

Nov. 11, 1930.

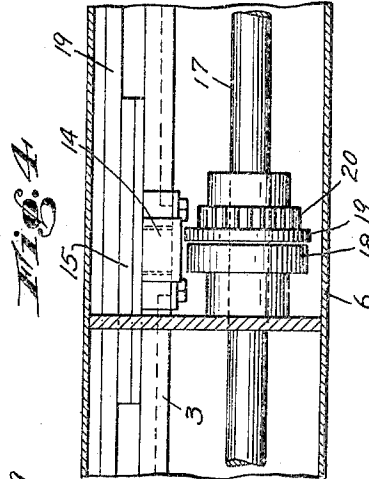
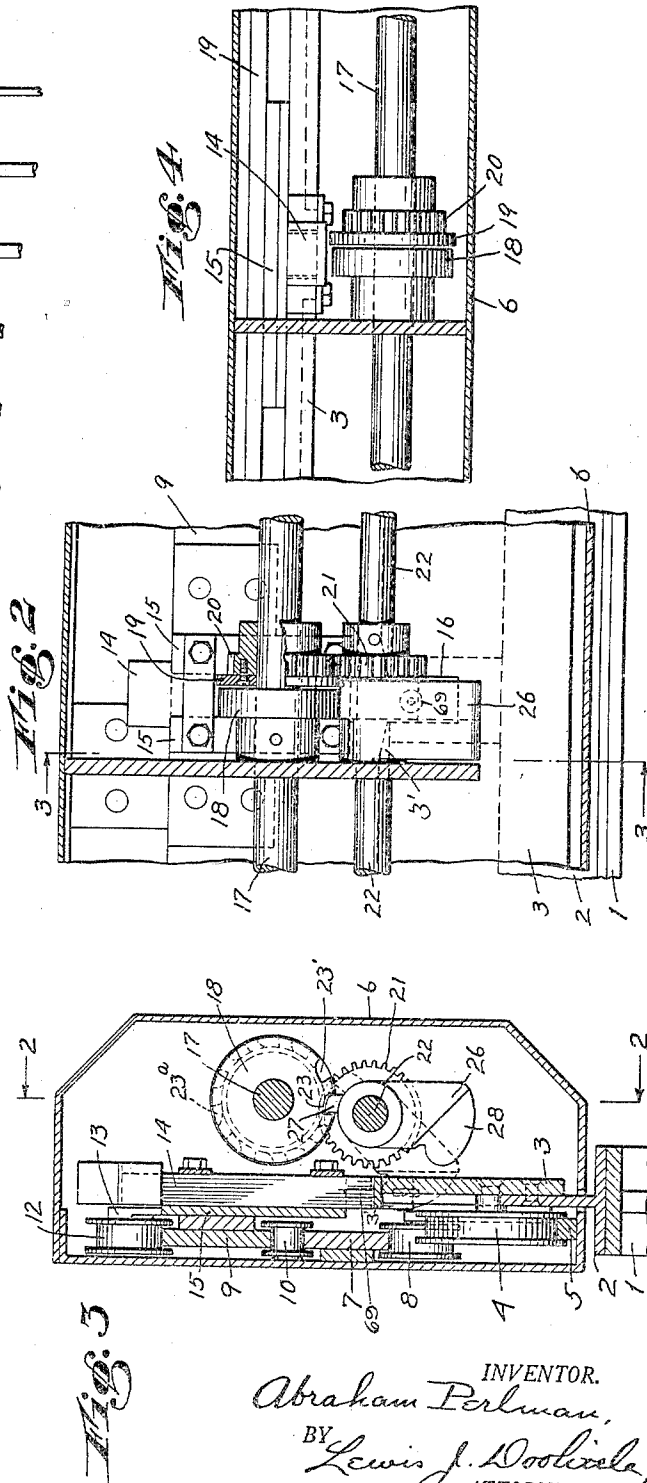
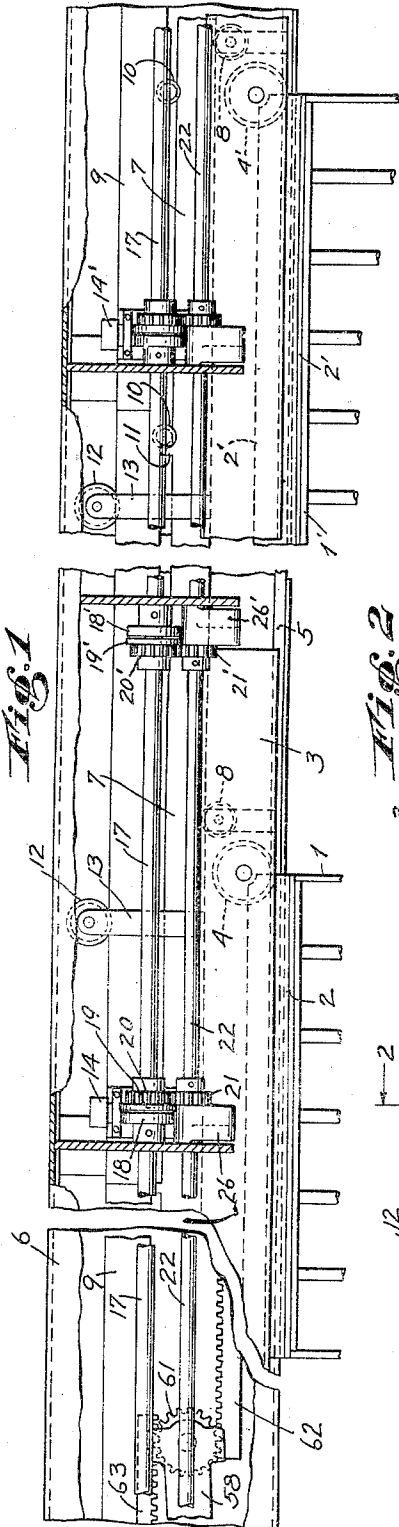
A. PERLMAN

