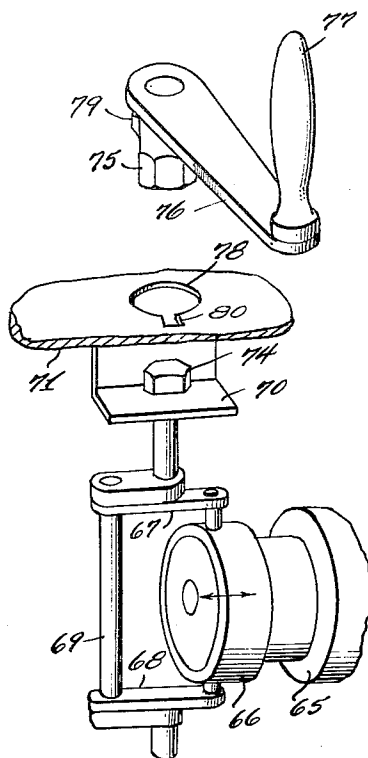


Fig. 3



INVENTORS

LOYD J. WHITE
ARCHIE L. ANDERSON

BY

Adams + Bush

ATTORNEY

Nov. 22, 1960

L. J. WHITE ET AL
MASTER ACTUATING MECHANISM FOR OPERATING
CELL DOORS KEYLESS LOCKS

2,961,076

Filed June 11, 1958

4 Sheets-Sheet 3

Fig. 5

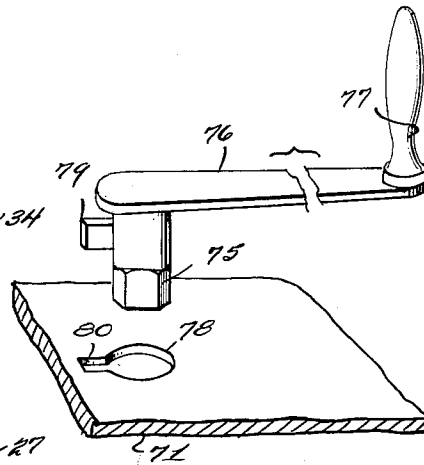
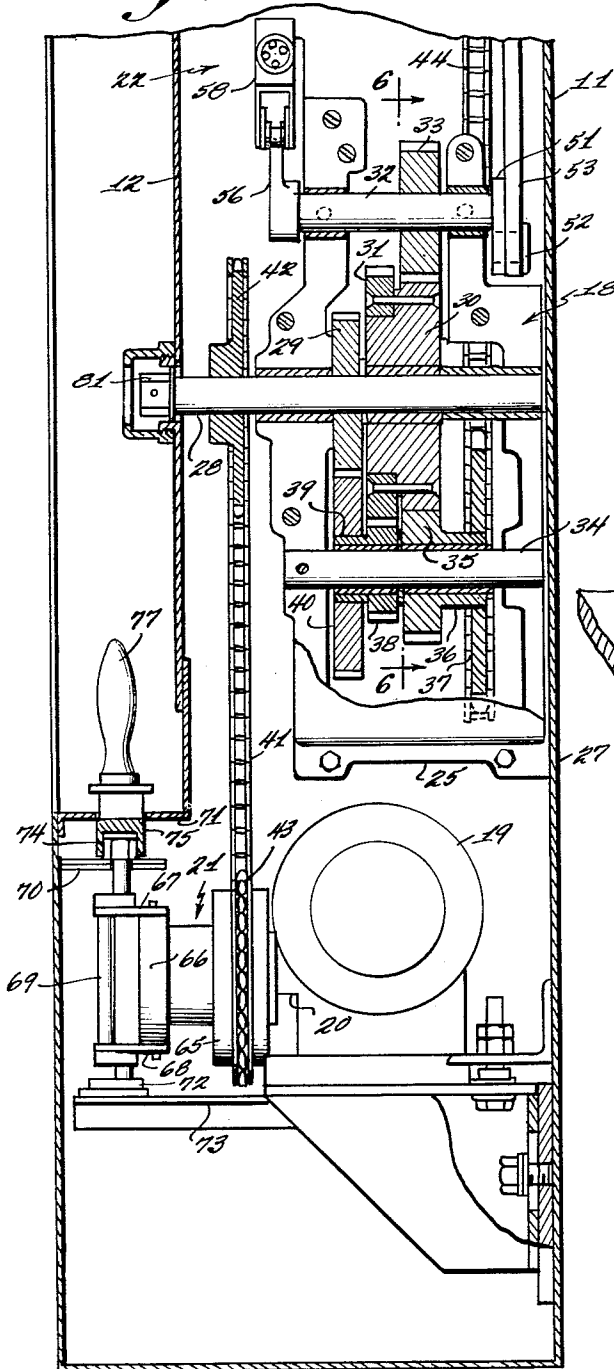


