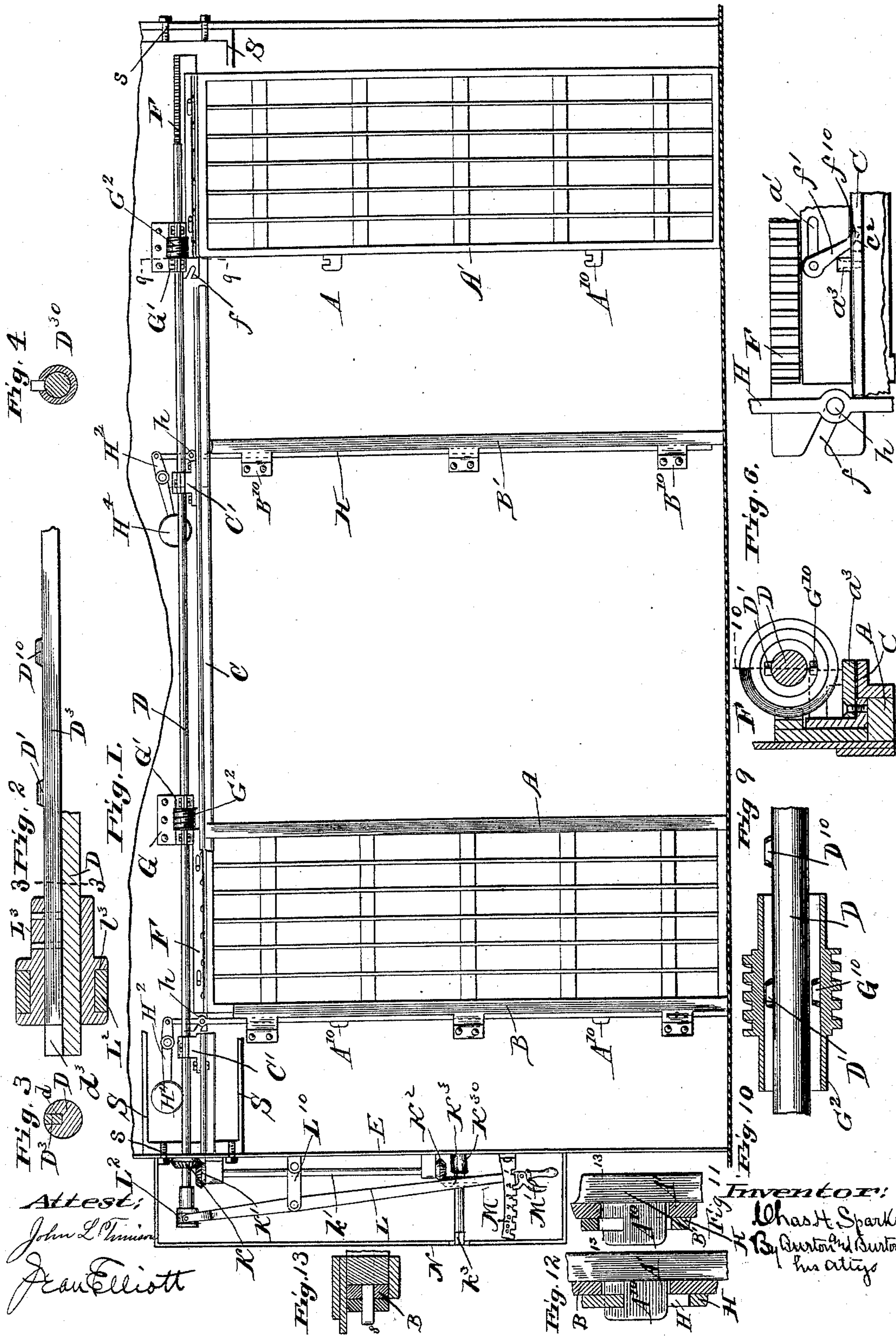


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MECHANISM FOR OPERATING AND LOCKING JAIL DOORS.

No. 483,178.