1,781,297

DOOR OPERATING AND LOCKING MECHANISM

Filed April 10, 1930

4 Sheets-Sheet 1



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DOOR OPERATING AND LOCKING MECHANISM

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4 Sheets-Sheet 2

Fig. 5

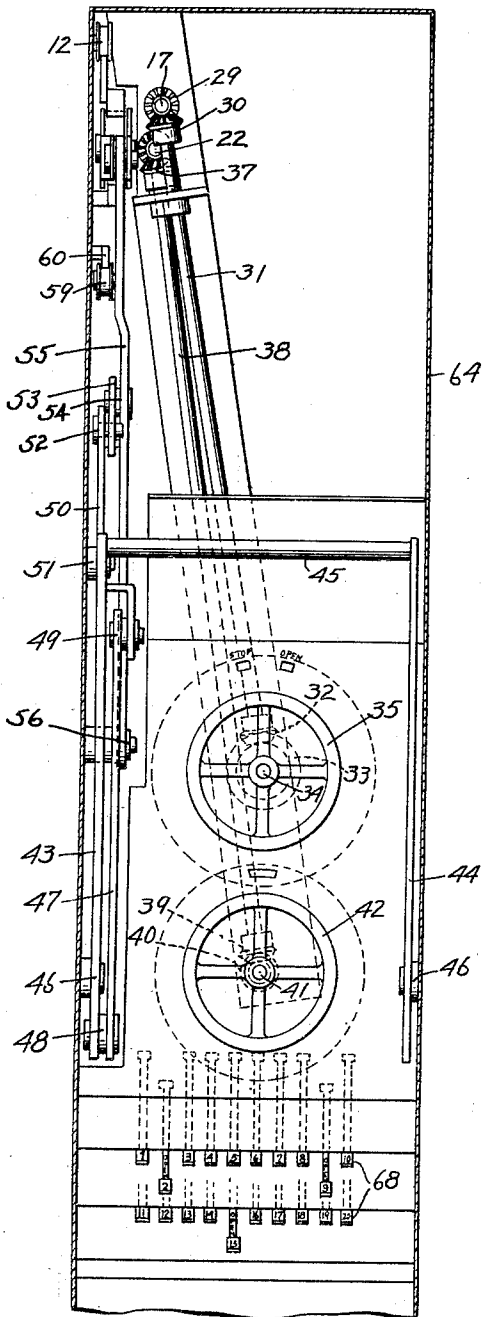
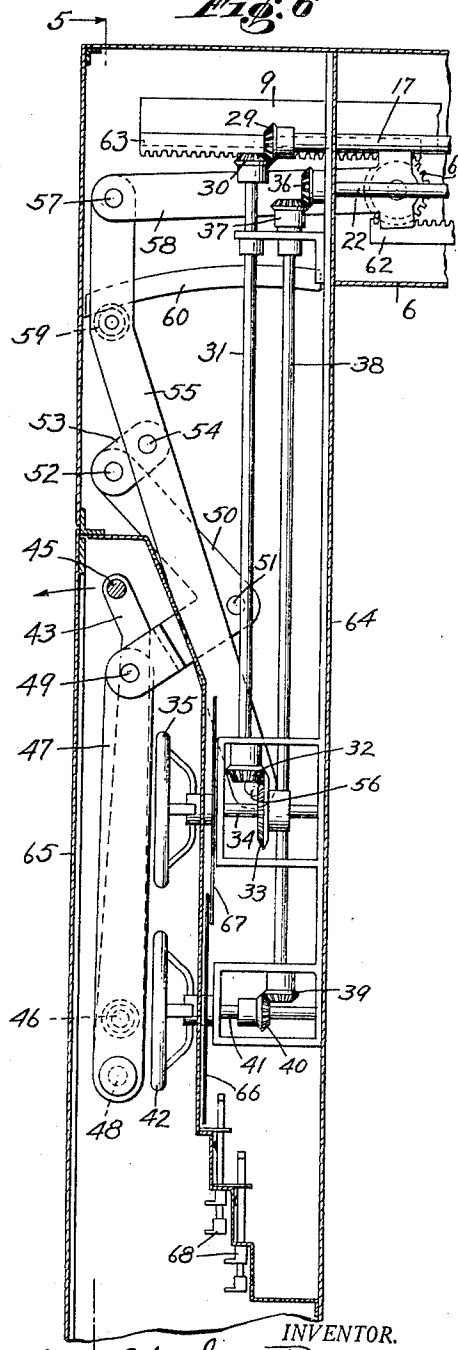


