Sept. 5, 1933.

R. W. ZIMMERMAN

1,925,165

CELL DOOR LOCKING MEANS

Filed July 23, 1930

5 Sheets-Sheet 1

Fig. 1

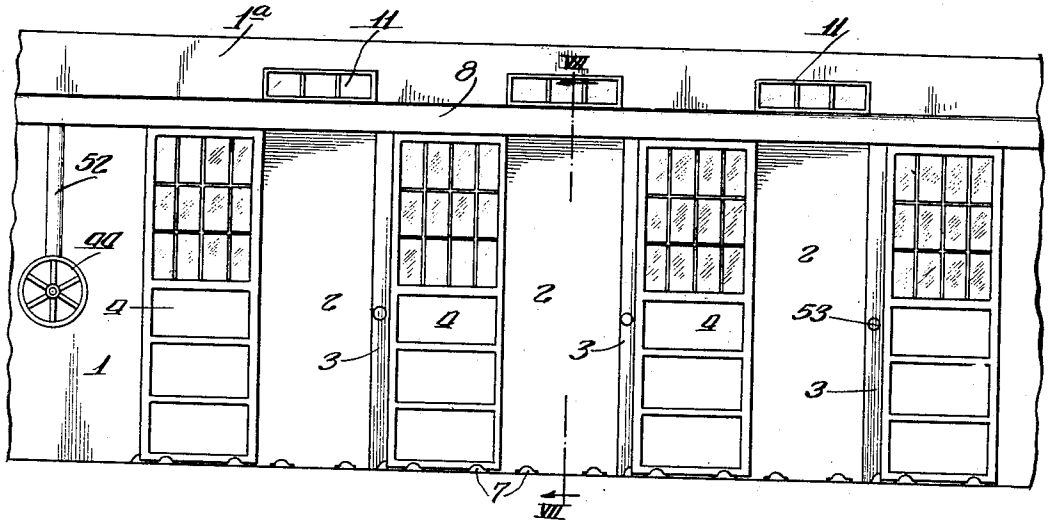
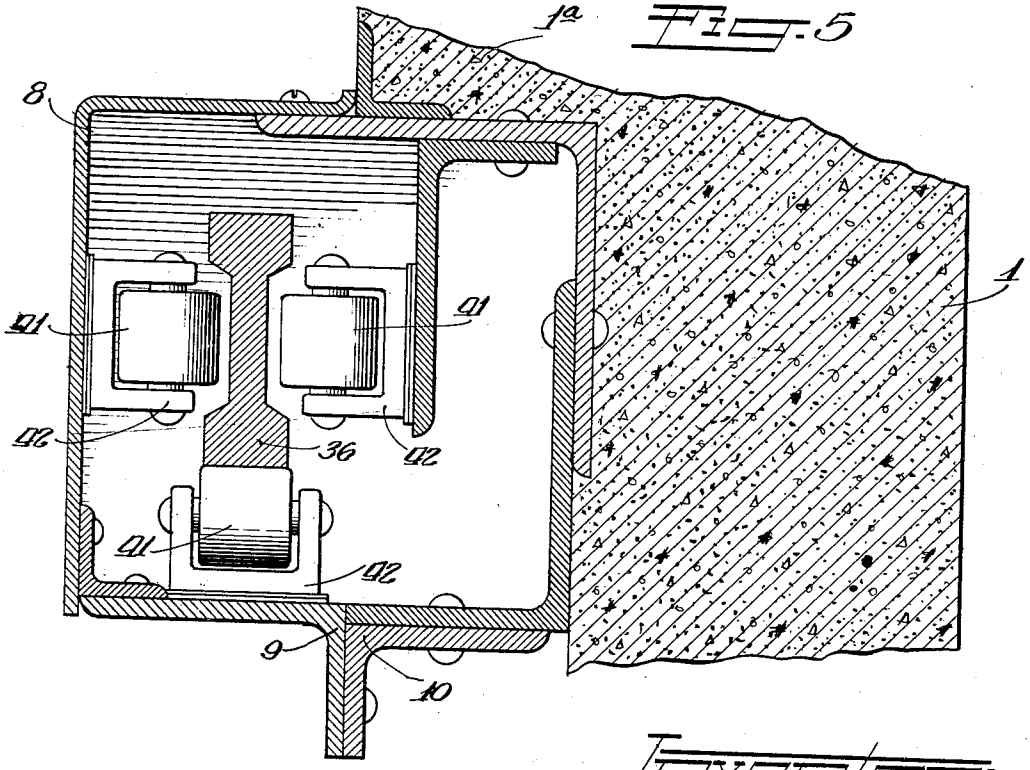


Fig. 5



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Sept. 5, 1933. R. W. ZIMMERMAN 1,925,165