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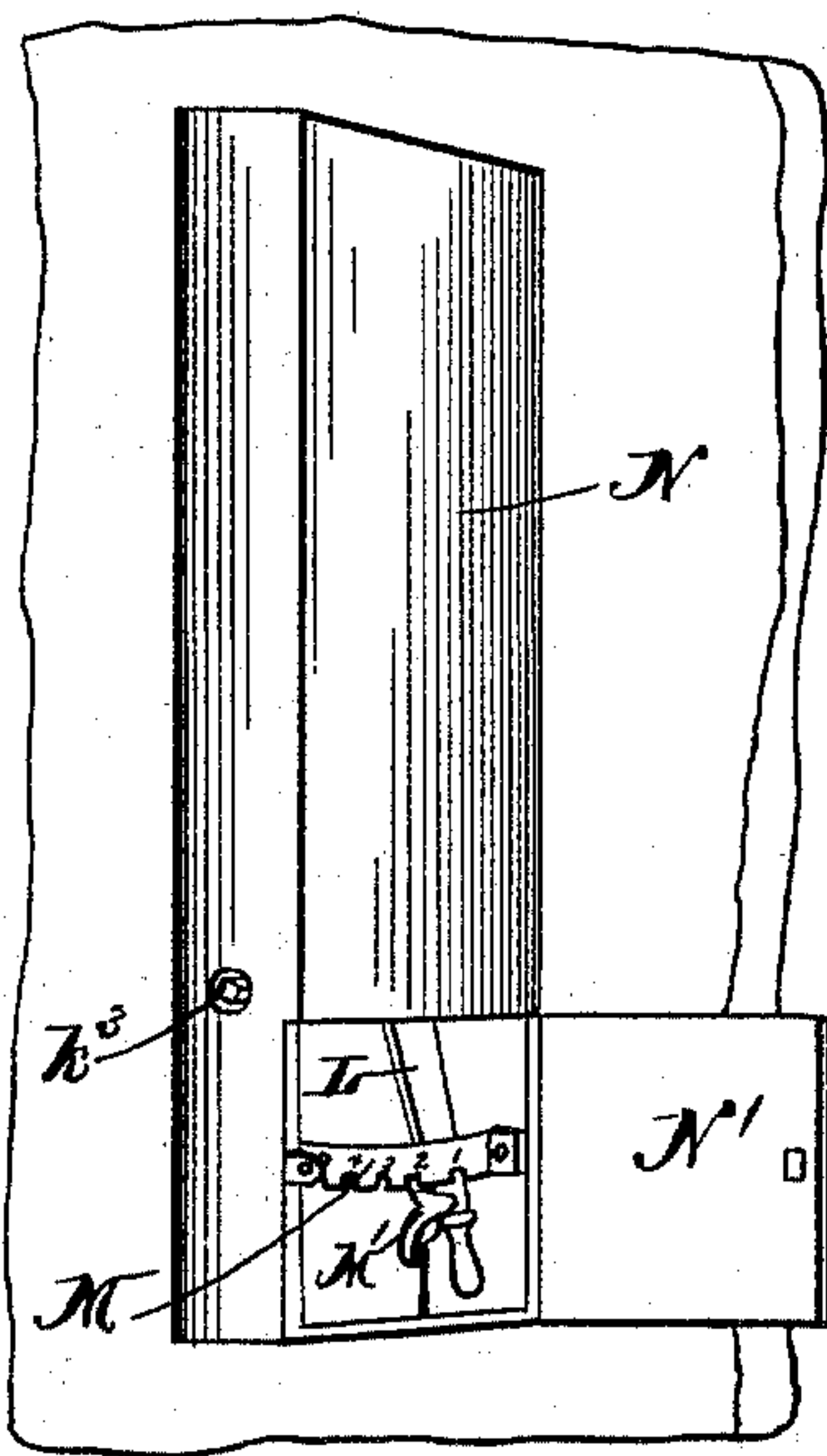


