(No Model.)

P. HALE & W. E. SPARKS.

DEVICE FOR OPERATING CELL DOORS.

No. 346,155. Patented July 27, 1886.

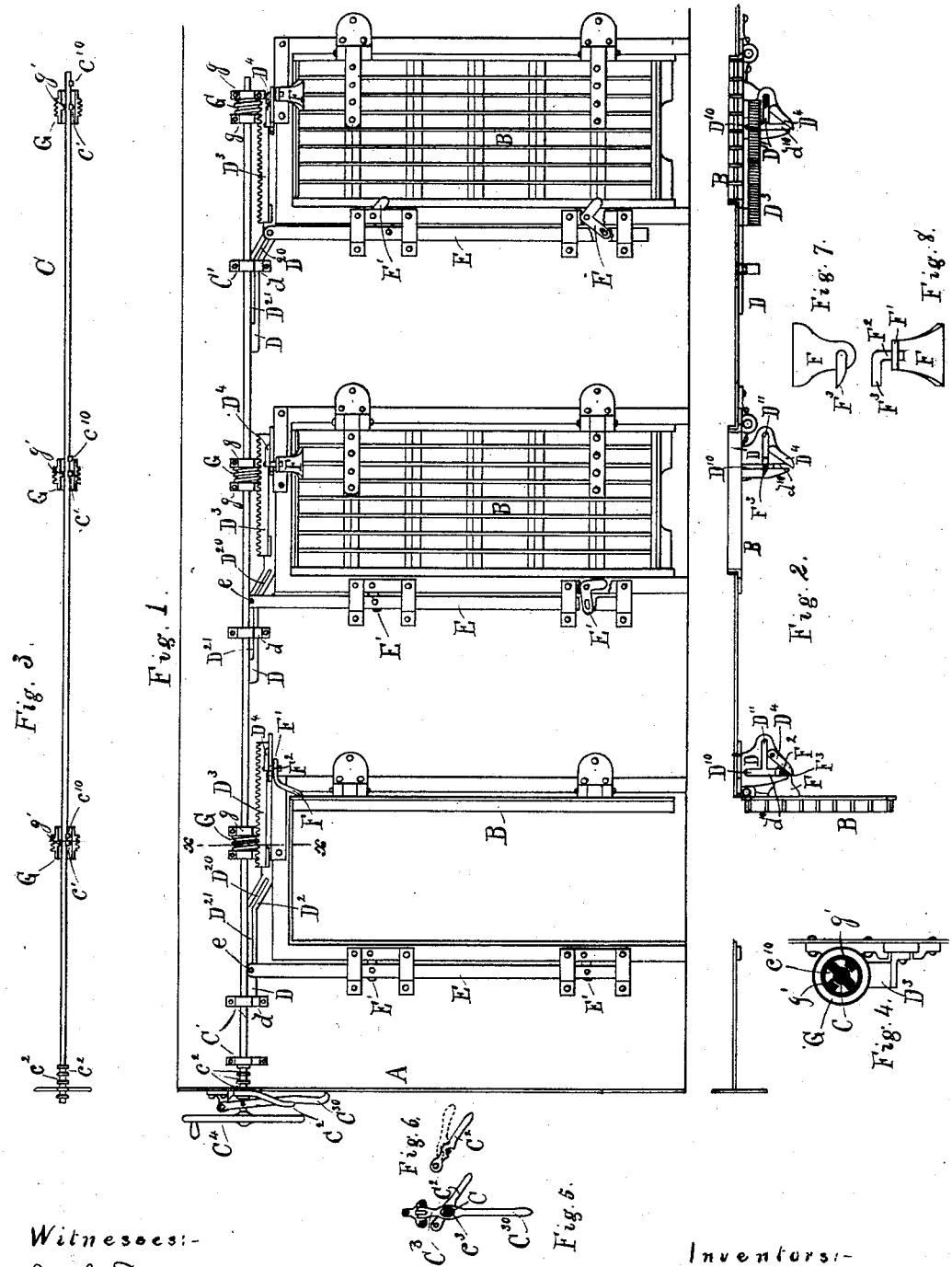

Fig. 1.

