C. C. LAMB.

LOCKING, SIGNALING, AND RECORDING CONSTRUCTION.

APPLICATION FILED NOV. 10, 1915.

1,302,384.

Patented Apr. 29, 1919.

6 SHEETS—SHEET 1.

Fig. 1

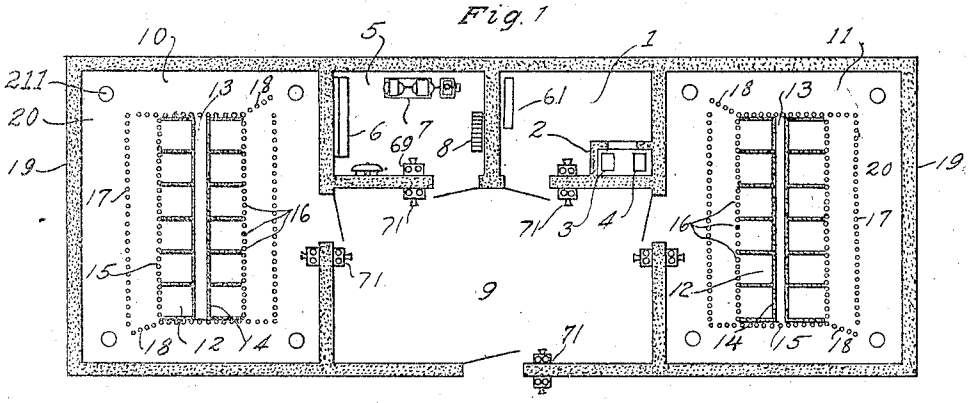
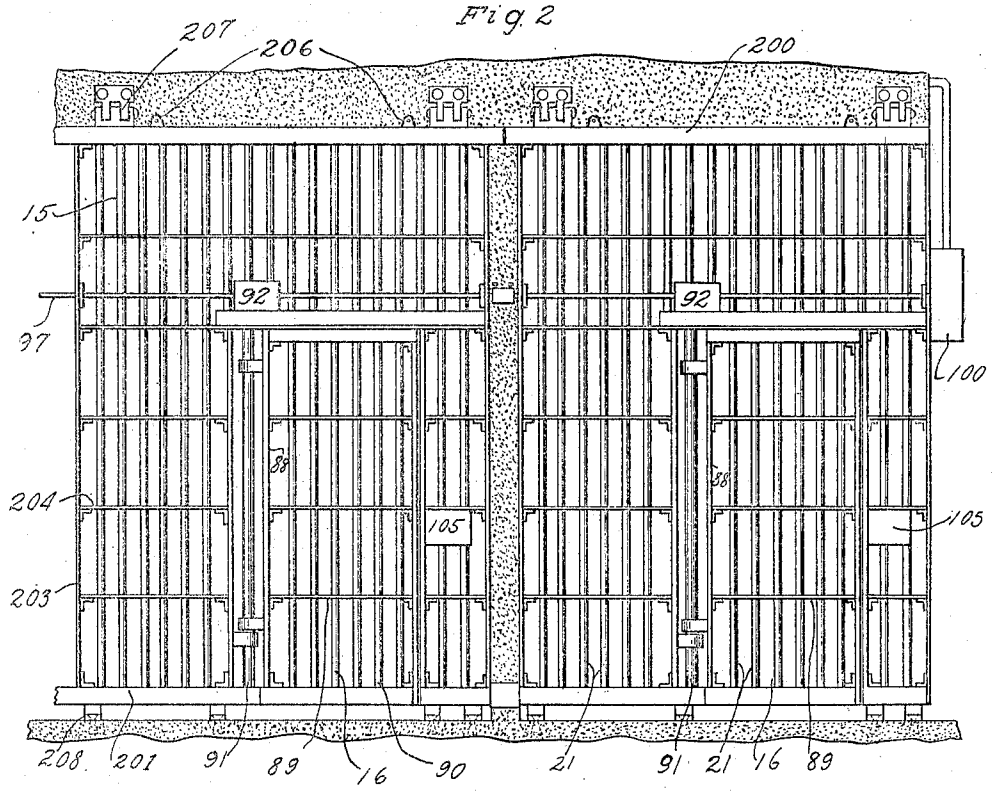


Fig. 2



Witness:
Walter J. Stone.

Inventor:
Charles C. Lamb,
By Rummler & Rummler,
Attys.