Fig. 14

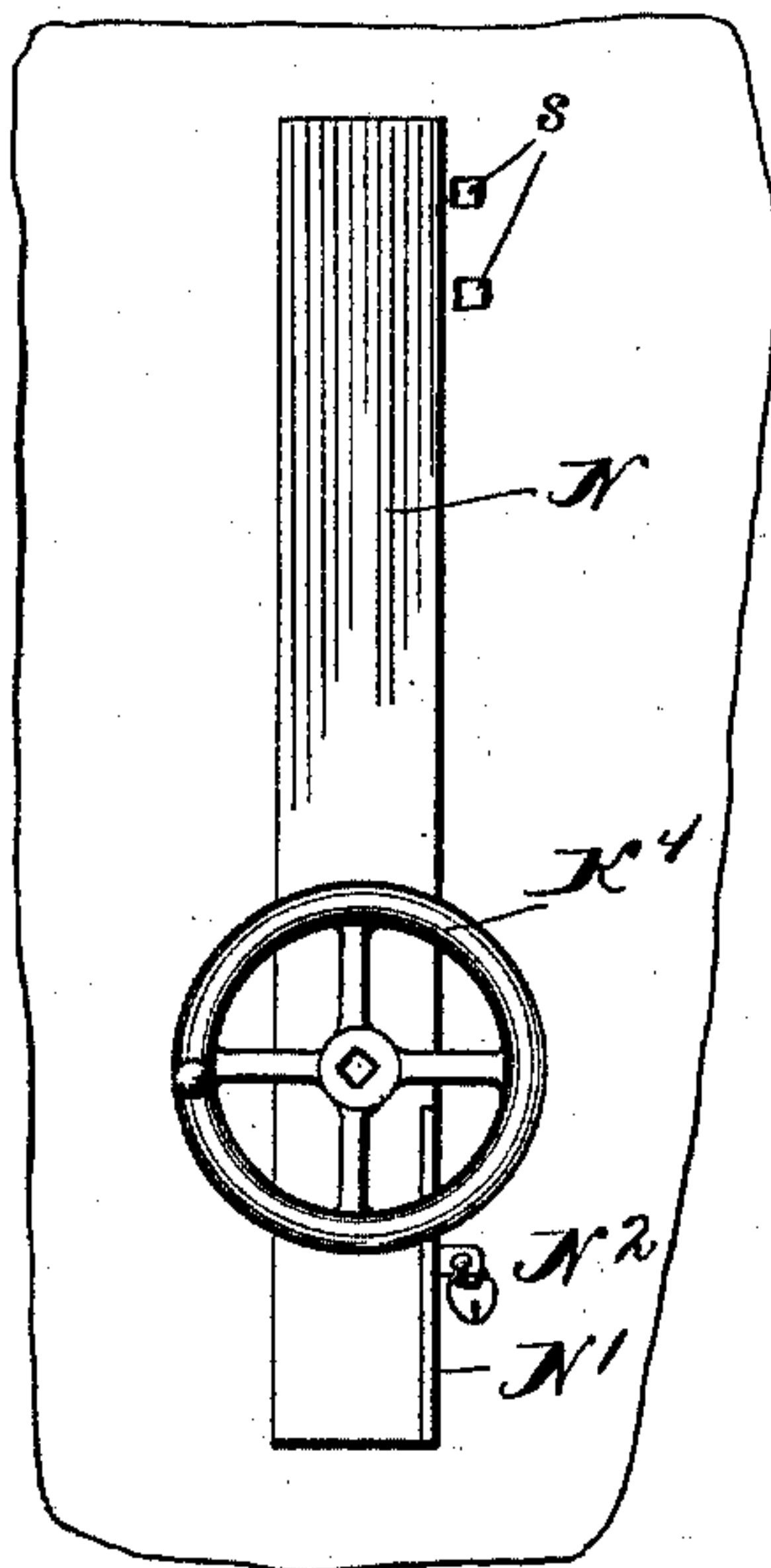


Fig. 15

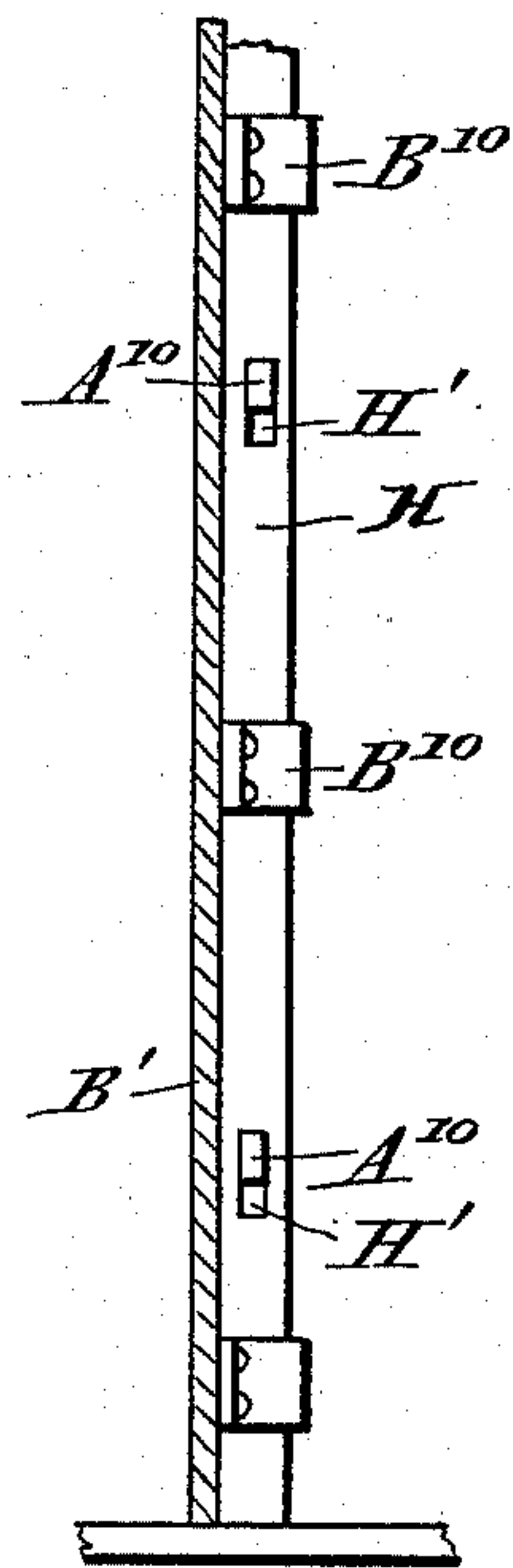


Fig. 16

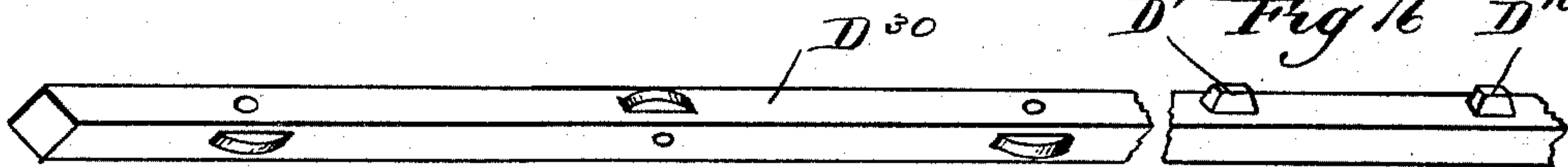


Fig. 5

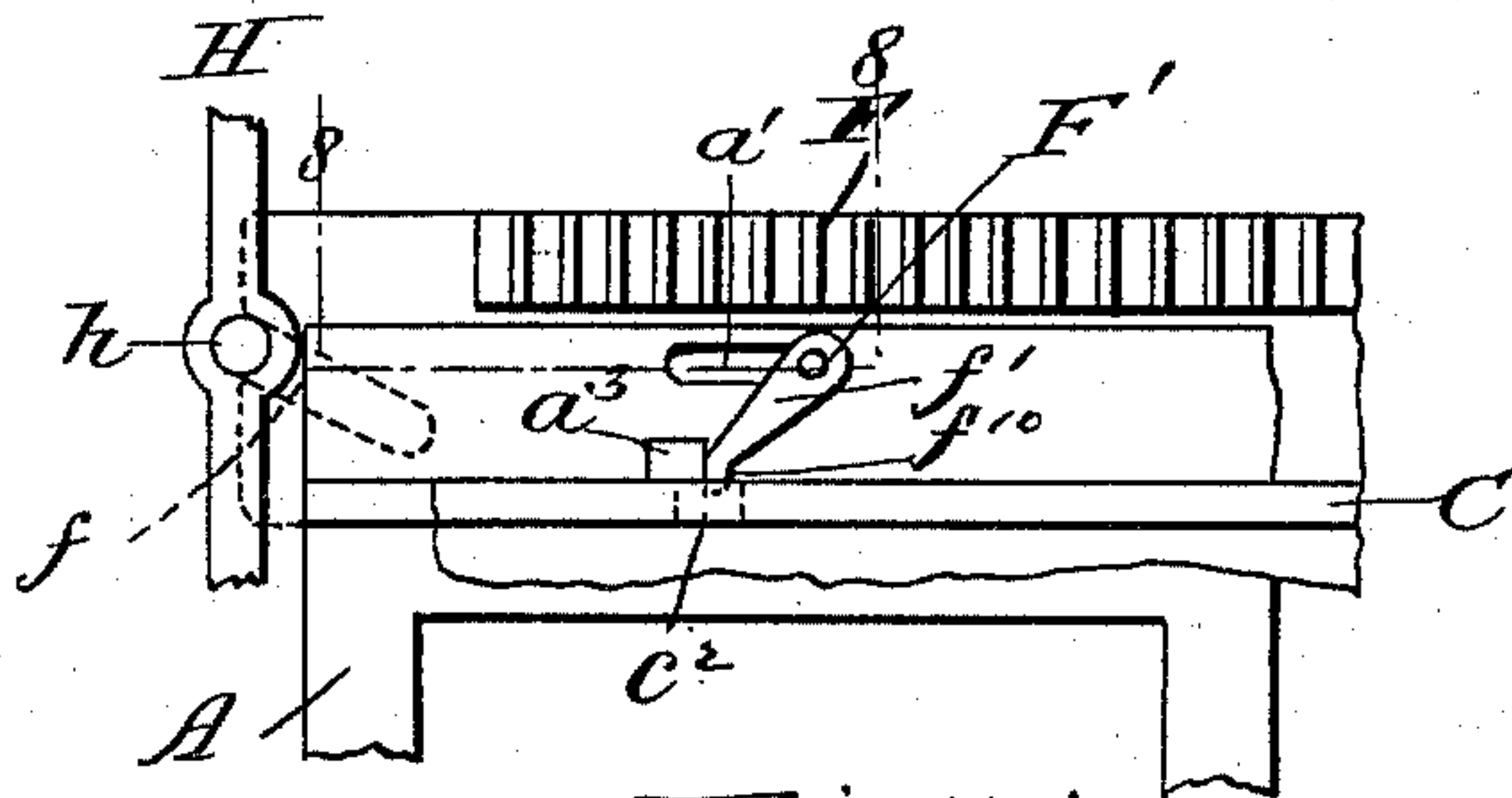