CELL DOOR LOCKING MEANS

Filed July 23, 1930 5 Sheets-Sheet 2

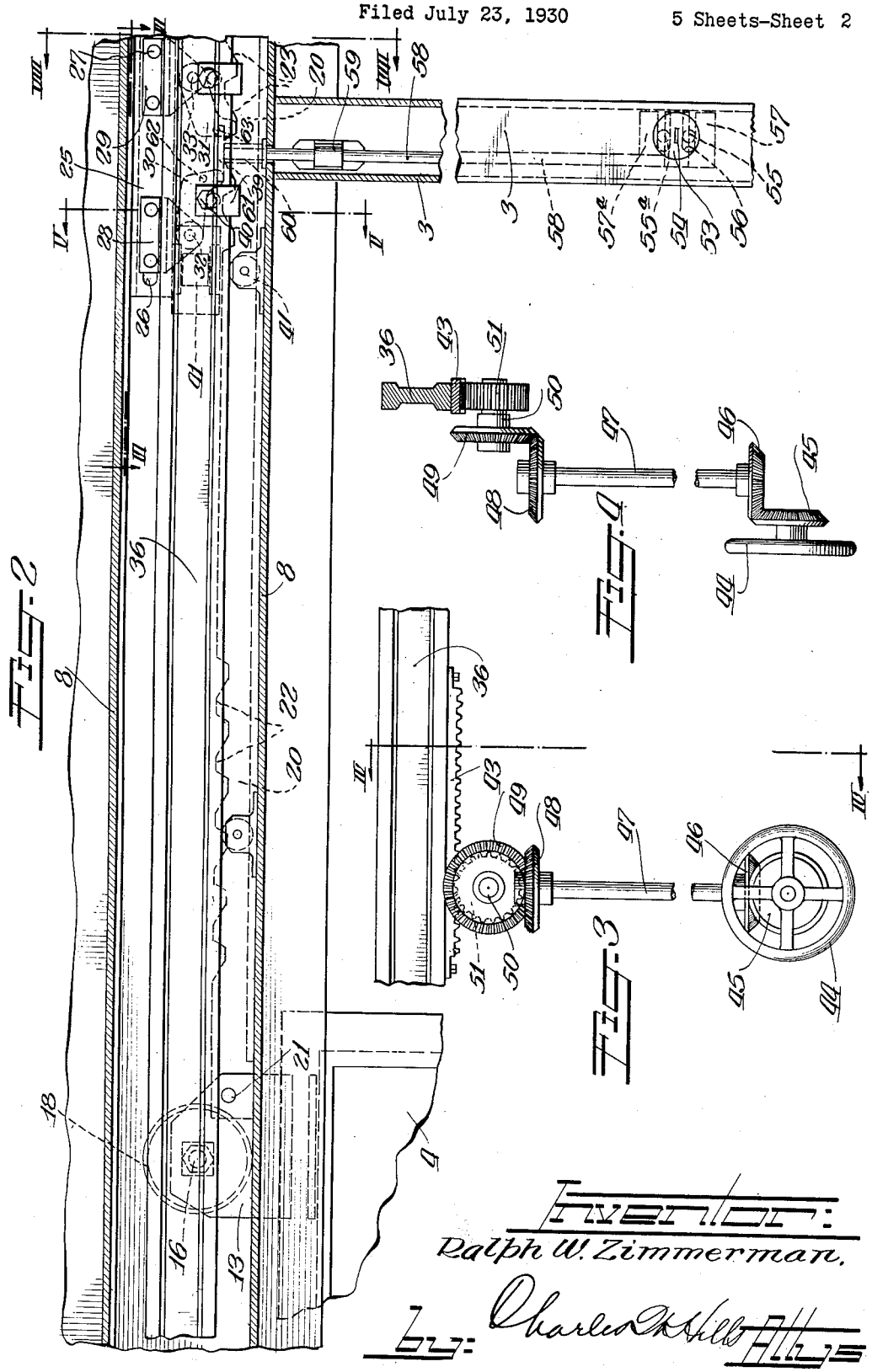

Fig. 2

Fig. 4

Fig. 3

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CELL DOOR LOCKING MEANS

Filed July 23, 1930 5 Sheets-Sheet 3