Fig. 4

INVENTORS
LOYD J. WHITE
ARCHIE L. ANDERSON

Adams + Bush
ATTORNEY

Nov. 22, 1960

L. J. WHITE ET AL
MASTER ACTUATING MECHANISM FOR OPERATING
CELL DOORS KEYLESS LOCKS

2,961,076

Filed June 11, 1958

4 Sheets-Sheet 4

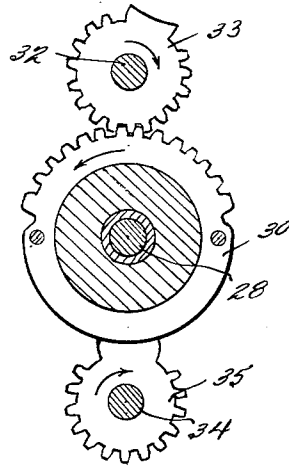


Fig. 6

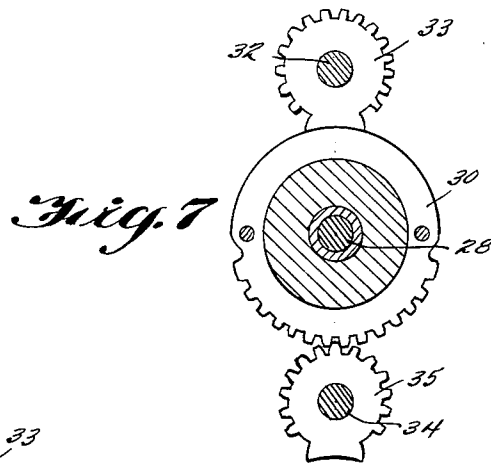


Fig. 7

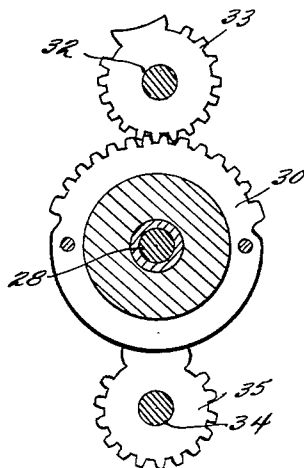


Fig. 8

INVENTORS.

LOYD J. WHITE
ARCHIE L. ANDERSON

BY

Adams & Bush
ATTORNEY

1

2,961,076

MASTER ACTUATING MECHANISM FOR OPERATING CELL DOORS AND KEYLESS LOCKS

Loyd J. White and Archie L. Anderson, San Antonio, Tex., assignors to Southern Steel Company, San Antonio, Tex., a corporation of Texas

Filed June 11, 1958, Ser. No. 741,318

2 Claims. (Cl. 189—7)

This invention relates to keyless locking and operating systems for a plurality of sliding cell doors arranged in a row or series such as are used in jail and prison installations, and has more particular reference to master actuating mechanism for the control and operation of cell doors and their keyless locks.

One object of the present invention is to provide novel and improved master actuating mechanism for imparting sequential movement to the operation of such locks and cell doors.

Another object of the present invention is to provide novel and improved master actuating mechanism, as characterized above, wherein the master actuating mechanism is mounted in a single control cabinet and includes intermittent gearing connected to impart sequential movement to the operation of the locks and cell doors and dual operating means for operating the intermittent gearing either electrically or manually, whereby the intermittent gearing, which normally is operated electrically, may be operated manually in an emergency arising from power failure or other causes.