Fig. 7

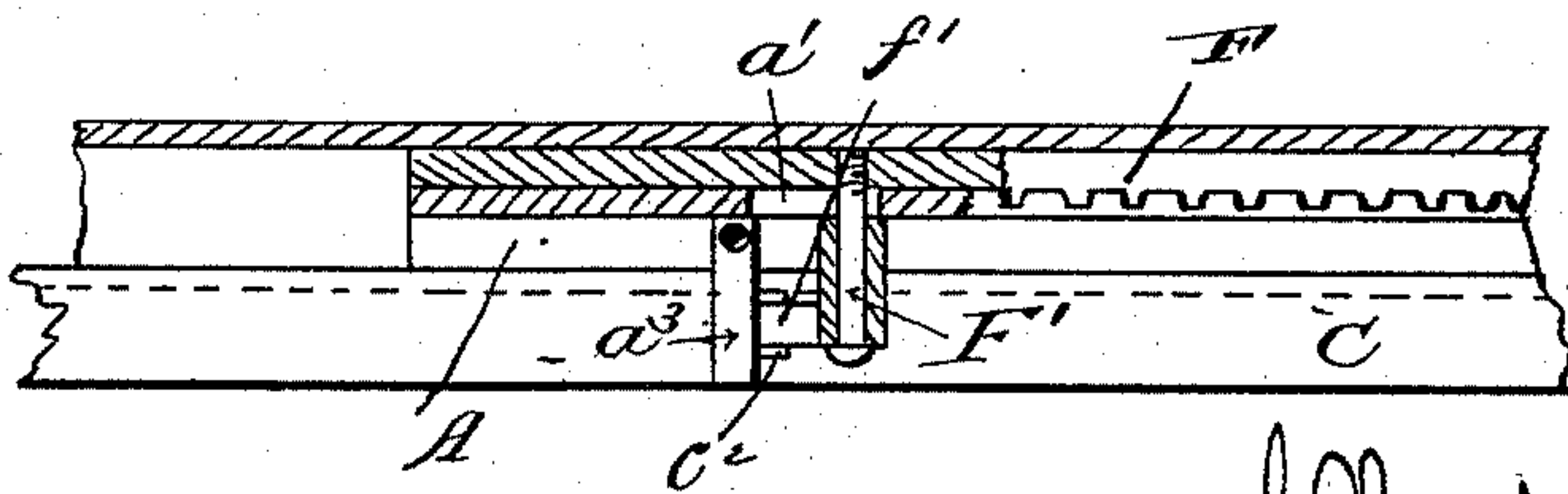


Fig. 8

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Inventor:
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By Burton & Burton
his attys.