Fig. 6

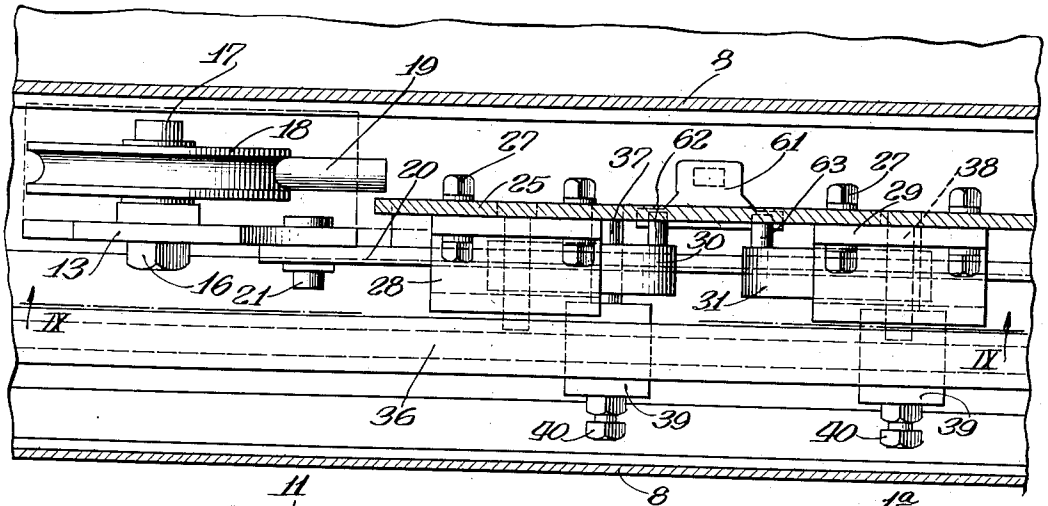


Fig. 7

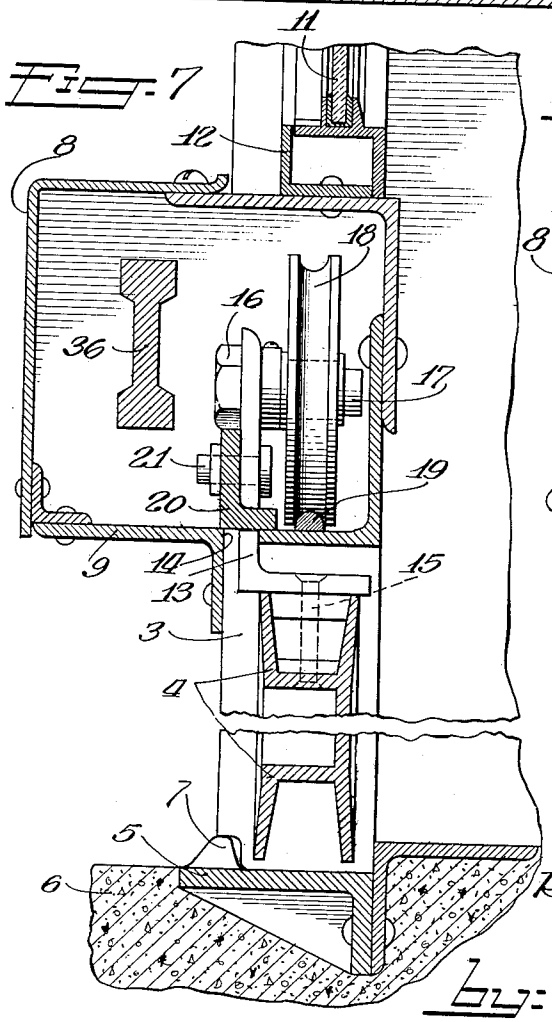
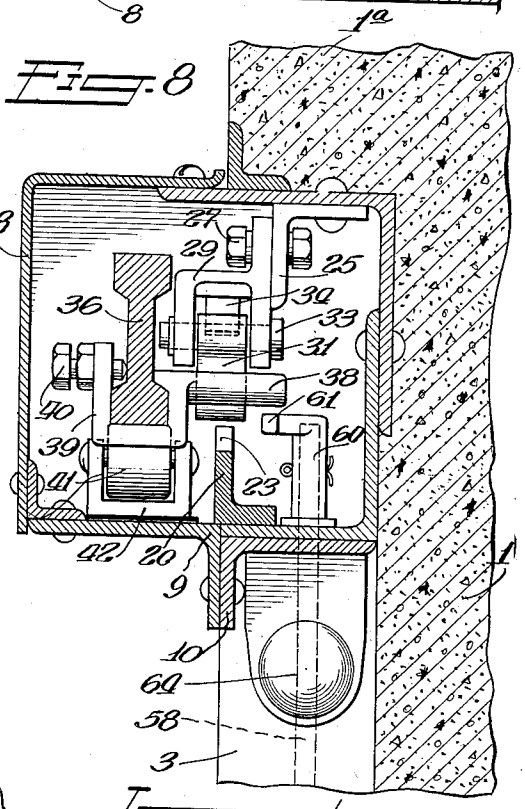


Fig. 8



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Sept. 5, 1933. R. W. ZIMMERMAN 1,925,165