C. C. LAMB.

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8 SHEETS—SHEET 2.

Fig. 3

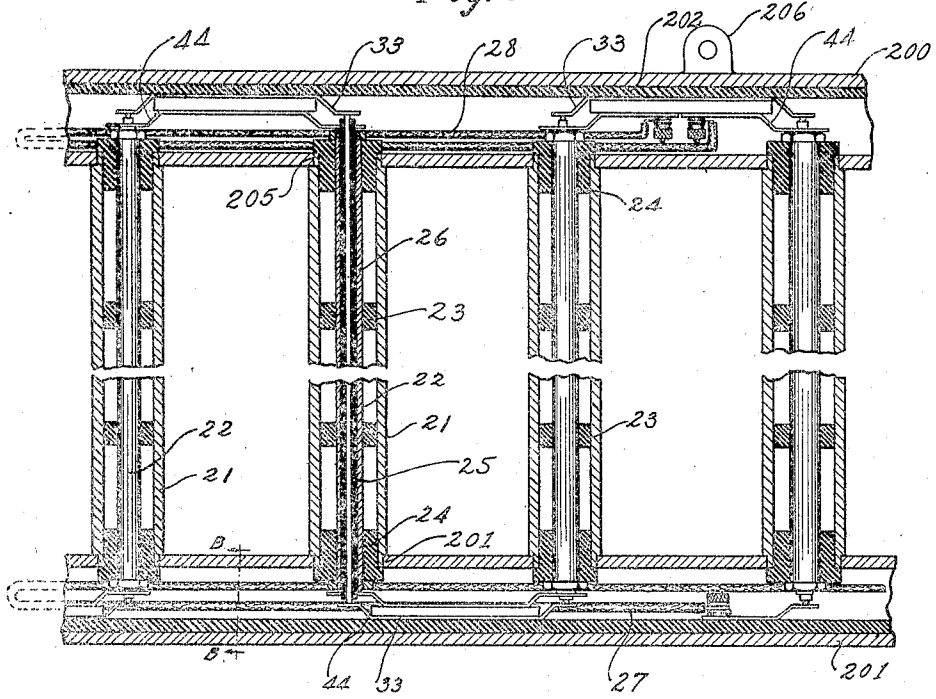


Fig. 4

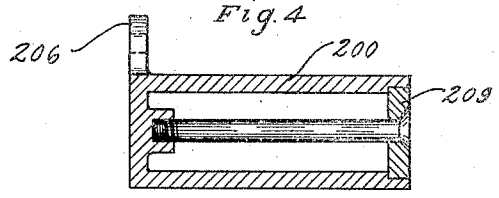
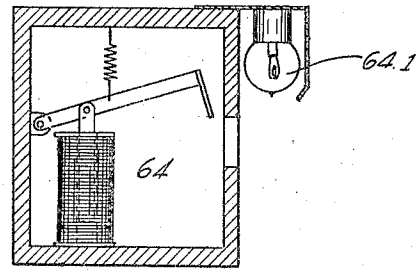


Fig. 30



Witness
Walter F. Stone

Inventor
Charles C. Lamb

By Rummler & Rummler,
Attys.

C. C. LAMB.

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8 SHEETS—SHEET 3.