UNITED STATES PATENT OFFICE.

CHARLES H. SPARKS, OF ST. LOUIS, MISSOURI.

MECHANISM FOR OPERATING AND LOCKING JAIL-DOORS.

SPECIFICATION forming part of Letters Patent No. 483,178, dated September 27, 1892.

Application filed March 10, 1892. Serial No. 424,444. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. SPARKS, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Devices for Operating and Locking Jail-Doors, which are fully set forth in the following specification, reference being had to the accompanying drawings, forming a part thereof.

This invention is an improvement upon the invention patented to myself and Charles O. Sobinski December 8, 1891, Patent No. 464,947.

The improvements consist in dispensing with much of the detail mechanism therein shown and simplifying the operation.

In the drawings, Figure 1 is an elevation of adjoining cells opening on the same corridor and their doors and mechanism for operating them, the inclosing case being removed to show said mechanism. Fig. 2 is a detail axial section of the operating-shaft and devices therein for bringing it into engagement with the mechanism for operating the doors, respectively. Fig. 3 is a section at the line 3 3 on Fig. 2. Fig. 4 is a similarly-taken section of a modified form of the shaft and adjusting device. Fig. 5 is a perspective of a special form of bar pertaining to said adjusting devices, which is provided with anti-friction-pulleys. Fig. 6 is a detail elevation of devices for operating the door-locking bolt or bar by horizontal movement of the bar which slides the door, the parts being shown in locking position. Fig. 7 is a similar view, the parts being shown in the position occupied after the door is shut and before it is locked. Fig. 8 is a sectional plan of the same parts, the position corresponding to Fig. 7, section being made at the line 8 8 on Fig. 7, and the cell-wall being shown in horizontal section at a plane above the device illustrated. Fig. 9 is an enlarged detail section at the line 9 9 on Fig. 1. Fig. 10 is a section at the line 10 10 on Fig. 9. Figs. 11 and 12 are detail sectional elevations of the hook or catch on the door with which the locking-bar engages, section being made longitudinally with respect to the locking-bar, the latter figure showing the bar engaged and the former showing it disengaged from the hook. Fig. 13 is a section at the line 13 13 on Fig. 11. Fig. 14 is a perspective showing a case outside the cor-

ridor inclosing the operating mechanism, with a door by which access is obtained thereto standing open. Fig. 15 is a direct edge elevation of the same, showing the door closed and a hand-wheel applied to operate the mechanism from without. Fig. 16 is a detail elevation of the locking-bar and its slide-bearings on the post against which the door closes, the latter being shown in section.

In the former patent to myself and Charles O. Sobinski, above referred to, sliding jail-doors are shown operated by a horizontal shaft extending above the entire series so operated, rack-bars which have a limited sliding movement on the doors, respectively, and at the limits of said movement travel with and thereby serve as means for moving the doors being actuated by worms which are journaled in fixed bearings encircling the horizontal shaft, the shaft passing freely through said sleeves, but being provided with projections adapted to co-operate with interior projections in the sleeves when the shaft is longitudinally adjusted to bring such projections respectively into engagement, the projections on the shaft which have this function being successively separated by distances which differ, respectively, from those which separate the projections from the interior of the corresponding sleeves, so that the shaft when set in position to cause one of its projections to engage with its corresponding sleeve will have its other projections out of positions to engage with their sleeves, respectively, so that the longitudinal adjustment of the shaft in its bearings determines the door which is operated by the rotation of the shaft, said shaft having, also, another series of projections whose distances apart on the shaft are equal to the distances apart of the projections in their corresponding sleeves, so that when the shaft is set in position to cause one of the projections of said latter series to engage with the sleeve all the projections of that series engage with their respective sleeves and operate all the doors simultaneously.

It will be observed that in practice the shaft which extends along the entire corridor and operates a number of doors will be very heavy and require mechanism to give it the longitudinal thrust necessary for adjustment,

as indicated. Such longitudinal adjustment has heretofore been effected by mechanism involving a train of gears and much complication, and I have found the same objection-
 5 able in operation in that the adjustment of the shaft longitudinally is thereby rendered too slow and causes too much time to be consumed in shifting it from one door to the other. I aim in this invention to remove
 10 these defects.

A A' represent two cell-doors, the former being shown closed and the latter open, B B' being the posts to which they are adapted, respectively, to be locked.

15 C is the horizontal top rail by which the doors are guided and retained.

The doors have upwardly-open hook-lugs or catches A¹⁰, which are adapted to protrude through the posts B', and a vertically-locking bar H, which slides in bearings B¹⁰ on the
 20 post B', has apertures H', through which the hook-lugs A¹⁰ protrude when the said locking-bar is at its elevated position and the door is closed. Said locking-bar being depressed, the upper margins of the said aper-
 25 tures therein engage the hook-lugs and secure the door. The raising and lowering of the locking-bar is effected by the engagement with a stud h on the bar at a point
 30 above the top rail C of the inclined notch f in the end of the rack-plate F in an obvious manner, and the rack-plate moves horizontally relatively to the door, as hereinafter set forth, while the door stands closed against
 35 the post.