Another object of the present invention is to provide a master actuating mechanism, as characterized above, wherein the electrical operating mechanism comprises a single reversible electric motor and speed reducing gear connected to operate the intermittent gearing, and limit switches for stopping the motor after the doors have been moved to their full open position and locked in such position, and to their fully closed position and locked in such position.

Another object of the present invention is to provide a master actuating mechanism, as characterized above, wherein means are provided to insure that the electric motor, together with the speed reducing gears, have been disconnected from the intermittent gearing before the intermittent gearing can be operated manually.

A further object of the present invention is to provide a dual operated master actuating mechanism, as characterized above, which is rugged and simple in construction, efficient in operation, and inexpensive in construction in comparison with constructions presently in use.

Other objects and advantages of the invention will appear in the following specification when considered in connection with the accompanying drawings, wherein:

Fig. 1 is a fragmentary side elevation showing one form of the master actuating mechanism and how it is applied to operate master door propelling and lock bars which are connected to the intermittent gearing in the control cabinet;

Fig. 2 is a front elevational view, with parts broken away, of the control cabinet shown in Fig. 1;

Fig. 3 is a perspective exploded view of the operating handle for controlling the electrical and manual operation of the mechanism, and showing the manner in which it is employed to operate the clutch mechanism of the motor;

Fig. 4 is a perspective view showing the manner in which the crank is employed for manually operating the intermittent gearing and the clutch mechanism;

2

Fig. 5 is an enlarged fragmentary view of the mechanism shown in Fig. 1, and showing the details of the intermittent gearing;

Fig. 6 is a sectional view taken on the line 6—6 of Fig. 5; and

Figs. 7 and 8 are views similar to that shown in Fig. 6, but showing the gearing in different positions.

The present invention provides novel and improved master actuating mechanism for imparting sequential actuating movement to the selected doors and their keyless locks for locking and unlocking a plurality of sliding cell doors in a fully selective manner and is an improvement over the mechanism shown in the Loyd J. White et al. Patent No. 2,012,556, and, in general, comprises an intermittent gear system connected to impart longitudinal movement to the propeller bar and lock bar for sequential operation of the selected cell doors and their locks; a single reversible motor connected to drive the intermittent gearing; manual means for operating the intermittent gearing; and means for insuring that the manual means can be operated only after the electric motor and its speed reducing gears have been disconnected.

Referring now to the drawings, there is illustrated, in Figs. 1 and 2, one embodiment of a master actuating mechanism constructed in accordance with the present invention and showing the manner in which it is connected to operate sequentially the master propelling bar and master lock bar in a fully selective door operating and keyless locking system for locking and unlocking a plurality of sliding cell doors, such as those disclosed in the patents to D. F. Youngblood, Nos. 1,269,244; 1,611,260 and 1,785,471.

As there illustrated, the master actuating mechanism, indicated generally at 10, is shown as mounted at the end of a block of cells in a control cabinet 11 having an operating or control panel 12, and the control cabinet is usually located at the front or entrance to a cell block (not shown).

The usual type of travel or door propelling bar 13 and lock operating bar 14 are shown as being mounted in the usual type of horizontally disposed cover box 15 above the cell front wall 16. The wall 16 is shown as comprising a series of bars; however, in some installations such walls are made of steel plate or masonry.

Each of the cell doors in the series of cells is provided with a selector mechanism (not shown) for connecting and disconnecting the door and its locking mechanism to the master bars and each such mechanism is connected, as by means of a cable 17, to a selector pin 17' pivotally mounted in the control cabinet 11. By operation of the selector pins 17', whose ends project through the panel 12, any one of the cell doors and its locking mechanism may be connected to or disconnected from the master bars, making the system fully selective.