Fig. 5

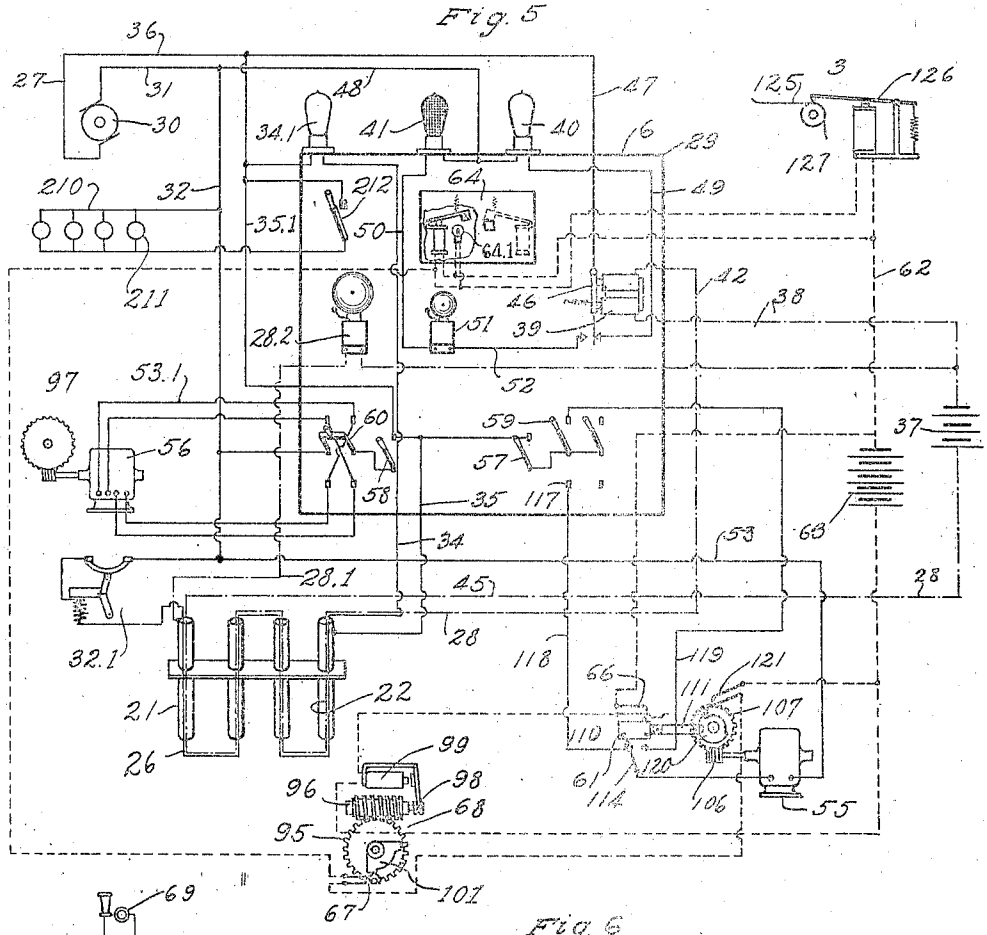
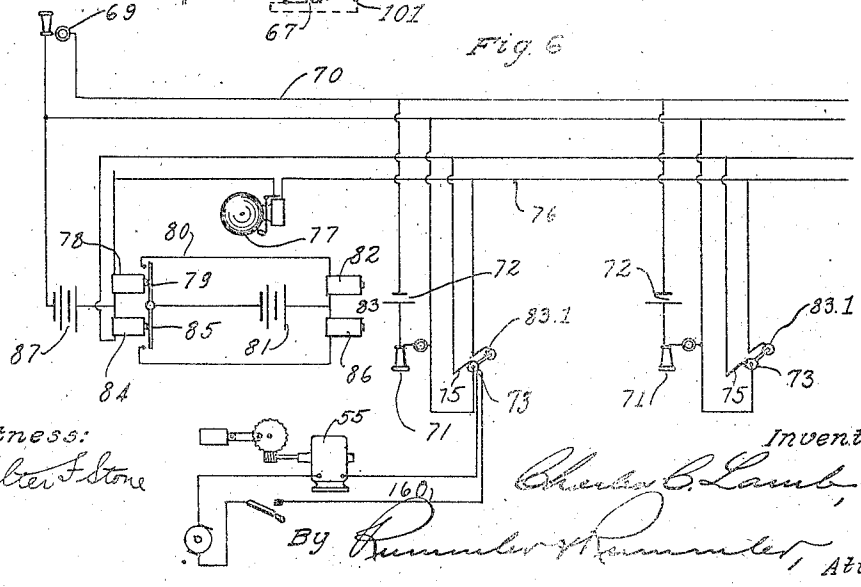


Fig. 6



Witness:
Walter F. Stone

Inventor:
Charles C. Lamb,
By Rummler & Rummler,
Attys

C. C. LAMB.

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8 SHEETS—SHEET 4.