CELL DOOR LOCKING MEANS

Filed July 23, 1930 5 Sheets-Sheet 4

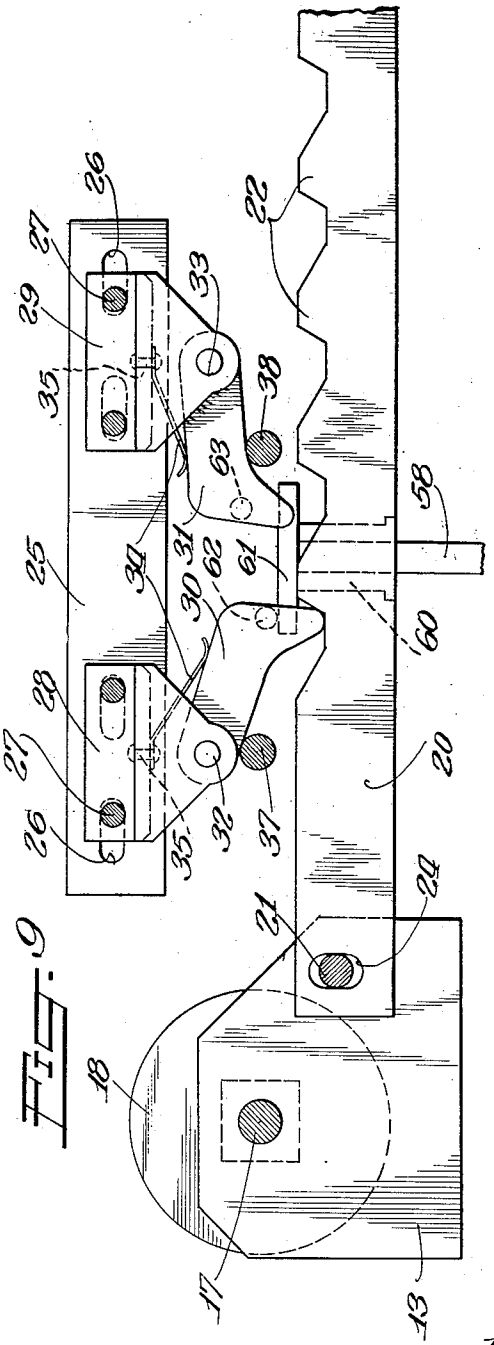

Fig. 9

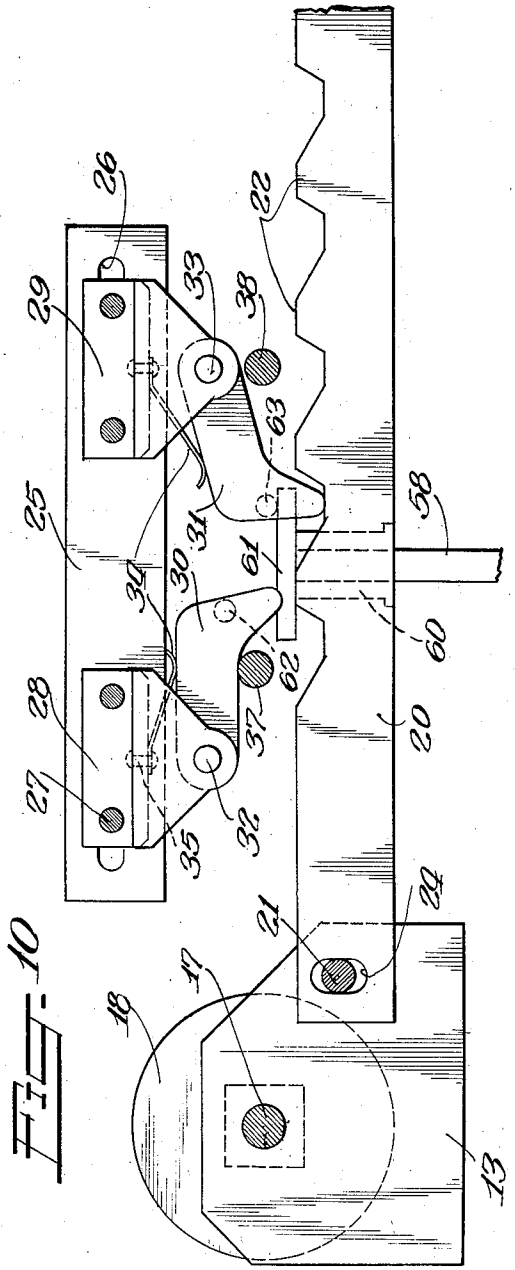

Fig. 10

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CELL DOOR LOCKING MEANS

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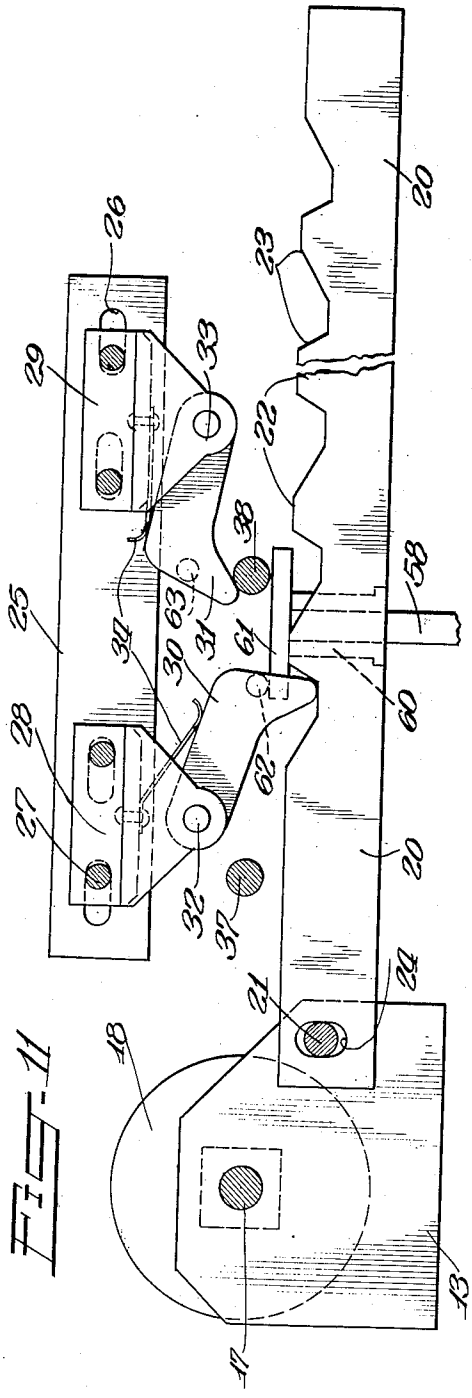

Fig. 11

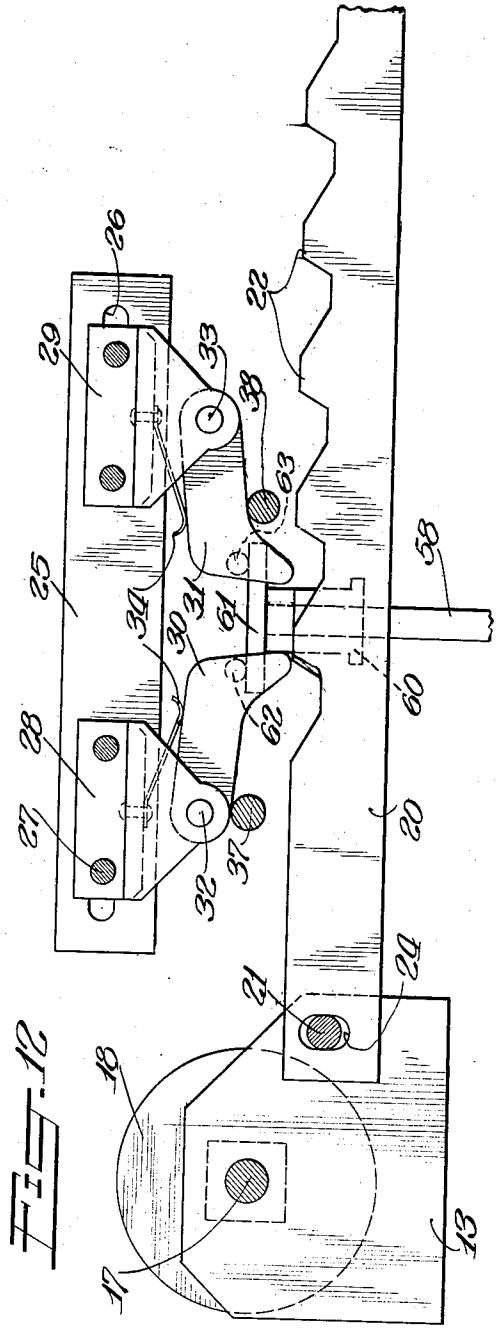

Fig. 12

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Patented Sept. 5, 1933 1,925,165

UNITED STATES PATENT OFFICE

1,925,165

CELL DOOR LOCKING MEANS

Ralph W. Zimmerman, Chicago, Ill.