The master actuating mechanism, indicated generally at 19, is shown as comprising an intermittent gearing, indicated generally at 18; a reversible motor 19 connected to drive the gearing 18 through a reduction gear 20; clutch mechanism, indicated generally at 21, for connecting and disconnecting the motor and reduction gear from the intermittent gearing 18; limit switch mechanism, indicated generally at 22, for stopping the motor 19 when the selected doors have reached locked open position or locked closed position; a pinion and rack drive gear assembly, indicated generally at 23, connected to be driven by the intermittent gearing and connected to give longitudinal movement to the master door propelling bar 13; and a bell crank assembly, indicated generally at 24, connected to be operated by the intermittent gearing and connected to give longitudinal movement to the master lock operating bar 14.

The intermittent gearing is mounted in a (split) gear

case 25, which is open at the top and closed at the bottom. The gear case 25 is shown as having a series of ears or lugs 26 adapted to be bolted or otherwise secured to the backwall 27 of the control cabinet 11.

As best seen in Fig. 5, the intermittent gearing is shown as comprising a main or drive shaft 28 journaled in and extending through the gear casing and having a driving gear 29 keyed thereon; a large intermittent gear 30 rotatably mounted thereon and having a ring gear 31 secured thereto; an upper rotatable shaft 32 having an intermittent pinion 33 keyed thereon and positioned to engage the intermittent gear 30 on the drive shaft 28; a lower fixed shaft 34 having an intermittent pinion 35 rotatably mounted thereon in position to engage the intermittent gear 30 on the drive shaft 28 and having a hub 36 on which is secured a sprocket 37; and a small driving pinion 38 rotatably mounted on the fixed shaft 34 in position to engage the ring gear 31 secured on the large intermittent gear 30 and having a hub 39 on which is keyed a pinion 40 in position to engage the driving gear 29 on the shaft 28. The arrangement is such that the intermittent pinion 35 is connected to impart movement to the door propelling bar 13 and the intermittent pinion 33 is connected to impart movement to the locking bar 14 and operate the limit switch mechanism 22. The main shaft 28 of the intermittent gear is connected to be driven by the reversible motor 19, as by means of a sprocket chain 41 passing over a sprocket 42 keyed on the shaft 28 and a sprocket 43 mounted on a hub forming part of the clutch assembly and adapted to be driven by the electric motor through the drive shaft of the reduction gearing 20. The sprocket 43 is adapted to be disconnected from the drive shaft of the reduction gearing by the clutch assembly, in a manner hereinafter to be described.

The manner in which the intermittent pinion 35 is connected to impart longitudinal movement to the master door propelling bar is best seen in Figs. 1 and 5. As there shown, the sprocket 37 on the hub of the intermittent pinion 35 is connected by a sprocket chain 44 to drive a sprocket 45 keyed on the drive shaft 46 of the rack gear drive assembly 23. The inner end portion of the master door propelling bar 13 has a rack 47 secured thereto and engaging the gearing in the rack bar drive assembly so that as the drive shaft 46 of the rack gear drive assembly is rotated, the bar 13 will be moved longitudinally. The rack 47 is of sufficient length to provide the desired travel distance for the doors and the size of the sprocket 37 determines the amount of movement that can be imparted to the travel bar and will be selected to suit any particular installation, depending upon the extent of movement required to fully open or close the doors. Of course, it is understood that a bevel gear drive may be substituted for the sprocket and chain drive, such gearing being shown in the Hart et al. Patent No. 1,836,661, and others.

The pinion and rack drive gear assembly 23 may be of any suitable type and is generally similar to the pinion and rack drive gear assembly shown in the L. J. White et al. Patent No. 1,836,696, and, as shown, comprises a housing or frame 48 in which is mounted a driving pinion 49 positioned to engage the rack 47 carried by the door propelling bar 13. The pinion 49 is driven through a bevel gear assembly (not shown) mounted in the housing 48 and keyed on the shaft 46, and an idle roller 50 for holding the rack in position to properly mesh with the pinion 49.

The manner in which the intermittent pinion 33 is connected to impart longitudinal movement to the master lock bar 14 and operates the limit switch mechanism 22 is best seen in Figs. 1 and 5. As there shown, the rotatable shaft 32, on which the intermittent pinion 33 is keyed, carries a crank arm or eccentric disk 51 on one end of which is mounted a crank pin 52 and a link 53 connects the crank pin to the bell crank 54 of the bell

crank assembly 24 which, in turn, is connected to the locking bar 14.