Fig. 7

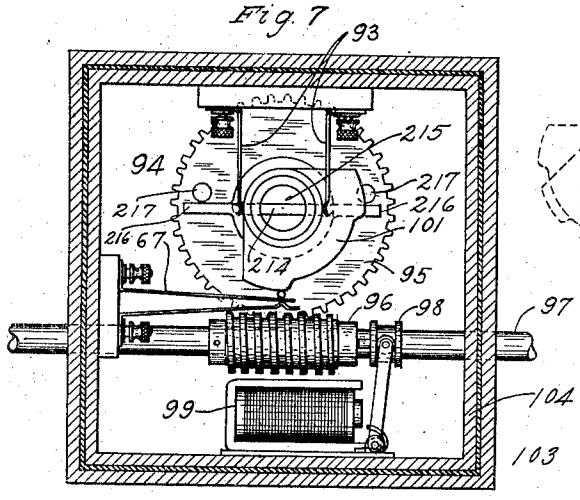


Fig. 8

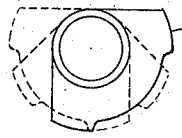


Fig. 9

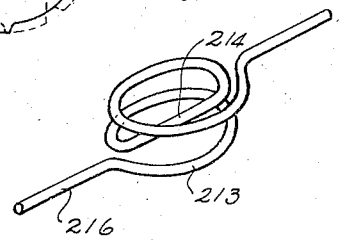


Fig. 10

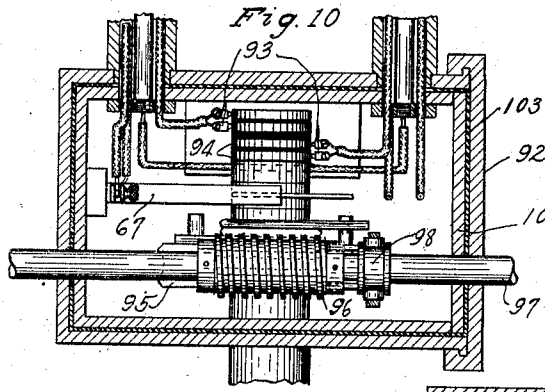
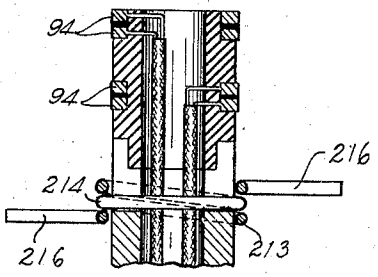
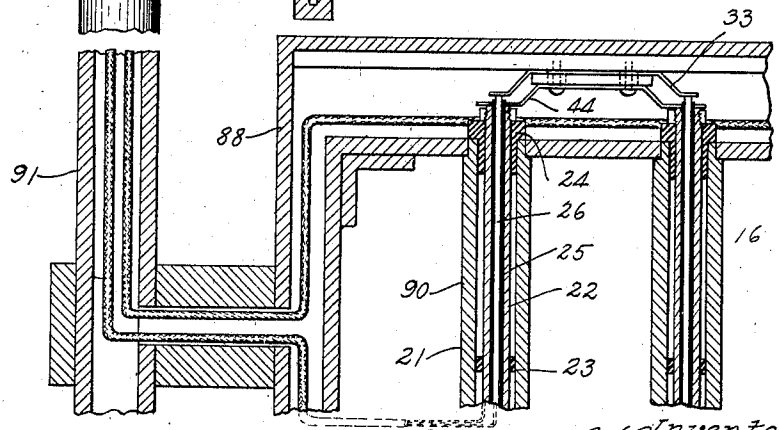


Fig. 11





Witness:
Walter F. Stone.

Inventor
Charles C. Lamb,
By Rummler & Rummler
Attys.

C. C. LAMB.

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8 SHEETS—SHEET 5.