C' C' are journal-boxes mounted on the upper side of the top rail to afford bearings for the operating-shaft D, which extends out through the end wall E of the corridor.

40 F F are rack-plates, which are connected to the upper ends of the doors, respectively, said connections being effected by the retaining stud-bolts F', which pass through the slots a' in the doors and are retained in the rack-
 45 plates, so that the plates may slide horizontally with respect to the doors to which they are attached the length of the slots and at the limit of such movement engage with and move the doors by means of the studs F'.

50 f' f' are dogs, which are pivoted on the stud-bolts F' F', respectively, outside the door—that is, on the opposite side thereof from the rack-plates. The nose F¹⁰ of the dog rides on the top of the rail C, behind which the door
 55 slides and by which it is retained in position against the cell, and the door has a lug a³, projecting forward over the top rail C at such position that the nose of the dog rests against it when the stud is at the end of the slot re-
 60 mote from the lug, so that in that position the dog's nose is in the angle between the top rail and said lug. The rail C has a notch C² near to the locking-post B', adapted to permit the nose of the dog to enter it when it reaches
 65 it, sliding on the top rail, as hereinafter explained.

G G are hangers secured to the corridor-

wall, having journal-bearing boxes G' G' for the worm-sleeves G³ G², which are stopped
 70 against longitudinal movement by the shoulders of the boss in which the worm is formed abutting on the proximate ends of the jour-
 75 nal-boxes, said boss and worm being between the latter. The axial line of these journal-bearings is coincident with the axis of the shaft D, and the axial aperture through the
 80 worm-sleeves is larger than the shaft, which therefore passes freely through the sleeves, deriving no support from the latter and ex-
 85 perienceing no friction on account of their presence either in its longitudinal or rotary motion.

D' represents one of the series of projec-
 90 tions or short feathers on the shaft D adapted to engage the projections G¹⁰ on the interior of the worm-sleeves G², respectively, such
 95 engagement being effected in the rotation of the shaft D when a projection D' is in the transverse plane of the corresponding projec-
 100 tion G¹⁰ of the sleeve, as seen in Figs. 9 and 10, the individuals of this series being separated by such intervals on the shaft that no
 105 two of them will be simultaneously engaged with their respective sleeves. D¹⁰ is one of another series of similar projections, the individ-
 110 uals of this series being separated by such intervals on the shaft that they will all be simultaneously engaged with their respective sleeves. This feature of construction is fully set forth
 115 in my above-mentioned patent, No. 464,947. The projection G¹⁰ on the sleeve does not
 120 touch the shaft, nor do the projections D' D¹⁰ on the shaft touch the sleeve, except as said projections on the shaft collide with the
 125 projections on the sleeve when the shaft is properly set and rotated. There is, therefore, no interior friction even of these projec-
 130 tions upon the shaft or sleeve, respectively, in either of the movements of the shaft. In order that the shaft, which is sometimes very
 135 heavy, need not be moved bodily longitudinally in order to bring any desired projection into the plane of the projection on its corre-
 140 sponding worm-sleeve, I provide the projections D' D¹⁰ upon a comparatively light bar, which slides in the shaft D, instead of sliding
 145 the whole shaft. In Figs. 2 and 3 the shaft has a longitudinal groove d³, and in said groove is the longitudinally-adjustable slide-
 150 bar D³, having the projections D' and D¹⁰ to engage the sleeves, as described, and to slide this slide-bar I provide the lever L, fulcrumed
 155 on the bracket L¹⁰, secured to the corridor end E outside the same, having a fork at its upper end, which is pivotally connected to
 160 the collar L², the latter being suitably formed in two parts to be lodged in the annular groove l³ of the sleeve L³, said sleeve being
 165 fitted on the shaft D, at the outer end thereof, and pinned fast to the slide-bar D³, so that the shaft may revolve, carrying with it and
 170 as a part of it the slide-bar D³, without restraint on account of the connection of the slide-bar D³ to the shifting-lever L. The le-

ver L oscillates past a notched bar M and is provided with a spring-actuated dog M', whose nose is adapted to engage the notches of said bar, which are numbered to correspond with the cells and are in such position that when the dog is engaged with any notch the slide-bar D³ in the shaft D is in position to bring one of its projections D' D¹⁰ into the plane of the corresponding projection of the worm-sleeve which pertains to the door of a cell of the same number as said notch. The bar M has two notches in addition to those which are numbered to correspond with the cells, said additional notches being marked, respectively, "0" and "00." When the dog is engaged with the notch marked "0," the slide-bar D³ in the shaft D is in position to cause the entire series of its projections D¹⁰ to engage with the entire series of worm-sleeves, respectively, so that the rotation of the shaft will then operate all the doors. When the dog is engaged with the notch "00," the slide-bar D³ is in such position that it has no projections engaging with any of the sleeves, and the rotation of the shaft under that condition operates none of the doors. A modification of this structure is shown in Fig. 4, consisting of the use of a tubular instead of a grooved shaft and an interior rod D³⁰ instead of the slide-bar D³, the tubular shaft being slotted to permit the projections to protrude. The mode of operation would be the same as in the case of the grooved shaft and bar, the sleeve L² being pinned fast to the interior rod, as in the former construction it is pinned fast to the slide-bar.