The bell crank assembly 24 is shown as comprising a bell crank 54 pivotally mounted on a bracket 55 with one of its ends pivotally connected to the upturned end of the locking bar 14 and the other of its ends universally pivotally connected to the link 53, as above described.

The rotatable shaft 32 has a cam member 56 fixedly secured on its end opposite the crank arm 51 and extends laterally from the shaft at an angle of approximately 180° from the direction in which the crank arm extends laterally from the shaft. The cam is positioned to engage and operate the limit switch mechanism 22, as best seen in Fig. 2. The limit switch mechanism comprises two limit switches 57, 58. The limit switch 57 is mounted in the circuit to the reversible motor, which, when energized, causes the motor to rotate in one direction, i.e., the direction which moves the cell doors from closed to open position, while the limit switch 58 is mounted in the circuit to the reversible motor, which, when energized, causes the motor to rotate in the opposite direction, i.e., the direction which moves the cell doors from opened to closed position.

The limit switches 57, 58 may be of any suitable usual type. As shown, each is identical in construction and each is normally resiliently held in position to close the circuit to the motor in which it is mounted. The switch 57 is provided with a pivoted actuator 59 positioned to be engaged by the cam member 56 and moved to open the switch when the cell doors have been moved to open position and locked in this position.

A master switch 61, which may be of any suitable usual construction, for controlling the operation of the reversible electric motor, is mounted on the back of the control panel 12 and has an indicating handle 61' mounted on the front of the panel 12, which is movable from a central point 62 (marked Off), in which both circuits to the motor are open, to a point 63 (marked Open), closing the circuit to energize the motor 19 to rotate in a direction to move the cell doors from closed to open position, and to a point 64 (marked Close) closing the circuit to energize the motor 19 to rotate in a direction to move the cell doors from open to closed position.

The clutch mechanism, indicated generally at 21, may be of any suitable usual construction. As shown, such mechanism comprises a plate clutch unit 65, movable into and out of clutching engagement with the sprocket 43 rotatably mounted on the reduction gear drive shaft and clutch throwout mechanism including a throwout yoke 66 pivotally connected by upper and lower horizontal links 67, 68, to a clutch disengaging eccentric 69 to having its upper end journaled in a bearing support 70 secured to the under side of a laterally extending flange 71 formed along and extending across the bottom end of the master panel 12, and its lower end journaled in a suitable bearing 72 carried by a support plate 73 mounted in the lower portion of the cabinet 11 (see Figs. 2, 3 and 4). The upper end of the eccentric 69 has a hexagonal nut 74 secured thereon and adapted to be engaged by a socket member 75 carried by a crank 76 provided with a handle 77. The socket member 75 of the crank projects through an opening 78 formed in the flange 71 and engages the hexagonal nut 74 on the eccentric. Then, by moving the crank through 180° the eccentric is moved to engage and disengage the clutch mechanism. A laterally projecting pin 79 formed on the socket member 75 prevents the crank from being lifted out of engagement with the eccentric until the crank has been swung into position to disengage the clutch mechanism, in which position the pin 79 will be in vertical alignment with a notch 80 opening into the opening 78 and the crank can be lifted vertically. The crank is also employed to rotate the drive shaft of the intermittent gearing 18, the socket member 75 fitting over a hexagonal nut 81 on the end of the shaft which projects through an opening in the panel 12.

5

The intermittent pinions 33 and 35 are meshed with the large intermittent gear 30 in such a manner as to provide the following sequential operations in one continuous run of the electric motor when the motor is run in the direction to cause the doors to be moved from locked closed position to locked open position:

- (1) Unlock the series of doors (one or more as determined by the selective mechanism).
- (2) Open said doors.
- (3) Lock said doors in open position.
- (4) Automatically open the power circuit as the doors are locked, to stop the motor.

In one continuous run of the motor operating in the reverse direction to cause the doors to be moved from locked open position to locked closed position:

- (5) Unlock the selected doors.
- (6) Close said doors.
- (7) Lock said doors in closed position.
- (8) Automatically open the power circuit as the doors are locked, to stop the motor.