Fig. 12

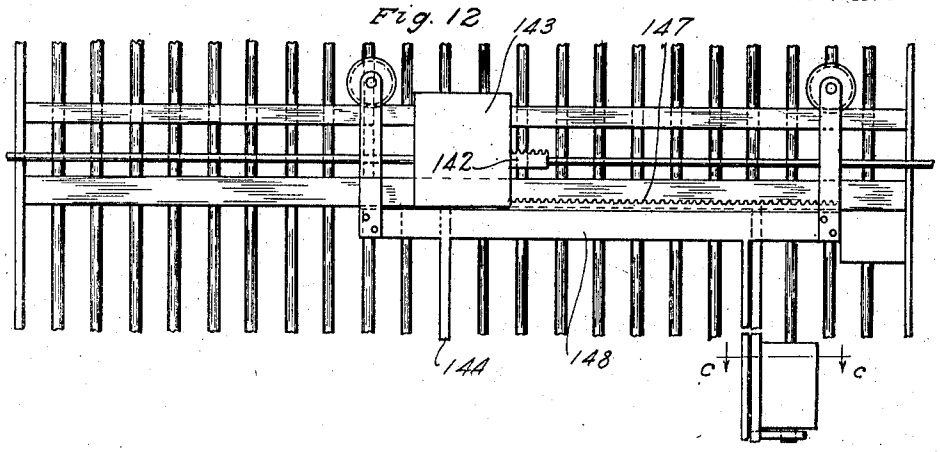


Fig. 13

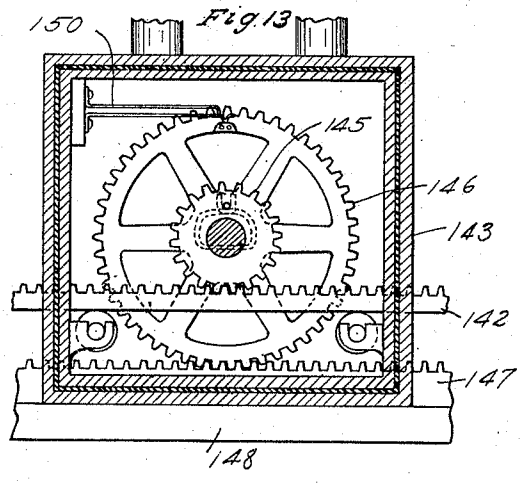


Fig 14

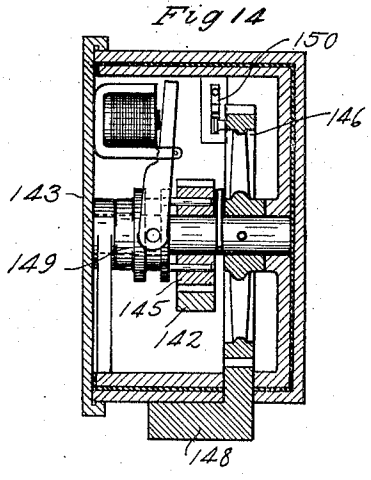
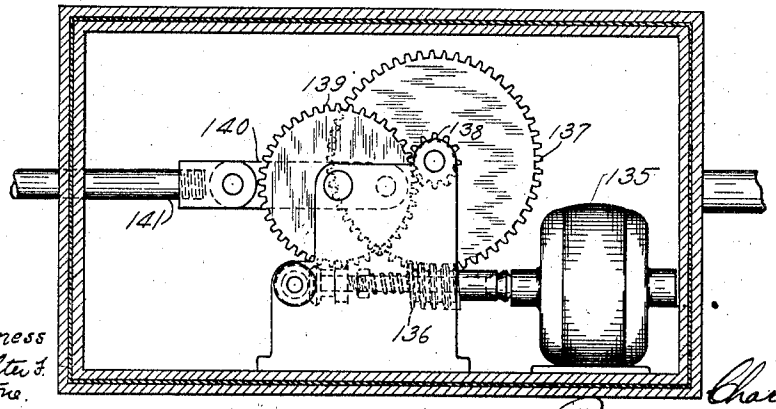


Fig. 15



Witness
Walter F. Stone.

Inventor
Charles C. Lamb,
Rummler & Rummler,
Attys.

By

C. C. LAMB.

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APPLICATION FILED NOV. 10, 1915.

1,302,384.

Patented Apr. 29, 1919.

8 SHEETS—SHEET 6.

Fig. 18.