Fig. 6



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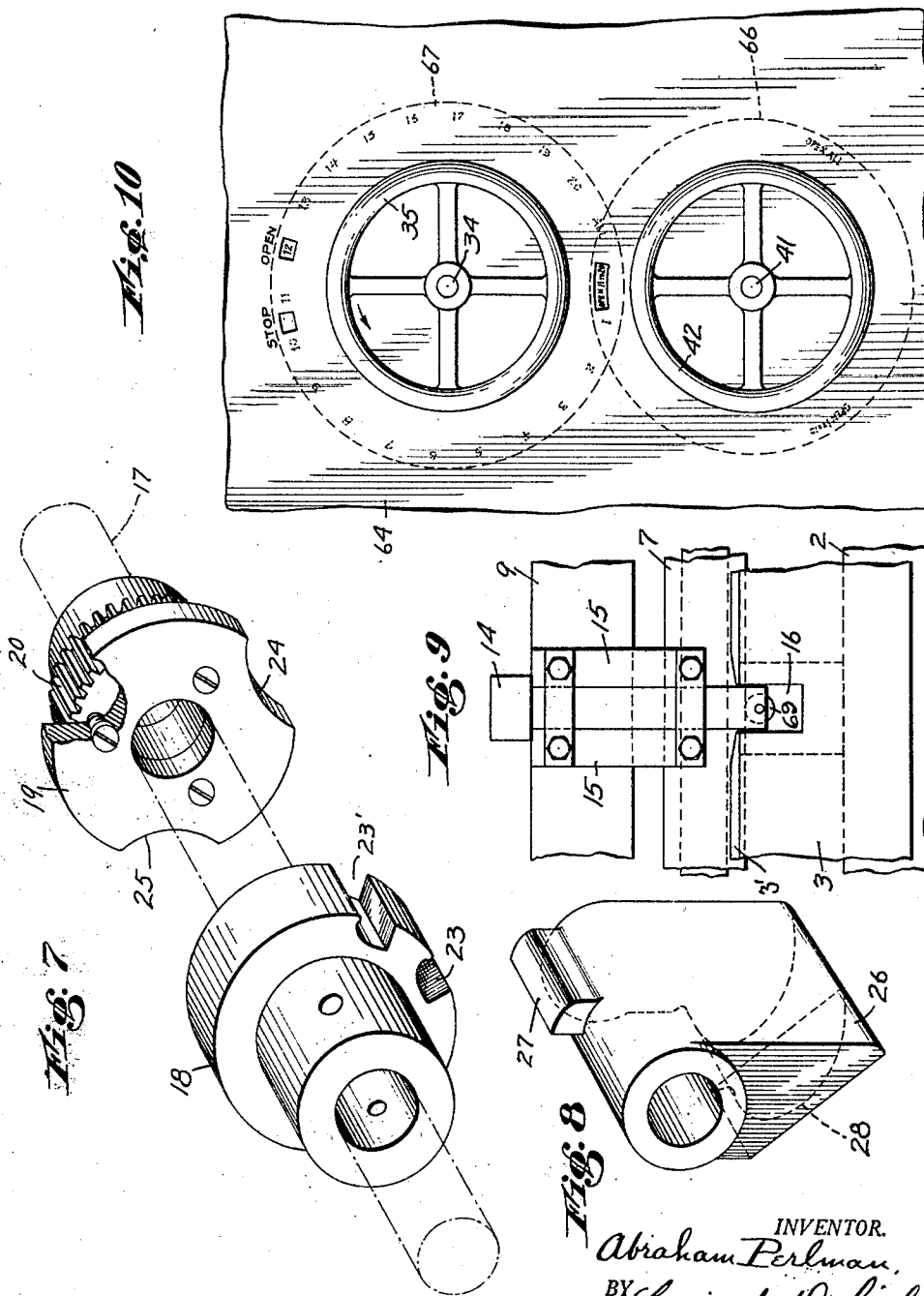
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DOOR OPERATING AND LOCKING MECHANISM