When the master actuating mechanism of the invention is in the position shown in Figs. 1, 2, 5 and 6, the doors (which are moved from right to left to close, as viewed in Fig. 1) are in locked open position, this position being indicated by the master switch handle being on "open," the motor is stopped, having been stopped by the cam member 56 engaging the actuator 59 of the limit switch 57 to open the circuit to the motor, which energizes the motor to rotate in the direction to move the doors to open position. After the doors have been moved to full open position and locked in this position, the crank pin 51 is at its lower position, having moved the locking bar 14 to the left as viewed in Fig. 1, by means of the bell crank 54, the small intermittent pinion 33 has its teeth meshing with the teeth on the large intermittent gear 30, as best seen in Fig. 6, and the small intermittent pinion 35 has its smooth part engaging the smooth part of the intermittent gear 30.

When the master motor control switch 61 is turned over to contact 64 marked "Close," the circuit to the motor through limit switch 58 is closed, which energizes the motor to rotate in a direction to cause the doors to be moved from open to closed position. The drive shaft of the intermittent gearing is rotated to cause the large intermittent gear 30 to be rotated counterclockwise, as viewed in Fig. 6.

As the intermittent gear 30 is rotated counter-clockwise, the intermittent pinion 33 is turned clockwise through approximately 165° to the position shown in Fig. 7, so that the crank pin 51 moves to its upper dead center position, the movement causing the locking bar 14 to be moved to the right as viewed in Fig. 1, to unlock the doors. The intermittent pinion 33 is held in this position while movement is being imparted to the intermittent pinion 35, it being noted that the pinion 35 has been held stationary while the pinion 33 was being rotated. After the pinion 33 assumes the position shown in Fig. 7, the teeth on the intermittent gear 30 engage the teeth on the intermittent pinion 35 and impart movement to it in a clockwise direction until it has been turned through one complete revolution and its smooth part engages the smooth part of the intermittent gear 30. In Fig. 7, only half of the door operating movement has been imparted through the intermittent pinion 35 and the connected sprocket and chain. After a complete revolution is imparted to this pinion (35) the intermittent gear 30 completes its revolution and assumes the position shown in Fig. 8, so that the intermittent pinion 33 is again turned through approximately 165° to impart locking movement to the locking bar 14 through the crank pin 51 and move it to the left as viewed in Fig. 1, to lock all of the selected doors in their locked position. Also, the cam member 56 has been rotated with the shaft 32 to bring the cam into engagement with the actuator 60 of the limit switch 58 and move it upward to open the switch and stop the

6

motor. In that position, one complete cycle of operation has taken place. That is to say, the doors (or selected doors) have been unlocked, closed, and locked closed, and the motor stopped after the doors have been locked closed. The intermittent gear 30 and the small intermittent pinions 33 and 35 are in position, when the motor is energized, to cause the large intermittent gear 30 to be rotated in a clockwise direction to cause the selected doors to be unlocked, moved to open position, locked in open position, and the motor stopped. In connection with the foregoing, it should be noted that the pinion 33 and the shaft 32 on which it is keyed is only rotated through approximately 330°, whereas, the pinion 35 has been rotated 360° in one complete cycle of operation. This limited movement of the pinion 33 is sufficient to raise and lower the crank an amount to impart locking and unlocking movement to the lock bar 14 and to move the cam member 56 from the position shown in Fig. 2 to a position in which the actuator 60 has been engaged and moved upwardly to stop the motor after the completion of the cycle of operation.

In the event of power failure in the jail or prison or when for any cause the electric motor cannot be operated to drive the intermittent gear, the crank 76 can be turned to disengage the clutch mechanism (the position shown in Fig. 1), then lifted out of engagement with the hexagonal nut on the eccentric and mounted on the hexagonal nut on the main drive shaft of the intermittent gearing, so that the intermittent gearing can be operated manually. In connection with the foregoing, as a precautionary feature, it should be noted that the crank cannot be removed and employed for manual operation until after the clutch mechanism has been disengaged, so that the motor and reduction gear do not interfere with manual operation of the intermittent gearing.