Application July 23, 1930. Serial No. 469,968

10 Claims. (Cl. 189—7)

This invention relates to improvements in cell door locking means, and more particularly to improvements in means for locking and controlling the locking of a string or bank of cell doors from a centralized or remote point, the invention being highly desirable for use in penitentiaries, jails, asylums, and the like, although the invention may have other uses and advantages which will be apparent to one skilled in the art.

In the past, many and various means and mechanisms have been developed for the locking of cell doors, either singly or in strings or banks, but in most instances, these structures have proven objectionable in that they were undesirably expensive and complicated to install, objectionably difficult to properly manipulate, and subject to danger and disorder. Also, in many instances, these formerly known locking mechanisms did not effectively lock or secure a cell door when open or when in an intermediate position between open and closed, whereby it was not a difficult matter for the prisoner or inmate of the cell to tamper with the mechanism. In this connection, it should be borne in mind that tampering does not always amount to an attempted escape, but is quite frequently maliciously indulged by the inmates merely for the purpose of exasperating the guard or other officers of the institution.

Perhaps the most serious objection to locking mechanisms of this type heretofore known lies in the inadequacy of the mechanism as a protective unit. In all the instances of which I am aware, while a mechanism may lock a gang of doors in open or closed position, still it permits a door to be individually opened with the aid of key controlled or other means at any and all times. Perhaps not very frequently, but too often, a guard, whose duty is to patrol the corridor of an institution, is deceived or otherwise inveigled into opening a single cell door, and sometimes the guard is even coerced into permitting the inmate of one cell to temporarily occupy the quarters of another prisoner or inmate. The imminent danger under such conditions and in such circumstances is quite apparent.

The present invention has been provided to overcome the above noted as well as many other defects and objections in the provision of mechanism for locking cell doors, which is extremely simple in construction, economical to install, and with little or no likelihood of becoming out of order.

The invention also seeks the provision of locking mechanism for a string or gang of cell doors which not only locks the doors in their fully open or fully closed positions, but also effectively locks the doors in intermediate positions regardless of the direction of movement of the various doors.

Another object of this invention is the provision of locking means for a string or gang of cell doors, the means being mounted in such a location as to be totally inaccessible by an inmate of a cell without the tearing down of permanent building structure.

It is another object of this invention to provide locking mechanism for a string or a bank of cell doors, which mechanism is controlled from a centralized or remote point, the mechanism being governed from this point so as to lock the cell doors in fully opened, fully closed, or intermediate position, and the mechanism also being adjustable from the remote or centralized point to prevent a door being individually opened by anyone until the proper adjustment has been made by the operator at the centralized point.

Still a further object of this invention is the provision of locking mechanism for a bank of cell doors, the mechanism being controllable by means operable from a remote or centralized point in such a manner as to permit the opening of the doors with the automatic locking of the same in fully open or intermediate position, the closing of the doors with the automatic locking of the same in fully closed or intermediate position, the opening or closing of any particular door by other locking means associated individually therewith, and the means being also so adjustable as to selectively render said individual locking means operable and inoperable as is desired.

A still further object of this invention is the provision of means operable from a remote or centralized point for rendering individual locking means associated with each cell door of an entire tier or bank operable and inoperable as is desired.

While some of the more salient features, characteristics, and advantages of mechanism embodying this invention have been pointed out, others will become apparent from the following disclosures.

The invention includes these and other features of construction and combinations of parts hereinafter described, and shown in a preferred form in the drawings, as more particularly indicated by the claims.

On the drawings:

Figure 1 is a fragmentary elevational view of a tier or gang of cells equipped with locking

means embodying principles of the present invention.

Figure 2 is an enlarged fragmentary front part sectional and part elevational view showing the locking mechanism in the housing seen above the doors in Figure 1.

Figure 3 is a diagrammatic view of the actuating means for the locking mechanism disposed at a remote or centralized point.

Figure 4 is a sectional view of the structure shown in Figure 3, taken substantially on line IV—IV of Figure 3.

Figure 5 is an enlarged fragmentary vertical sectional view taken substantially as indicated by the line V—V of Figure 2.

Figure 6 is an enlarged fragmentary plan sectional view taken substantially as indicated by the line VI—VI, with the door in closed position.

Figure 7 is an enlarged fragmentary vertical sectional view taken substantially as indicated by the line VII—VII of Figure 1.

Figure 8 is an enlarged fragmentary vertical sectional view taken substantially as indicated by the plan VIII—VIII of Figure 2.

Figure 9 is an enlarged fragmentary sectional view, with parts omitted, taken substantially as indicated by the line IX—IX of Figure 6.

Figure 10 is a view similar to Figure 9, showing the locking mechanism in a different stage of adjustment.

Figure 11 is a view similar to Figures 9 and 10, showing the locking mechanism in a still different stage of adjustment.

Figure 12 is a view similar to Figures 9, 10, and 11, showing the operation of the locking mechanism to permit the opening of a single door.

As shown on the drawings:

In the structure selected to illustrate an embodiment of the present invention, there is shown, in Figure 1 a portion of a building structure including a wall 1 behind which is disposed a plurality of cells or rooms 2 in banks or tier-like formation. The cells are defined by a plurality of cell walls, each of which is provided with a substantially tubular and preferably metallic jamb 3 on the front portion thereof. Each of the cells is closed by means of a slidable door 4 which abuts a corresponding jamb 3, the doors being shown in open position in Figures 1 and 2. As seen more clearly in Figure 7, the doors are suspended, and a base rail or track 5 is preferably embedded in the floor 6 beneath the lower extremities of the doors. This track 5 is provided with suitable guides 7 spaced therealong.