The rotary movement of the shaft D is necessarily effected by a train of gearing consisting of the beveled gear K, journaled on the corridor end E, adapted in a familiar manner to have the shaft D slide through and revolve with it, the beveled gear K meshing with the beveled gear K', fixed on the upper end of the shaft k', which is journaled in bearings secured to the corridor end E and which has at its lower end the beveled pinion K², which is driven by the beveled gear K³, whose shaft k³ is journaled in a bearing-box K³⁰ on the corridor end E and operated by a crank or hand wheel K⁴.

If desired, the sliding movement of either the bar D³ or rod D³⁰ may be eased by providing such bar or rod with antifriction-pulleys set in it at intervals in its length alternately in longitudinal planes at right angles to each other, alternating rollers projecting from two opposite sides, and alternating rollers from the other two sides of the bar or rod, as illustrated in Fig. 5. I do not consider this expedient usually necessary; but it may be resorted to in special instances.

In order to make the action of the inclined notch f of the slide-bar F upon the locking-bar H when the stud on said locking-bar is engaged on the notch as easy as it ought to be both in the opening and closing movement, and also in order to cause said locking-

bar to stand at the upper position, which is the unlocked position, when the door is open, so that its stud will be in the path of the mouth of the slot and enter it as the rack-bar is advanced for that purpose, I provide the lever H², fulcrumed on the corridor-wall above the upper guide-rails, and extend the locking-bar H up to that lever, and on the opposite end I mount a counterpoising-weight H⁴, adapted to balance the locking-bar, so that the bar will stand wherever it may be placed in its vertical range of movement and the friction experienced in the slot f as the stud h enters it will be only that which results from the force necessary to overcome the inertia of the locking-bar H and its friction in its bearings.

The mode of operation of these devices, starting with the doors closed, is as follows: The lever L being set with the dog M engaged with a notch corresponding in number to any cell which is to be opened, the shaft k³ will be rotated, thereby rotating the shaft D and the worm-sleeve thereon which corresponds to the door in question, such sleeve being by the adjustment effected by the lever L engaged by the projection D' corresponding to such sleeve, so that the rotation of the shaft rotates the sleeve. Such rotation of the sleeve, causing its exterior worm to engage with the rack-bar of the door to which the sleeve pertains, first moves that rack-bar from the position shown in Fig. 6 to the position shown in Fig. 5, the stud F' moving the length of the slot a' and the dog f' having its inclination reversed, as seen by comparison of said figures. In this movement said rack-bar by the engagement of its inclined slot f with the stud h of the locking-bar H will elevate the locking-bar, thereby disengaging it from the hook-lugs A¹⁰ of the door. The further rotation of the sleeve still engaging the rack-bar and further moving the latter horizontally will cause it to carry the door with it away from the post and to open position, the dog f' having its nose f¹⁰ withdrawn from the aperture c² in the top rail C and sliding on the top of the rail in the further opening of the door. When the operator desires to close this cell-door, the lever L being left or again set with its dog engaged with the corresponding number on the bar M, the shaft k³, and thereby the shaft D, will be rotated in the reverse direction, with the effect, first, of sliding the door toward the post, the rack-bar being prevented from sliding on the door because the dog f' would thereby be compelled to poke its nose downward, which it is prevented from doing until it reaches the aperture c² in the top rail. This aperture is not reached until the door is closed against the post, and at that point the nose of the dog collides with the projection a³, and the open mouth of the notch f has received the stud h of the locking-bar, and the further rotation of the sleeve will now slide the rack-bar on the door, causing the dog to poke its nose through the aperture c² and reverse its inclination and

come to the position shown in Fig. 6 by the time the stud h reaches the end of the notch f and the locking-bar H is fully depressed and in effective engagement with the hook-lugs A^{10} . When all the doors are to be operated simultaneously, either for opening or shutting, the operation will be precisely the same, except that the lever L will be set with the dog M' engaged with the notch numbered "0," which causes the projections D^{10} to be engaged with the sleeves, respectively, so that they are all rotated and all the doors are operated.

I prefer that the mechanism located outside of the corridor end E and by which the mechanism within is operated to operate the doors should be inclosed in a case provided with a door through which the operating-lever and wheel may be reached, and which may be secured by a safe-lock, so that it shall not be possible for any unauthorized person to tamper with the mechanism or operate the cell-doors. Such inclosing case is represented at N , its door at N' , the lock at N^2 . In order that the dimensions of such case may be the minimum, I extend the shaft k^3 of the beveled gear K^3 out through the side of the case N and square its protruding end to receiving the operating-crank or hand-wheel. The jailer or person in charge will always leave the lever L set at "00," that being the position in which the rotation of the shaft D operates none of the cell-doors. The accessibility, therefore, of the shaft k^3 , which drives the train which rotates the shaft D , can constitute no objection nor afford any opportunity for tampering with the position of the doors, so that it will be apparent that the purpose of said inclosing case will be entirely accomplished if it incloses and guards against intrusion merely the means for longitudinally shifting the shaft D or its slide-bar in the construction above shown.