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4 Sheets-Sheet 3



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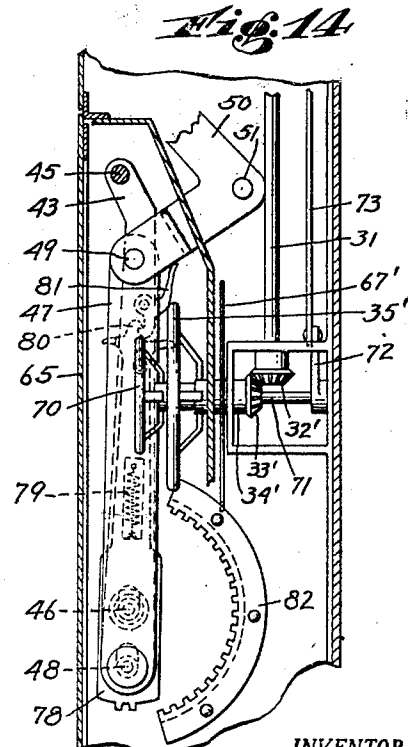
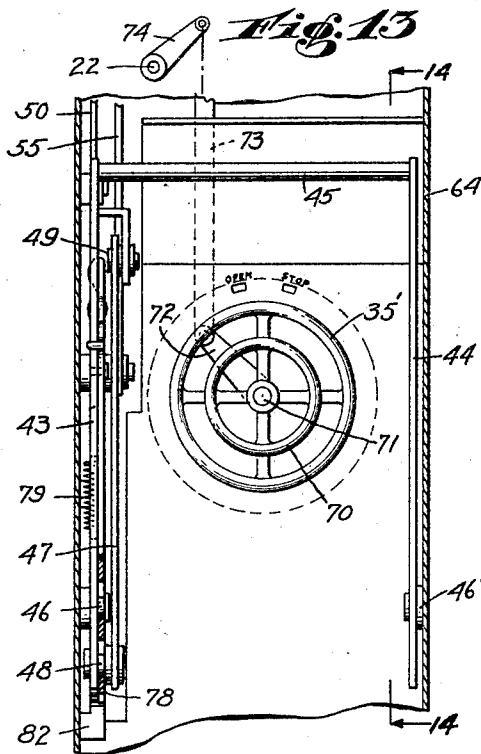
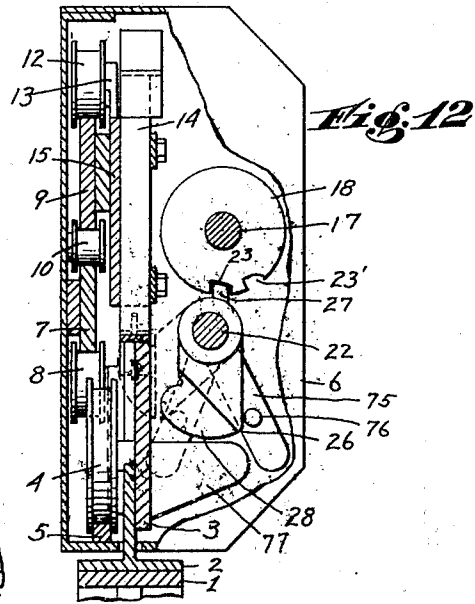
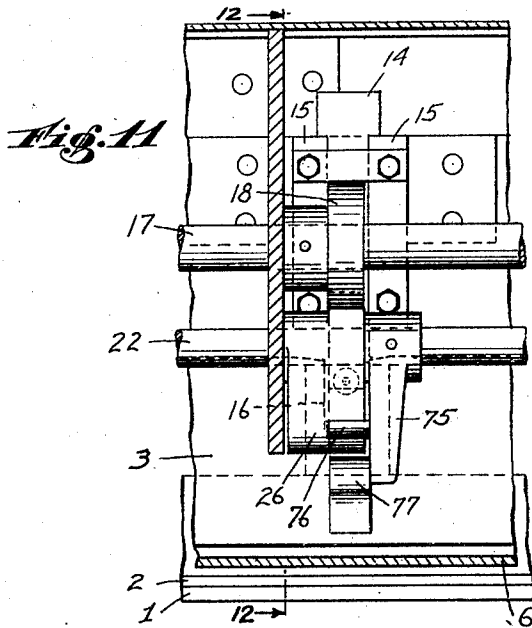
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1,781,297

DOOR OPERATING AND LOCKING MECHANISM

Filed April 10, 1930

4 Sheets-Sheet 4



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DOOR OPERATING AND LOCKING MECHANISM

Application filed April 10, 1930. Serial No. 443,057.

This invention relates to door operating and locking mechanisms and is particularly designed for use in connection with the cell doors of a prison.

5 The object of the invention is to provide a positive mechanically operated mechanism by means of which each and every door in the system may be locked in either open or closed position and when unlocked may be
10 opened or closed by the positive mechanism operated by the keeper from any distant point, such as outside the corridor from a control box to which he has the key to render the mechanism accessible for operating the
15 doors. The doors may be conveniently arranged and connected in groups and any or all of the doors of one group, or of all groups, operated from the control box. Also, any door or group of doors may be opened and
20 locked in their respective open positions without interfering with the operation of the other doors.

To carry out the above and other objects of the invention, which will appear from the description of the mechanism illustrating the
25 same hereinafter, positive mechanical devices are employed, which are simple in their construction and not easily tampered with or prevented from performing their required
30 purpose and function and which are easily operated by the person authorized, all of which will appear more fully in connection with the description of the operative embodiment of the invention illustrated in the ac-
35 companying drawings, showing the same as designed and applied to a group of sliding doors.

In the drawings, like parts in the several views have been given the same reference num-
40 eral.

Fig. 1 is a front elevation, partly in section, of a part of the doors and operating mechanism.

Fig. 2 is an enlarged detail view of one of the individual door locking and releasing de-
45 vices of Fig. 1, being a sectional view on the line 2—2 of Fig. 3.

Fig. 3 is a section on the line 3—3 of Fig. 2.

Fig. 4 is a plan view of Fig. 2.

50 Fig. 5 is a sectional view of the operating

mechanism in the control box, being taken on the line 5—5 of Fig. 6.

Fig. 6 is a front elevation, partly in section, of the operating mechanism in the control box, being a continuation of the left-
55 hand end of Fig. 1.

Fig. 7 is a detail view, in perspective, of the clutch disks, showing the same separated to show their construction.

Fig. 8 is a detail view, in perspective, of the locking and releasing dog.
60

Fig. 9 is an enlarged detail front view of one of the door operating and connecting bolts.