Fig. 3.

Fig. 2.

Fig. 7.

Fig. 8.

Fig. 4.

Fig. 6.

Fig. 5.

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UNITED STATES PATENT OFFICE.

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DEVICE FOR OPERATING CELL-DOORS.

SPECIFICATION forming part of Letters Patent No. 346,155, dated July 27, 1886.

Application filed June 21, 1886. Serial No. 205,754. (No model.)

To all whom it may concern:

Be it known that we, PERLEY HALE and WALTER E. SPARKS, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Jail-Door Operating and Locking Mechanisms, which are fully set forth in the following specification, reference being had to the accompanying drawings, forming a part thereof.

The purpose of this invention is to provide mechanism to open and close and to lock and unlock the doors of jail-cells, which may be operated from the end, and preferably from the exterior, of the corridor into which the cells open, and which may be adapted to operate, open, close, lock, and unlock any one of the cells on the corridor, or all of them simultaneously, as may be desired.

In the drawings, Figure 1 is an elevation of one side of a corridor of cells, showing three doors and their operating mechanism in different positions, one being closed and locked, one being closed but unlocked, and one being open. Fig. 2 is a detail plan of the doors and cell-wall on which they are hung, showing also the door-operating cams, and at one door the lock-operating cam, and the rack by which movement is communicated to said cams. Fig. 3 is an axial section of the operating-shaft and the endless screws which engage the racks and communicate motion to the doors. Fig. 4 is a section through X X, Fig. 1. Figs. 5, 6, 7, and 8 illustrate the construction of different elements in the device.

A is the corridor-wall.

B B B are the cell-doors.

C is a shaft journaled in suitable boxes, C′ C′ C′, on the corridor-wall above the cell-doors.

D D D are bars, hereinafter called "cam-bars," which are fixed in slide-bearings *d d d* on the corridor-wall above the doors.

E E E are the bolt-operating bars, which are fixed in vertical slide-bearings on the corridor-wall alongside of the doors, respectively.

E′ E′ E′ are the bolts or latches, which, as illustrated, are pivoted on the door-casings or corridor-wall, and provided with a slotted connection with the bars E, but which may be any well-known form of bolt, either pivoted or sliding, to engage and fasten the doors.

F F F are brackets secured to the cell-doors, and constituting lever projections therefrom, comprising the bracket or lever-arm proper, F′, the wrist or or cam-engaging neck F^2, and the terminal extension F^3, which serves a purpose hereinafter explained.

The cam-bars D, which slide horizontally in their bearings *d*, have two cams, D′ and D^2. The former engage the wrists F^2 of the lever projections F, and comprise the working-spaces D^{10}, the idling-spaces D^{11}, and the supplemental cam-tracks D^4, which engage the lever-extensions F^3, as hereinafter explained. The cams D^2 engage the lateral studs *e* on the bolt-operating bars E, and have the working-spaces D^{20} and the idling-spaces D^{21}. Said cam-bars have also rigid with them, respectively, the racks D^3, which are engaged by the endless screws G. Said screws are journaled in suitable bearings, *g*, on the corridor-wall, and have hollow axles, through which the shaft C passes. Said shaft and hollow axles are provided with devices, hereinafter explained, whereby the shaft engages and rotates the screws, which, engaging the racks D^3, cause the cam-bars to slide in their bearings, and the cams D′ and D^2 to actuate, respectively, the door and the bolt-operating mechanism. The action in this respect is as follows: When the doors are closed and locked, the cam-bars are at one extreme of their range of motion. The wrists F^2 of the lever projections F stand at the extreme end of the idling-spaces D^{11} in the cams D′, and the studs *e* stand at the beginning of the working-spaces D^{20} in the cams D^2. As the shaft C is rotated the endless screws, engaging the racks D^3, cause them to slide inward, and the cams D^2 immediately begin to actuate the bolt-operating bars E and withdraw the bolts or latches E′, while the cam D′ advances over the wrists F^2, which stand unactuated in the idling-spaces D^{11}. The lengths of said working-spaces D^{20} and the idling-spaces D^{11} are such that their limits are reached simultaneously, and the length of the former is sufficient to fully withdraw the bolts, so that when the idling-space D^{21} of the cam D^2 reaches the stud *e* the working-space of the cam D′ has reached the wrist F^2, and the further sliding of the bar D causes the cam D′ to act