The mechanism which is located within the corridor and mounted on the outside of the cell-walls is protected from intrusion or tampering by the case S , which may be made fast to the cell-walls; but since it is desirable that access should be obtainable by authorized persons to said mechanism this inclosing case should be removable; but its removal should be possible only upon conditions which will prevent such removal by the prisoners while they are allowed the freedom of the corridor. Any ordinary means of fastening by bolts answers the purpose tolerably well, since while the prisoners are in the corridor a guard would usually be in attendance outside the corridor-grating and any attempt on the part of the prisoners to tamper with the case to get access to the mechanism would be immediately observed and prevented; but I prefer to add to this ordinary means of fastening, which may be employed in any event, the further means which consists in securing the case to the end walls of the corridor by screw-bolts s , which enter said case from the exterior of

the corridor, and which are therefore inaccessible within the corridor.

I claim—

1. In combination with the worm-sleeves longitudinally stopped and the rotary shaft extending within said sleeves, the rod or bar in said shaft, longitudinally movable independently of the shaft, having the projections D' related to the sleeves as described, and suitable means for adjusting said rod longitudinally, substantially as set forth.

2. In combination with the worm-sleeves longitudinally stopped and the rotary shaft extending axially through said sleeves, the rod or bar in said shaft, longitudinally movable independently thereof, having the projections D' related to the sleeves as described, the lever L , suitably connected to the said sliding rod or bar to move the latter longitudinally with respect to the shaft, and means for locking the lever at positions corresponding to the engagement of the projections D' with the sleeves, respectively, substantially as set forth.

3. In combination with the worm-sleeves longitudinally stopped and the rotary shaft extending axially through said sleeves, the rod or bar in said shaft, longitudinally movable independently thereof, having the projections D' related to the sleeves as described, a collar adapted to slide on the shaft, pinned fast to said rod or bar, the lever L , fulcrumed outside the corridor and suitably connected to said collar to move the latter longitudinally with respect to the shaft, and means for locking the lever at positions corresponding to the engagement of the projections D' with the sleeves, respectively, substantially as set forth.

4. In combination with the worm-sleeves longitudinally stopped and the rotary shaft extending axially therethrough, the rod or bar in said shaft, longitudinally movable independently thereof, having the projections D' and D^{10} related to the sleeves as described, the lever L , suitably connected to the sliding rod or bar to adjust the same longitudinally without interfering with its rotation with the shaft, and a graduated scale along which said lever oscillates, having graduations corresponding to the adjustment of said sliding rod or bar for engagement with the several sleeves, respectively, and for engagement with all the sleeves and for non-engagement with the sleeves, the gearing-train by which the shaft is rotated to operate the sleeves, a case which incloses said gearing-train, and the mechanism for longitudinally adjusting said rod or bar, and the securable door for said case through which access is obtained to the adjusting mechanism, the primal shaft of said rotating train protruding from said case and adapted to receive a rotating crank or hand-wheel outside the case, whereby it is rendered unnecessary to make the compass of the case sufficient to inclose the operating-wheel or crank, substantially as set forth.

5. In combination with the rotary shaft and

the sliding bar therein, the mechanism which said shaft operates by means of said sliding bar at its respective longitudinal positions, the mechanism for adjusting said bar longitudinally to its various operative and inoperative positions, and the mechanism for rotating the shaft, and a case inclosing the bar-adjusting mechanism, having a securable door through which access is obtained thereto, substantially as set forth.

6. In combination with the rotary shaft, the sliding bar therein, and the mechanism which said shaft operates by means of said sliding bar longitudinally to its various operative and inoperative positions, the mechanisms for rotating the shaft and for longitudinally adjusting the bar, and a case inclosing said adjusting and rotating mechanism, provided with a securable door through which access is obtained to the adjusting mechanism, the primal shaft of said rotating mechanisms extending outside of said case and exteriorly adapted to receive an operating-crank or hand-wheel, substantially as set forth.

7. In combination with the sliding cell-doors, the upright posts which stop the sliding movement at closed position, the locking-bars H, sliding vertically on said posts, plates mounted on the doors and having short horizontal movement relative thereto and having the inclined notches *f*, the locking-bars having the studs *h*, adapted to enter said inclined notches, and means for actuating the said plates horizontally and for engaging them with the doors, respectively, until the latter reach closed position against their respective posts and for disengaging them therefrom and permitting longitudinal movement relative thereto thereafter, whereby such longitudinal movement operates the locking-bars, substantially as set forth.

8. In combination with the locking-bars H, the levers H², connected thereto and provided with weights to counterpoise the weight of the locking-bars, and mechanism which operates such locking-bars, substantially as set forth.

9. In combination with the locking-bars H, levers connected thereto provided with weights to counterpoise the locking-bars and the sliding bars F, operating the locking-bars by the inclined groove engaging therewith, substantially as set forth.

10. In combination with the sliding cell-door and a rail adjacent to which it moves, the plate connected to the door and having a short horizontal movement relatively thereto, the dog pivoted to the plate and having its nose riding on the rail and longitudinally stopped against the lug on the door, and the rail having the track of the dog cut away at the point reached by the nose when the door is fully closed, substantially as set forth.

11. In combination with the cells opening upon a common corridor and the door operating and locking mechanism mounted outside the cell-walls within the corridor, a case inclosing said operating mechanism, extending from end wall to end wall of the corridor and secured to the said end walls by screws and bolts inserted from the outer side of said walls and inaccessible from within the corridor, substantially as set forth.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, at Washington, District of Columbia, this 10th day of March, 1892.

CHARLES H. SPARKS.

Witnesses:

E. H. BOND,
L. C. HILLS.