As seen more clearly in Figures 1, 5, and 8, the wall 1 is provided with an outwardly projecting upper portion designated as 1*a* for the purpose of convenience, the portions 1 and 1*a* of the wall providing a seat for the embedment therein of a fabricated casing or housing 8 which contains the major portion of the illustrated embodiment of the present invention. The housing 8 is supported in any desired manner, for instance, by means of an angle iron 9 bolted to the door jamb 3 at certain points therealong, and bolted to a second angle iron 10 at other points therealong. The upper portion 1*a* of the wall 1 is also provided with a plurality of transoms 11, there being one transom for each of the cells 2, which are mounted in any suitable sash frame 12 secured to the upper portion of the housing 8 (Figure 7).

Each of the doors 4 is suspended in any suitable manner from an angular hanger 13, Figures 2, 6, and 7, the vertical flange of which extends through a slot 14 in the lower wall of the housing 8. In this instance, the lower flange of the hanger is shown secured to the upper portion of the door 4 by means of a rivet 15, and the same construction may be used for all of the doors, it being only necessary to describe herein the construction centered about a single door. The vertical flange of the hanger 13 is suitably secured as by the bolts 16 to the shaft or axel 17 of a door roller 18 which rides upon a rail 19 mounted on the inner side of the lower wall of the housing 8.

A locking or ratchet bar 20 is secured in any desired manner, as by means of the bolt 21, adjacent one end thereof to the vertical flange of the hanger 13. It will be seen from Figure 2, that as the door is moved into open position, the ratchet bar 20 preferably trails the door, and as the doors move to close position, the ratchet bar preferably precedes the door. It is to be noted that the ratchet bar 20, which preferably slides along the inner face of the lower wall of the housing 8, is angular in cross section so that the lower flange of this bar effectively closes the slot 14 so as to preclude access to the mechanism within the housing 8 by an inmate of the cell. The ratchet bar 20 is provided at one end thereof with a set of teeth 22 which, when engaged by a pawl, as will be later explained herein, effectively prevent movement of the door towards open position, and at the other end thereof with a set of teeth 23 which are opposed in structure to the teeth 22 and, when engaged by another pawl, effectively prevent movement of the door toward closed position. It is apparent that each set of teeth may be extended inwardly as far as it is desired towards the center of the ratchet bar so that the door may be locked in fully open, fully closed, or any intermediate position regardless of the direction of movement of the door. Provision is made of course, for the proper adjustment of the ratchet bar to each particular installation job, and in this instance the bar is provided with an elongated aperture 24 for engagement over the bolt 21 in the vertical flange of the hanger 13, whereby the ratchet bar may be connected to properly ride upon the inner face of the housing.

Locking means for selective engagement with the ratchet bar 20 are also mounted within the housing 8 adjacent each cell door and preferably above each of the door jambs 3. As utilized for each cell door, these means include a pawl bracket support 25, preferably angular in shape, and bolted to the housing 8 as seen more clearly in Figure 8. This bracket support 25 is provided adjacent each end thereof with a pair of elongated apertures 26, each of which receives in a desired position of adjustment a bolt 27 by means of which a pair of spaced pawl brackets 28 and 29 respectively are secured to the bracket support 25. As seen more clearly in Figures 8 and 9, each pawl bracket has a depending portion of substantially the shape of an inverted U, and between the legs of the brackets 28 and 29 pawls 30 and 31, respectively, are pivotally mounted on a shaft or bolt 32 and 33, respectively. It will be noted that the pawls 30 and 31 are disposed in opposite directions so that these pawls will confront each other, the pawl 30 being engageable with the teeth 22 on the ratchet bar 20 to prevent the cell door from being moved towards open position, and the pawl 31 engaging with the teeth

23 to prevent the door from being moved towards closed position. To insure the engagement of the pawls with the teeth on the ratchet bar, a flat spring 34 is secured by means of a rivet 35 or in any other desired manner to the upper portion of each of the brackets 28 and 29, the outer portions of the spring 34, each bearing against its respective pawl downwardly.

Of course, means are provided for exercising control simultaneously over each set of pawls, whereby the locking of an entire tier or bank of cell doors may be controlled from a single centralized or remote point. These means include an operating bar 36 which in this instance is shown in the form of an eye beam, extending substantially the length of the entire tier or bank of cells, this bar being mounted within the housing 8 wherein the bar is reciprocally movable to various positions of adjustment by means to be later described. Adjacent each set of pawls, or in other words, for each cell door, this operating bar is provided with a pair of pawl lift pins 37 and 38 corresponding respectively to pawls 30 and 31. Each of the pins 37 and 38 is preferably an integral part of a U-shaped clamp 39 (Figure 8) which engages over the lower portion of the operating bar, the engagement being consummated in any desired position of adjustment by means of a set-bolt 40 or in any other desired manner. The pins extend sufficiently inwardly to underlie the pawls 30 and 31 whereby these pawls may be selectively raised and held in raised position by proper manipulation of the operating bar. For example, in Figure 9, the pin 38 maintains the pawl 31 in raised position, while the pawl 30 is free to engage with the ratchet bar 20; and in Figure 10, the converse is true, since the pin 37 maintains the pawl 30 in raised position. At suitably spaced intervals in the housing 8 rollers 41 mounted in suitable brackets 42 are disposed for carrying and guiding the operating bar during its movement (Figures 2 and 5).