Fig. 10 is an enlarged detail front view of the control wheels and dials.
65

Fig. 11 is a view similar to Fig. 2, showing a modification of the individual door locking and releasing devices.

Fig. 12 is a sectional view on the line 12—12
70 of Fig. 11.

Fig. 13 is a fragmentary sectional view of a modified form of the operating mechanism in the control box for operating the form of
75 door locking and releasing devices shown in Figs. 11 and 12.

Fig. 14 is a sectional view on the line 14—14
of Fig. 13.

The actuating mechanism for opening and closing the doors is substantially the same for
80 either form of selective control mechanism for locking and unlocking the doors and connecting the selected door to the actuating mechanism.

This actuating mechanism comprises an
85 actuating bar 9 mounted for longitudinal movement, riding on the rolls 10 which roll on the upper face of the rail 7, the movement being restricted by the lugs 11 on the upper face of said rail 7. The bar 9 is also held in
90 position on the rolls 10 by the guide rolls 12 carried by supports 13 from rail 7.

This actuating bar 9 carries a number of locking pins, one for each door, as indicated
95 at 14—14', one of which is illustrated in detail in Figs. 2, 3 and 9. These pins 14 are mounted for free vertical movement in guides 15 on the actuating bar 9 and are positioned to engage in a slot 16 in the bar 3 of the door structure and when so engaged connect
100

the door with the actuating bar 9 and by means of which the several doors are, selectively, opened and closed by the movement of the bar 9.

5 An upper control shaft 17 carries two disks, 18 and 19, for each door. These disks are positioned adjacent each other on the shaft 17, the disk 18 being attached to said shaft 17 while the disk 19 is freely rotatable
10 thereon. A gear 20 is attached to the disk 19 which meshes with a gear 21 attached to the lower shaft 22.

The doors may be arranged in any desired combination of groups. In the arrangement
15 as illustrated, twenty doors are provided for and arranged in groups of ten and the several disks are provided with notches which must be brought into register before the particular door can be operated. The disk 18 is pro-
20 vided with a notch 23 and successive disks for adjacent doors are provided with similar notches which are spaced successively around the periphery, as indicated at 23^a in Fig. 3. A like arrangement of notches in
25 the other group of ten is provided. Each disk 18 also has an additional notch 23', all of which are in alinement and utilized for operating all of the doors simultaneously, as will be explained. The disks 19 are also
30 divided into two groups of ten and each disk has a notch 24 which may be brought into register with one of the notches 23 of the disks 18 of the first group. The other group of disks 19 is provided with a similar notch
35 spaced 120 deg. from the notch for the first group and which may be brought into register with one of the notches 23 of the second group of disks 18.

All of the disks 19 are provided with an
40 additional notch 25 which are all in alinement on the several disks and spaced 120 deg. from the notch 24. This latter notch 25 is utilized to permit the operation of all doors by bringing it into register with the common
45 notch 23' of the disks 18. It will thus be noted that each disk is provided with two notches, one for the selective operation of any door and one for the common operation of all doors, simultaneously.

50 A locking and releasing dog 26 is mounted for free movement about the lower shaft 22, one of these dogs being provided for each door, in connection with the disks 18 and 19. This dog is provided with a lug 27 which
55 engages in the notches 23—24 of the disks 18—19 when the notches are brought into alinement, as shown in the full line position in Fig. 3. The dog 26 is also provided with an ear 28 which is designed to move into
60 the slot 16 in the bar 3 and engage the lower end of the locking pin 14 and raise the same out of engagement with the bar 3 and release the door from the actuating bar 9 and also locking the door against movement while
65 the dog is maintained in the position, indi-

cated by the dotted outline in Fig. 3, the dog being maintained in said position by the engagement of the ear 28 with the periphery of either of the disks 18 or 19, except when the slots in both disks are brought into register by the manipulation of the control mechanism, as will be explained. When the slots are so brought into register, the lug 27 enters the same and permits the dog 26 and its ear 28 to fall into the full line position of Fig. 3, permitting the pin 14 to fall into the slot 16 and so connect the door with the actuating bar 9. This movement of the dog 26 also unlocks the door, as will be seen by reference to the drawings. It will be understood also that this operation is performed for one or more doors, selectively, or for all doors simultaneously.

The control mechanism is shown in Figs. 5, 6 and 10 and is a continuation of Fig. 1 to the left hand, as will be understood by reference to the drawings.

A bevel gear 29 is attached to the end of shaft 17 and meshes with the gear 30 at the upper end of shaft 31, at the lower end of which is a gear 32 meshing with a larger gear 33 (approximately in the ratio of two to one), which latter gear is mounted on a shaft 34 operated by the hand wheel 35.

A bevel gear 36 is attached at the end of shaft 22 and meshes with a gear 37 at the end of a shaft 38, at the lower end of which a gear 39 is mounted and meshing with the gear 40 on a shaft 41 operated by the hand wheel 42.