against the wrist F^2 and swing the doors open. Since the lever projection F and its wrist F^2 stand inward—that is, toward the edge of the door—from a vertical plane passing through the hinge of the door at right angles to the corridor-wall, the said wrist, as the door begins to open, moves away from the wall, and therefore travels outward in the part d^{10} of the slot D^{10} until it comes directly in front of the hinge, and then as the door swings farther open it travels back the whole length of the working-space D^{10}. When the shaft C is revolved in the opposite direction, the wrist F^2 travels outward through the part d^{10} of the working-space D^{10}, bearing against the surface toward the delay-space D^{11}, and but for the presence of the supplemental cam-track D^4 and the extension F^3 it would pass into said delay-space; but to prevent this said extension and supplemental track are provided, and become engaged just before the wrist reaches the opening of the delay-space, and the further sliding of the cam continues the swinging of the door by means of the pressure of the track D^4 against the extension F^3, the wrist F^2 meanwhile traveling first outward and then back through the part d^{10} of the working-space D^{10}. (The work, however, during this stage being mainly done by the supplemental track D^4 and the extension F^3.) When the wrist F^2 gets back again to the entrance of the delay-space D^{11}, the door is fully closed, and the point of the extension F^3 has previously cleared the supplemental cam-track D^4, and the wrist enters the idling or delay space D^{11}, while at the same instant the stud e enters the working-space D^{20} of the cam D^2, and during the further sliding of the cam-bar the said cam D^2 operates to slide the bolt-operating bar and shoot the bolts into into their places to secure the door, the wrist F^2 meanwhile traveling idly in the delay-space D^{11}, and at the end of the said movement the parts are at their initial positions and the door is closed and locked.

In order that the several doors may be operated either singly or simultaneously, the shaft C has connection with the endless screws G only by means of the engagement of projections on the shaft with the screws. The shaft has one series of projections, c' c' c', which are separated by distance equal to the distances between the screws G G G, so that all the said projections are engaged at one time, one with each screw, and are all disengaged at once by sliding the shaft longitudinally. The shaft has another series of projections, c^{10} c^{10} c^{10}, which are separated by distance not equal, respectively, to the distance between the screws which they are designed respectively to engage, so that only one of them will be in engagement with the screws at a time, and the shaft must be adjusted longitudinally to a different position for each screw.

The engagement of the projections c' c' with the screws may be effected by making the tubular aperture through the axles of the screws large enough to allow the shaft and projections to revolve within it, and providing a projection within such tubular aperture, with which the projection on the shaft shall collide and engage when it is longitudinally adjusted to the proper position.

For convenience of effecting the engagement without loss of rotary movement, we provide the screws with several such interior projections, g'. This structure is obviously equivalent to providing grooves or notches leading out of the tubular aperture into the body of the axle or hub of the screws extending longitudinally through it, in which the projections c' c^{10} may engage.

It is not absolutely essential that the screws G should have exterior bearings; but they might instead have their bearings only on the shaft C and be stopped between lugs, (as the lugs g, which in the form illustrated constitute their bearings,) to prevent their movement longitudinally with the shaft; but in that case it would be necessary to slide the shaft the whole length of the bearing of the screw thereon for each adjustment, and when there were several doors operated by one shaft the total distance of such adjustment would be too great for convenience.