From the foregoing, it will be apparent that there has been provided novel and improved master actuating mechanism for imparting sequential actuating movements to the selected locks and doors in a keyless locking and operating system for operating a plurality of cell doors in a fully selective manner employing a single reversible electric motor and intermittent gearing connected to impart sequential movements to the operation of the locks and cell doors, mechanism which provides means for manual operation in the event of power failure, which permits the controls for electrical and manual operation to be housed in a single control cabinet; and which provides means for preventing manual operation without disengaging the motor.

Obviously, the invention is not restricted to the particular embodiment thereof herein shown and described.

What is claimed is:

1. In a remote controlled keyless locking and operating system for operating a plurality of sliding cell doors in a fully selective manner; mechanical means for imparting sequential actuating movements to the selected locks and doors including a locking bar movable in one direction to unlock and then lock the selected doors as they are moved from open to closed position and movable in the opposite direction to unlock and then lock the selected doors as they are moved from closed to open position; a reversible electric motor connected to operate said mechanical means; a pair of limit switches with one limit switch connected in the circuit which energizes the motor for rotation in one direction and the other limit switch connected in the circuit which energizes the motor for rotation in the other direction; cam means actuated by the operation of the locking bar for operating the locks, to actuate said limit switches, the construction and arrangement being such that said limit switches will be operated to automatically stop said motor whenever the selected doors have been moved to and locked in their open or closed position; manually operable means for operating said mechanical means in the event of power failure to said motor including clutch mechanism for disconnecting

7

said motor from said mechanical means and a hand turned crank adapted for engaging and disengaging said clutch mechanism and for operating said mechanical means, said crank normally being mounted in position to control the engaging and disengaging of said clutch mechanism; and means including an integral stop member carried by said crank which permits removal of said crank from its normal position only when said clutch member is disengaged.

2. In a remote controlled keyless locking and operating system for operating a plurality of sliding cell doors in a fully selective manner of the type having a horizontal cover box mounted over the cell doors housing a master lock operating bar and a master cell door propelling bar for actuating the locks and door and a master control cabinet outside the cells; master actuating mechanism for operating said lock operating bar and said door propelling bar to impart sequential actuating movements to the selected locks and doors comprising a gear unit mounted in said control cabinet, said gear unit including a first driven shaft connected to operate said master locking bar, a second driven shaft connected to operate said master door propelling bar, and a drive shaft connected by gearing to rotate said first and second driven shafts in either direction; a reversible electric motor connected to rotate said drive shaft in either direction; a pair of limit switches with one limit switch connected in the circuit which energizes the motor for rotation in one direction and the other limit switch connected in the circuit which energizes the motor for rotation in the other direction; cam means, actuated by the operation of said master locking bar to lock

8

the selected doors, to actuate said limit switches, the construction and arrangement being such that said limit switches will be actuated to automatically stop said motor whenever the selected doors have been moved to and locked in either their open or closed position; manually operable means included an eccentric shaft operated clutch mechanism for disengaging said motor from said gear drive shaft and a hand turned crank for driving said drive shaft in the event of power failure, said crank being provided with a socket member adapted to fit over and engage the outer end of said drive shaft and the upper end of said eccentric shaft, said crank normally being mounted on said eccentric shaft for controlling the engagement and disengagement of said clutch mechanism; and means including a stop member carried by said crank which permits removal of said crank from said eccentric shaft only when said clutch mechanism is in disengaged position.

References Cited in the file of this patent

UNITED STATES PATENTS

812,637	Carter	Feb. 13, 1906
1,133,318	Rindfleisch	Mar. 30, 1915
1,611,260	Youngblood	Dec. 21, 1926
1,707,648	Turner et al.	Apr. 2, 1929
1,858,624	Hess et al.	May 17, 1932
2,012,556	White et al.	Aug. 27, 1935
2,546,685	Ashton	Mar. 27, 1951
2,837,182	White	June 3, 1958
2,841,252	Adam	July 1, 1958