A pair of levers, 43 and 44, are pivotally mounted at 46 and 46', respectively, in the casing 64 the upper ends of the levers 43 and 44 being connected by the cross bar, which forms a convenient handle, 45. A link 47 is connected at one end to the lower end of lever 43 at 48 and at its upper end 49 connected to a bell-crank lever 50, pivotally mounted at 51 to the casing. The opposite end of the lever 50 is connected at 52 to a link 53 which, in turn, is connected at 54 to the lever 55, which is pivotally mounted at its lower end 56 and connected at its upper end 57 to a connecting bar 58. A guide rail 60 is engaged by a guide roll 59 carried by the lever 55, the roll 59 being provided with flanges maintains the several members in position and alinement during their movement, as will be understood.

At the inner end of the connecting bar 58 a gear 61 is mounted, which gear rides upon a fixed gear rack 62 and operates a movable gear rack 63 engaging its upper side, which latter rack is attached to the actuating bar 9. The effect of this connection is to impart twice the amount of linear movement to the actuating bar 9 as is imparted to the bar 58, as will be understood.

The enclosing casing 64 for the control mechanism is attached to the casing 6, as

shown in the drawing, and a removable door, 65, is provided with suitable locking means, which prevents access to the control and operating mechanism except when the door 65 is opened by the keeper or other person provided with the key thereto.

The operation of the control mechanism will be understood by reference to the drawings and the explanation hereinafter.

The actuation of the operating mechanism is also apparent from a reference to Figs. 5 and 6, in connection with the foregoing description of the parts thereof. Briefly outlined, the door 65 is opened and the handle 45 grasped by the operator and pulled downwardly, moving the lever 43 about its pivot 46, raising link 47 and swinging lever 50 about its pivot 51, moving link 53 and lever 55 about its pivot 56, thus imparting movement to the connecting bar 58 and the actuating bar 9 through the action of the gear 61 on the racks 62 and 63, as will be understood.

A dial 66 is mounted on the shaft 41 operated by the hand wheel 42. This dial carries three markings, for the arrangement illustrated, "Open 1 to 10", "Open 11 to 20" and "Open all", which are brought, respectively, in register with the opening in the plate immediately in front of the dial as shown in Fig. 10. A second dial 67 is mounted on the shaft 34 operated by the hand wheel 35. This dial carries the numerals 1 to 20 and the designation "All", which are brought, respectively, in register with the openings marked "Stop" and "Open" in the plate immediately in front of the dial, as shown. The numerals indicate the number of the several cells, which, in the present illustration, are twenty in number and divided into two groups of ten each, numbered, respectively, 1 to 10 and 11 to 20. The indicators shown at 68 are moved down by the operator to show which doors have been operated.

A roller 69 (Fig. 9) is mounted at the lower end of the locking pins 14 which enables the pins to ride freely on the rail 3' on top of the bar 3 on each of the doors.

The cell doors, indicated at 1 and 1', are hung from "T-bars" 2 and 2', respectively, it being understood that for the purposes of illustration only two doors are shown and the mechanism is only described in connection with one door. A bar 3 is attached to the "T-bar" 2 and extends on either side of the door structure. This bar 3 carries the rollers 4 which ride upon the track 5 when the door is opened and closed by the actuating mechanism heretofore described. A housing 6 encloses the mechanism and a guide rail 7 is engaged on its under side by rollers 8 carried by the door structure to hold the door rollers 4 on the track 5. These rollers are also preferably flanged to prevent the same from leav-

ing their respective tracks while permitting a free movement of the door.

Referring to Figs. 1 to 10, the several successive steps to open any desired door by means of the mechanism as shown, may be briefly stated as follows:—Assume that door to cell No. 12 is to be opened. Hand wheel 35 is rotated, counter-clockwise, to bring the numeral "12" on the dial 67 in register with the opening marked "Stop" and the dial 66 is then set, by rotation of the hand wheel 42, so that the designation "Open 11 to 20" is in register with the plate opening, as shown in Fig. 10. The hand wheel 35 is now moved in the opposite direction (clockwise) bringing the door designation numeral "12" on the dial 67 in register with the opening marked "Open", as shown in Fig. 10.

The rotation of the hand wheel 35 rotates the upper shaft 17 and brings the notch 23 in the disk 18 for the door to cell No. 12 into the lower position. The rotation of the hand wheel 42 rotates the lower shaft 22 and gears 21 and 20.

The disk 19, operated by the gears 21—20, is thus rotated to bring the notch 24 to its lower position in register with the notch 23 of the disk 18. Upon reaching this position, the dog 26 previously locking this door drops from its position as indicated by the dotted outline in Fig. 3 to the full line position, this movement of the dog 26 being rendered positive by the movement of the hand wheel 35 from the "Stop" to the "Open" indication, as previously explained. The locking pin 14 now drops into the slot 16, connecting this door with the actuating bar 9, which is then moved by means of the handle 45 and connected mechanism, previously explained, and slides the door to its open position, in which position it may be locked, if desired, by moving the hand wheel 35 back to the "Stop" position, moving dog 26', by means of a like arrangement of disks, 18' and 19', with gears 20' and 21' and associated parts mounted opposite the open position of the door. This particular door is thus locked in its open position and the mechanism may then be re-set for operating other doors, as desired, in the same manner.

The operation to open all of the doors simultaneously is accomplished in a similar manner. The dial 66 is set for "Open all" and dial 67 for "All", bringing the notches 23' and 25 on all disks 18 and 19, respectively, in register and permitting all of the dogs 26 to drop simultaneously and all of the locking pins 14 to fall into their respective slots and thus connect all doors with the actuating bar 9, which is then operated in the same manner as heretofore described and, as will be readily understood, opens and closes any or all doors thus connected thereto.