In order to hold the shaft securely at each position to which it is adjusted for the purpose of engaging the several doors separately or all together, it is provided at the end of the corridor from which it is operated with annular grooves c^2 c^2 c^2 c^2, corresponding in position to the several desired positions of the shaft; and upon the shaft-bearing is pivoted the latch C^2, adapted to engage in any one of such grooves which is brought into the plane of the oscillation. For the purpose of sliding the shaft longitudinally, the lever C^3 may be provided, pivoted to the wall at some distance from the shaft-bearing, and having the slot c^3, which adapts it to fit into any one of the grooves c^2, and the handle C^{30}, by which it may be operated. This is particularly necessary when the shaft is very long, as when it operates several doors or doors considerably separated, in which case it would require too much strength to adjust the shaft by a direct pull upon it. To rotate the shaft there is provided the crank or hand-wheel C^4, secured to its outer end.

We claim—

1. In combination with the door having the cranked lever projection provided with the extension F^3 from the end of the wrist F^2, the cam D', having the T-slot, and the supplemental cam-track D^3, located in the plane of the extension F^3, substantially as and for the purpose set forth.

2. In combination with the endless screws and the mechanism, substantially as described, whereby they operate the doors, and the shafts longitudinally adjustable through the endless screws, and provided with devices, substantially as set forth, for engaging different screws at different positions, said shafts having the

annular grooves c^2 c^2 c^2, and the latch engaging any one of said grooves which may be brought into its plane of oscillation, whereby the shaft is locked in position to operate any selected door, substantially as set forth.

3. In combination, substantially as set forth, the endless screws longitudinally immovable, and having hollow axles provided with interior projections, and the shaft C, longitudinally movable and having two series of projections, the individuals of one series being successively separated by spaces equal to those which separate the interior projection of the corresponding screws, and the other series being successively separated by distances different, respectively, from those which separate the projections of the corresponding screws, whereby in one position the shaft engages all the screws simultaneously and in other positions engages one screw at a time.

4. In combination with the doors having lever projections, as F, the cam-bars sliding on the corridor-wall, and provided each with a cam to engage the lever projections, respectively, and with a rack, as D^3, the endless screws having hollow axles journaled on the corridor-wall, and the shaft C, journaled on the corridor-wall and passing through the hollow axles of the endless screws, said screws having interior projections, and the shaft being longitudinally adjustable, and having exterior projections longitudinally separated by a distance different from the distance between the interior projections of the screws, whereby the shaft may be made to engage the screws separately at will, substantially as set forth.

5. In combination with the doors provided with lever projections, as F, the cam-bars having cams engaging said projections, respectively, and having racks D^3, the endless screws engaging said racks, and the shaft passing axially through said screws and longitudinally adjustable, and provided with means, substantially as set forth, for engaging the several screws at different positions of the longitudinal adjustment, substantially as set forth.

6. In combination with the doors having lever projections, as F, the bolt-operating bars E, the cam-bars having door-operating cams to engage the lever projections, respectively, and lock-operating cams to engage the bolt-operating bars, respectively, and the means, substantially as described, for sliding the cam-bars, said cams having each a delay or idling space and a working-space, the parts co-operating with said door-operating and lock-operating cams, respectively, being engaged simultaneously, the one with the delay-space and the other with the working-space, whereby one continuous sliding movement of the cam-bar successively unlocks and opens or closes and then locks the door, substantially as set forth.

7. In combination with the bolt-operating bars, the cam-bars sliding on the corridor-wall, having a cam, as D^2, to engage and actuate the bolt-operating bar, and the rack D^3, the shaft having the endless screw to engage the rack, substantially as set forth.

8. In combination with the doors having a lever projection, as F, the cam-bars sliding on the corridor-wall, and provided each with a cam, as D′, to engage the lever projection, and with a rack, as D^3, and the shaft journaled on the corridor-wall and carrying the endless screw G, engaging one with each rack on the cam-bars, respectively, substantially as set forth.

In testimony whereof we have hereunto set our hands, this 16th day of June, A. D. 1886, in the presence of two witnesses, at Chicago, Illinois.

PERLEY HALE.
WALTER E. SPARKS.

Witnesses:
CHAS. S. BURTON,
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