On the under space and adjacent one end thereof, the operating bar 36 is provided with a rack 43 for engagement by the means through which the operating bar is moved to its desired positions of adjustment. With reference to Figure 1 and also to Figures 3 and 4, which diagrammatically illustrate the means for operating the bar 36, it will be seen that these means include a hand-wheel 44 to which is fixedly secured a bevel gear 45 in mesh with a transversely disposed bevel gear 46 mounted adjacent one end of a shaft 47 carrying another bevel gear 48 adjacent the opposite end thereof, the latter gear 48 being in mesh with a bevel gear 49 fixedly secured to a shaft 50 which is also fixedly connected to a spur gear 51 in mesh with the rack 43 on the operating bar 36. It is apparent, therefore, that when the hand wheel 44 is rotated, the operating bar will be moved in the same direction a proportional distance by means of the spur gear 51 and the rack 43. The gears 48, 49, and 51 are preferably contained within the housing 8, and as seen more clearly in Figure 1, the shaft 47 is preferably incased within a tube 52, the gears 45 and 46 being preferably incased also so that only the hand wheel 44 is exposed. Obviously, the hand wheel 44 and the necessary controlling mechanism may be disposed at any desired point with regard to the tier of cells controlled thereby, this structure being shown adjacent a central portion of the tier in Figure 1, in which instance the rack bar 43 may be connected to an intermediate point of the operating bar 36. Of course, it is to be understood that the hand wheel 44 and adjacent mechanism is preferably disposed within a guarded or otherwise protected room or chamber and is preferably under the individual attention of a trusted officer at all times. The locking mechanism for the entire tier or bank of cells is therefore under the exclusive control at any one time of a single party.

Suitable means, preferably key controlled, are also provided in the present instance for the purpose of opening an individual cell door when the operating bar is in a position of adjustment maintaining all of the other cell doors in locked position, but not in a position of adjustment such as to render the key controlled means inoperative. The key controlled means include a cylinder 53 which opens through the front face of a jamb 3, this front face of the cylinder being the only portion of the key controlled means exposed, the remainder being concealed by a corresponding jamb 3 and the housing 8. The cylinder is provided with a key slot 54 to accommodate any suitable key whereby the cylinder may be turned. An inwardly extending pin 55 is carried by the cylinder, the pin normally resting in a slot 56 formed in a foot 57 on the lower end of a pawl lift rod 58, which is vertically movable within the tubular door jamb 3, the rod being guided in its movement by suitable guiding elements 59 secured to the back portion of the jamb. The upper end of the pawl lift rod 58 is provided with a cap 60 secured thereto in any desirable manner, the cap having a substantially T-shaped head 61 which underlies a pair of inwardly extending pins 62 and 63 mounted on the pawls 30 and 31 respectively. It is, therefore, apparent that when the cylinder 53 is rotated by means of a key or suitable instrument so that the pin 55 assumes the position designated at 55*a* in Figure 2, the foot 57 and consequently the rod 58 will be raised so that both pawls 30 and 31 will be elevated by means of the head 61 contacting the pins 62 and 63 on the respective pawls, whereby the individual door corresponding to the door jamb mechanism just described may be opened. The opening of the various doors is rendered as noiseless as possible by the use of a suitable buffer 64 (Figure 8) mounted on the door jamb 3.

The operation of the present invention may be best explained with particular attention directed to Figures 9 to 12 inclusive which show the doors in closed position, as exemplified by the fact that the door hanger is in a position adjacent to the locking pawls. As pointed out hereinabove, the operating bar 36 controls the locking means for every door in the entire tier or bank of cells simultaneously, and the operation of the locking mechanism for each door is the same, so that it will only be necessary to describe the operation as centered about a single cell door. Assuming now that the door is locked in closed position, it will be seen from Figure 9 that the pawl lift pin 38 on the operating bar 36 holds the pawl 31 in elevated position against the action of the flat spring 34 associated therewith, while the pawl lift pin 37 on the operating bar is disposed in such a position as to permit the pawl 30 to be pressed downwardly by its flat spring 34 so that it may engage with the ratchet bar 20. As seen in Figure 9, the pawl 30 is engaged with the teeth 22 on the ratchet bar so that the door is effectively locked in closed

position, since the ratchet bar cannot move to the left as seen in this figure until the pawl 30 is elevated sufficiently to clear the teeth 22. Of course, this particular adjustment of the operating bar may be made before the door is moved into closed position, in which event the pawl 30 would merely ride along the teeth as long as the door was being moved toward closed position or to the right as seen in Figure 9. In the event the inmate of the cell blocks the entire closing of the door for any reason, the pawl 30 would engage, not with the last of the teeth 22 as shown, but with the nearest tooth 22 so that the door would be effectively locked in the intermediate position and could only be moved toward fully closed position.

Now, assuming it is desired to open the door, the operating bar is moved to the right to the position shown in Figure 10 by means of the hand wheel 44. In this position, it will be seen that the pawl lift pin 37 holds the pawl 30 in elevated position, while the pawl lift pin 38 is disposed so as to permit the pawl 31 to drop downwardly into engagement with the teeth on the ratchet bar 20. With the mechanism so adjusted, the door may readily be swung into open position, the pawl 31 riding along on the teeth 22 until the pawl engages with one of the teeth 23, whereupon it will be impossible to move the door toward closed position until the pawl is elevated by means of the operating bar. Of course, the teeth 23 extend inwardly toward the center of the ratchet bar 20 as great a distance as is desired so that if the door is moved over half its period of travel toward open position, it will be effectively locked in any position between this point and fully open position. In the event the door is not opened half way, the operating bar may be immediately shifted to permit the pawl 30 to drop into engagement with the teeth 22 and further opening of the door is thereby prevented. It will thus be seen that the door may be locked in any desired position by a simple adjustment of the hand wheel 44, the adjustment being made previously or substantially simultaneously with the movement of the door, and if the adjustment is made previously, the door will automatically become locked when moved to the desired position or in the desired direction.