The modification shown in Figs. 11 to 14 is a simplified arrangement suitable for a

small number of doors and is similar in general construction and operation to that just described in connection with Figs. 1 to 10.

As shown in Figs. 13 and 14, the hand wheel 35' and dial 67' correspond to the hand wheel 35 and dial 67 of Figs. 5, 6 and 10. The hand wheel 35' is attached to a sleeve 34' which is freely rotatable on the shaft 71. The dial 67' is carried by the sleeve 34', which also carries and rotates a bevel gear 33' meshing with the gear 32' on the lower end of shaft 31. This shaft 31 operates shaft 17, as shown in Figs. 5 and 6, together with the series of disks 18, one for each door, which disks are each provided with two notches, 23 and 23', the notches 23 on successive disks being spaced circumferentially to provide an individual setting of the disks for each door, while the notches 23' are in the same relative position on each disk, providing for unlocking all doors simultaneously.

Hand wheel 70 (Figs. 13 and 14) rotates shaft 71, which carries a crank 72 at its inner end, connected by a link 73 to a second crank 74 attached to the end of the shaft 22, shown in Figs. 11 and 12 and corresponding to the shaft 22 shown in Fig. 1.

In this modification as shown in Figs. 11 to 14, individual dogs 26 are provided for each door and are mounted or carried on the shaft 22 but not attached thereto. These dogs are provided with lugs 27 engaging in the notches 23 or 23' in the disk 18 attached to the shaft 17 and are also provided with ears 28 for operation of the locking pins 14 into and out of operative engagement with the door structure and actuating bar 9. This part of the mechanism is the same as described in connection with the device as shown in Figs. 1 to 10.

The operation of these dogs 26 in the modification shown in Figs. 11 to 14 is somewhat different and simplified, being intended for use where a small number of doors are to be operated, although the general features of operation are practically the same. An operating finger 75 is attached to the shaft 22 adjacent each of the dogs 26.

A pin 76 on each of these operating fingers 75 extends back of the dog 26 and when the finger 75 is operated, by the hand wheel 70 rotating shaft 22 about 45 deg., the pin 76 engages the dog 26 and moves the same from the full line position shown in Fig. 12 to the dotted position or when moved in the opposite direction permits the dog 26 to be moved by the rotation of the disk 18 on the shaft 17 operated by the hand wheel 35' into the unlocked position, in which position the locking pin 14 falls into engagement with the door structure, connecting the door with the opening mechanism. These operating fingers also perform another function. It will be noted from Figs. 11 and 12

that a projecting lug 77 extends from the door structure bar 3 into a position to be engaged by the finger 75 when the same is moved to its inner position, which corresponds to the locked position of the door. Also, the adjacent face of this lug 77 engaged by the finger 75 is slightly beyond the face of the dog 26. The purpose of this is to prevent the inmate from forcing the door against the dog and so hindering or preventing its operation. In such case, the pressure is taken by the finger, leaving the dog free to be operated.

The operation of this form of the mechanism (Figs. 11 to 14) is similar to that previously described. The dial 67' is operated by the hand wheel 35' to bring the number designating the particular door under the opening marked "Stop." The hand wheel 70 is then rotated about 45 deg., moving the finger 75 to the position shown in full lines in Fig. 12, disengaging the lug 77. Hand wheel 35' is then rotated to bring the door numeral from the "Stop" opening to the "Open" designation, which rotates shaft 17 and disk 18 causing the dog 26 for that particular door to be moved, by the engagement of the lug 27 in the slot 23, to its open position, this being indicated in full lines in Fig. 12, permitting the locking pin 14 to drop, connecting the door and actuating bar.

The operation of the actuating bar by the handle 45 has been described heretofore in connection with the illustration in Figs. 1 to 10. In the modification shown in Figs. 13 and 14 a positive lock is provided to lock the operating handle in any intermediate position. As there shown, this comprises a slidable member 78 mounted on the side lever 43 and normally moved outwardly by means of a spring 79. The upper end of this slidable member 78 is provided with suitable hand grips and with a latch portion 80 which may be engaged by a latch lever 81 to hold the slidable member 78 in its inner position against the spring 79. The outer end of the slidable member 78 is provided with projections adapted to be engaged in corresponding notches in a segment 82, attached to the casing. This may be utilized in case an inmate jams the door of his cell as the same is being opened or closed by the movement of the lever 45, in which case the operator releases the latch 81, permitting the member 78 to engage the segment 82 and hold or lock the mechanism, and the door being operated against movement.

As the general features of operation are the same for either form of the device, it is not though necessary to further describe the same in connection with this latter modification.

The locking device, comprising the segment 82, slidable member 78 and associated

parts, also provides for locking a door being operated in any intermediate position against movement in either direction. Also, when the operating handle is in its closed or locked position, as shown in Figs. 6 and 14, the pivot center 48 is slightly past the center line through pivot centers 46—49, thus preventing the same being forced open by movement of the doors, or attempted movement of the same or the actuating bar 9 or associated parts.

What I claim as new and desire to secure by Letters Patent is:—

1. Door operating and locking mechanism of the class described comprising the combination with a number of cell doors each independently mounted and adapted to be moved into open or closed position, of an actuating member extending adjacent and adapted to be operatively connected to a predetermined number of said doors, a separate locking pin for each of said doors adapted to operatively connect said actuating member with a predetermined number of said doors, a separate locking dog for each of said doors pivotally mounted and adapted to be swung into position to selectively disengage said locking pins from one or more of said doors and to lock said doors against movement, a shaft upon which said locking dogs are pivotally mounted, a second shaft, a pair of control disks for each of said locking dogs, one of said disks being attached to and operated by said second shaft and the other of said disks being mounted adjacent thereto and rotatable thereon, said disks being provided with notches which when brought into register permit the operation of said locking dog, means operatively connecting said rotatable disk with said first named shaft for bringing said notches into and out of register, means for independently rotating said shafts, and means for operating said actuating member to open and close said doors.

2. Door operating and locking mechanism of the class described comprising the combination with a number of cell doors each independently mounted and adapted to be moved into open and closed position, of a longitudinally slidable actuating bar extending adjacent and adapted to be operatively connected to a predetermined number of said doors, a separate locking pin for each of said doors adapted to operatively and positively connect said actuating bar with a predetermined number of said doors, a separate locking dog for each of said doors pivotally mounted and adapted to be swung into position to selectively disengage the locking pins from one or more of said doors and to lock said doors against movement, a shaft upon which said locking dogs are pivotally mounted, a second shaft, a pair of control disks for each of said locking dogs, one of said disks being attached to and operated by said second shaft and the

other of said disks being mounted adjacent thereto and rotatable thereon, said disks being provided with notches which when brought into register permit the operation of said locking dog, means operatively connecting said rotatable disk with said first named shaft for bringing said notches into and out of register, means for independently rotating said shafts, and means for operating said actuating bar to open and close said doors.

3. In a device of the class described, the combination with operating mechanism for opening and closing a number of cell doors, of locking means comprising a pair of shafts, a plurality of locking dogs pivotally mounted upon one of said shafts, each of said dogs having a portion adapted to be engaged with one of said cell doors to lock the same in position and also having a portion adapted to be engaged by operating disks mounted on the second of said shafts, a pair of operating disks mounted on said last named shaft, one being fixed and one being rotatable thereon, said disks being provided with notches which when brought into register permit the operation of said locking dog by rotation of said last named shaft and disk fixed thereon, rotating means operatively connecting said rotatable disk and said first named shaft for adjusting the relative position of said disks by rotation of said shaft, and independent manually operated means adapted to rotate said shafts and disks, one selectively adjusting the relative position of said disks and one effecting the operation of said locking dogs.

4. In a device of the class described, the combination with opening and closing mechanism for a number of cell doors, of connecting means for operatively connecting one or more of said doors with said opening and closing mechanism, locking means controlling said connecting means and adapted when in its locking position to disconnect said connecting means and when moved to its unlocked position to render said connecting means operative, means for operating said connecting means, means for operating said locking means, and interconnected means between said two operating means for controlling and determining the particular doors to be affected.

5. In a device of the class described, the combination with door operating and locking mechanism for selectively locking and unlocking and opening and closing a number of cell doors, of interconnected manually operated means comprising two separate lines of shafts operating respectively selective mechanism for determining the particular doors to be affected and locking mechanism and operating connection with the said selective mechanism, operating mechanism for opening and closing the aforesaid particular doors determined by said selective mecha-

nism, and connecting means controlled by the operation of said locking mechanism for connecting the said particular doors with said operating mechanism.

5 6. In a device of the class described, the combination with a number of cell doors in-
dividually mounted and adapted to be moved
to open and closed position, an actuating
member common to a group of said doors,
10 separate connecting devices for each of said
doors adapted to connect said actuating mem-
ber with a predetermined number of said
doors, separate locking devices for each of
said doors adapted to lock the same in open
15 or closed position, the operation of said lock-
ing device controlling the operation of said
connecting device by means of a member
moved into and out of operative engagement
with the door structure engaging a connect-
20 ing member of the said connecting device and
respectively moving the same out of engage-
ment or permitting the engagement thereof
with the door structure, a shaft for operat-
ing said locking devices, a second shaft op-
25 erating a selective control device for each of
said locking devices, a selective control de-
vice operative in connection with each of said
locking devices causing the selected devices
to be operatively connected with said first
30 shaft, and manually operated means for op-
erating said shafts from a distant point.

7. In a device of the class described, the
combination with opening and closing mech-
anism for a number of cell doors, of connect-
35 ing means for operatively connecting one or
more of said doors with said opening and
closing means, locking means controlling
said connecting means and adapted when in
its locking position to disconnect said con-
40 necting means and when moved from its lock-
ing to its unlocked position to render said
connecting means operative, means for op-
erating said connecting means, means for op-
erating said locking means, means asso-
45 ciated with said locking means adapted to
prevent the operation and movement there-
of being jammed, and interconnected means
between said two operating means for con-
trolling and determining the door to be op-
50 erated.

Signed at New York city, in the county of
New York and State of New York, this 25th
day of March, A. D. 1930.

ABRAHAM PERLMAN.

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60