Under certain conditions, and especially during the night time, it is desirable to lock the door so that it cannot be opened even by the guard patrolling the corridor without the previous knowledge and consent of the officers in charge of the remote control or hand wheel 44. In this particular case, the hand wheel is rotated so as to move the operating bar to the left or right a greater distance than is necessary for the normal control of the pawls. As seen in Figure 11, the operating bar has been moved to the left further than in Figure 9, so that the pawl lift pin 38 overlies the head 61 on the pawl lift rod 58 and thus prevents the raising of the rod 58 sufficiently to elevate the pawl 30 and permit the door to be opened. It is obvious, therefore, that the party in charge of the hand wheel 44 must give his consent before it is possible to open any of the cell doors either simultaneously or individually.

On the other hand, if the operating bar is in a neutral position relative to the key controlled locking mechanism, as seen in Figures 9, 10, and 12, the pawl lift rod 58 together with the head 61 thereon may be elevated as previously described, into the position shown in Figure 12 when both pawls 30 and 31 will be retained in elevated position so that the door is free to move open or shut as is desired. Obviously, when the key controlled mechanism is released, the pawls 30 and 31 will assume the same position as similar pawls on each of the other doors in the tier, so that the entire mechanism will be restored to its previous adjustment.

Again, it might be mentioned that although the operation has been above described with regard to a single door, all the doors are controlled by means of the operating bar 36 simultaneously and in like manner, and the individual key controlled locking mechanism for each door is preferably the same as for every other door. It is at once apparent, therefore, that the control of the locking mechanism for an entire bank or tier of cells, there being any desired number of cells in the tier, is effectively controlled by simple movement of a hand wheel 44 so as to cause a proportional movement of the operating bar 36. Preferably, the mechanism is adjusted and mounted so that only a small movement of the operating bar is necessary to change from one adjustment to another, in many cases it being only necessary to move the bar less than six inches to change from the furthest left adjustment to the furthest right adjustment.

From the foregoing, it will be aparent that I have provided simple and effective means for controlling the locking mechanism of a series of cell doors, or, in fact, of a series of any desirable type of movable closure members. Moreover, the entire locking mechanism is so enclosed as to be absolutely inaccessible without obvious destruction of parts by an inmate of the cell or room. In this manner, tampering is dispensed with, and any very ordinary inspection will at once disclose the fact that an inmate is attempting to interfere with the mechanism. Furthermore, the entire mechanism is under the control of an operator at a remote point, and the doors may be locked in full open, fully closed, or any intermediate position, or a door may be individually opened or locked, only with the knowledge and consent of this operator. In addition, the locking mechanism embodying principles of the present invention is exceedingly simple in construction, extremely durable, positive in its action, and may be very economically manufactured and installed.

I am aware that numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I, therefore, do not purpose limiting the patent granted, otherwise than necessitated by the prior art.

I claim as my invention.

1. In locking mechanism for a string of cell doors, a ratchet bar movable with each door, means for engaging each of said bars to lock each door, means for simultaneously actuating said first mentioned means, and means for individually actuating the portion of said first mentioned means corresponding to each door and means controllable from a remote point for rendering said last mentioned means inoperable.

2. In cell door locking means, a ratchet bar movable with a cell door, a set of teeth adjacent an end of said bar, a set of teeth adjacent the other end of said bar and opposed to said first mentioned teeth, and a pair of oppositely disposed pawls adjacent said bar, one of said pawls engageable with teeth of one set to lock said door in open position, and the other pawl engageable with the teeth of the other set to lock said door in closed position.

3. In locking mechanism for a series of cell doors, a ratchet member movable with each door, a plurality of pawls engageable with each ratchet member to lock the corresponding door in any of a plurality of positions, means for releasing the pawls for an individual door, and means for controlling all of said pawls and movable to prevent actuation of said first said means.

4. In locking mechanism for a string of cell doors, a locking bar movable with each door, a pair of members engageable with each bar for locking said door in open and closed positions, key controlled means for individually releasing each of said pairs of members, and means associated with said members and adjustable to selectively render said key controlled means inoperable.

5. In locking mechanism for a bank of cell doors, a ratchet bar movable with each door, a pawl for engaging each of said bars to lock said door in closed position, a pawl engageable with each of said bars to lock said door in open position, key controlled means for releasing the pawls associated with each of said doors, and an operating bar adjacent said ratchet bars and adjustable to selectively render said pawls operable and inoperable and adjustable to render said key controlled means operable and inoperable.

6. In locking means for a string of cell doors, a locking bar movable with each door, means for engaging said bars to lock said doors, means individual to each door for releasing said first mentioned means, and means for the entire string of doors and controllable from a remote point for rendering said second mentioned means operable and inoperable.

7. In cell door locking mechanism, a housing having a slot therein, a door hanger mounted in said housing and extending through said slot, a locking bar in said housing movable with said hanger, said locking bar being angular in shape with a flange thereof covering said slot, and means for lockingly engaging said bar.

8. In cell locking mechanism for a bank of cell doors, a housing above said doors, hanger means for each of said doors movable in said housing, a ratchet bar in said housing for each of said doors and movable with the respective door, means in said housing for engagement with each of said ratchet bars to lock the respective doors, key-controlled means adjacent each door for releasing said first mentioned means, and means in said housing selectively adjustable to render said key-controlled means inoperable.

9. In locking mechanism for a bank of cell doors, ratchet bars disposed above the cell doors each connected to and movable with an individual door, pawls for engagement with said ratchet bars to lock said doors, means individual to each of said doors for moving the respective pawls to disengaged position, and means adjacent said ratchet bars adjustable to prevent movement of said first mentioned means.

10. In locking mechanism for a string of cell doors, a member movable with each door, means adjacent each door for engagement with said member to lock said door, means individual to each door for controlling the respective first said means, and means operable from a remote point and movable to cause engagement and disengagement between said member and first said means and also movable to directly act upon the second said means to render operable and inoperable the second said means.

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