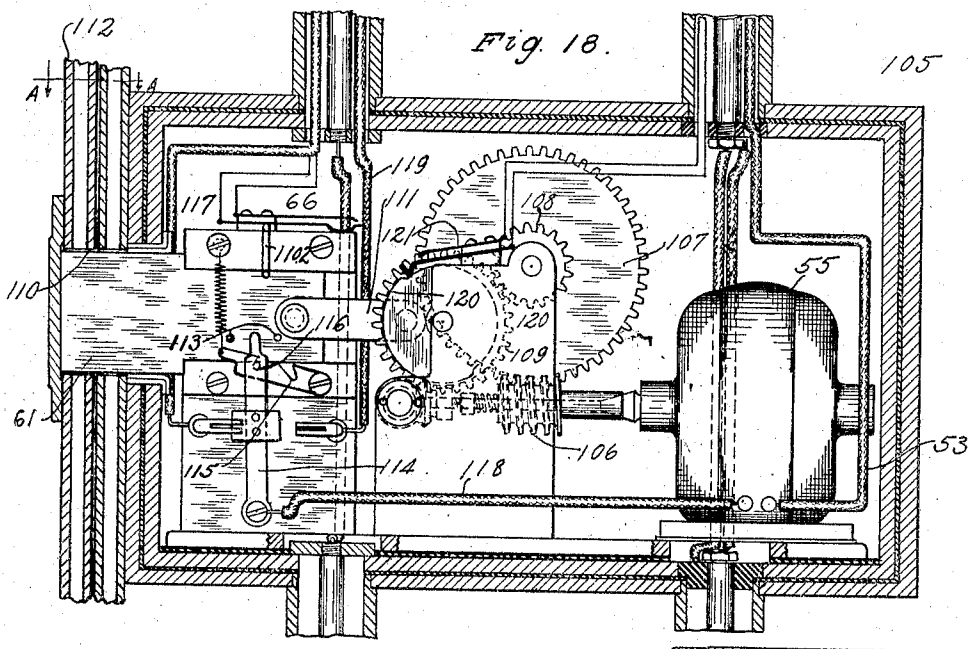


Fig. 19

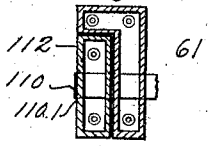


Fig. 20

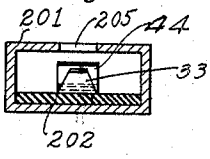


Fig16

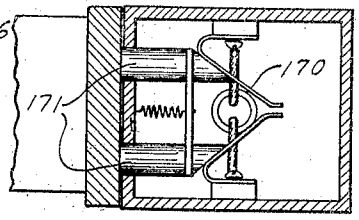
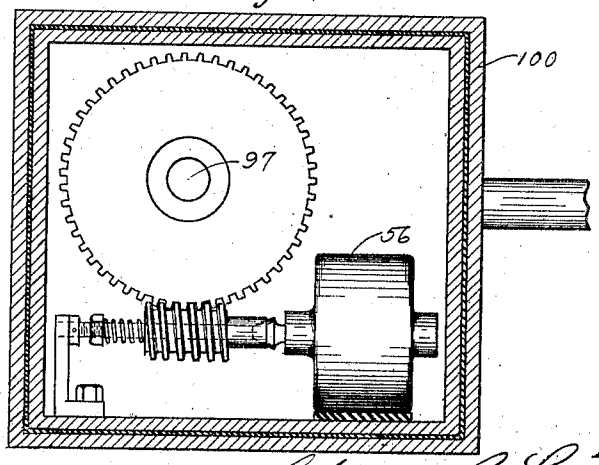


Fig. 17



Witness:
Walter J. Stone

Inventor
Charles C. Lamb,
By Rummler & Rummler, Attys.

C. C. LAMB.

LOCKING, SIGNALING, AND RECORDING CONSTRUCTION.

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8 SHEETS—SHEET 7.

Fig. 21

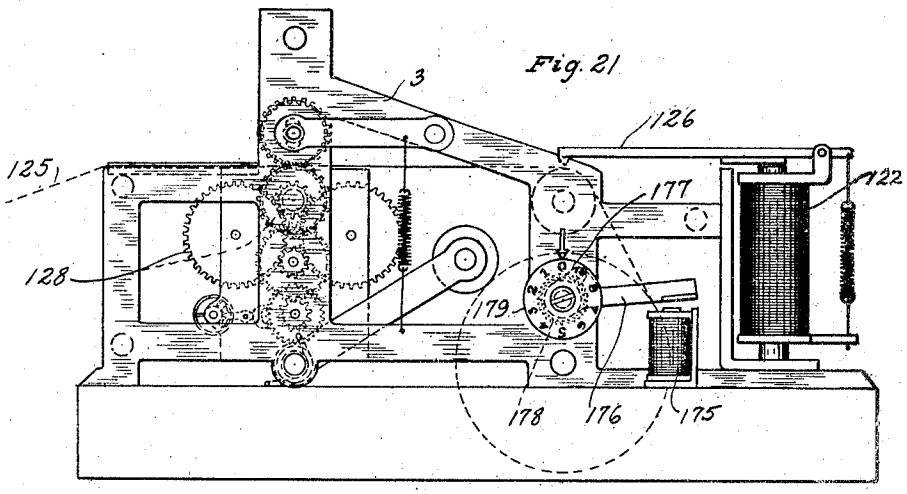


Fig. 22

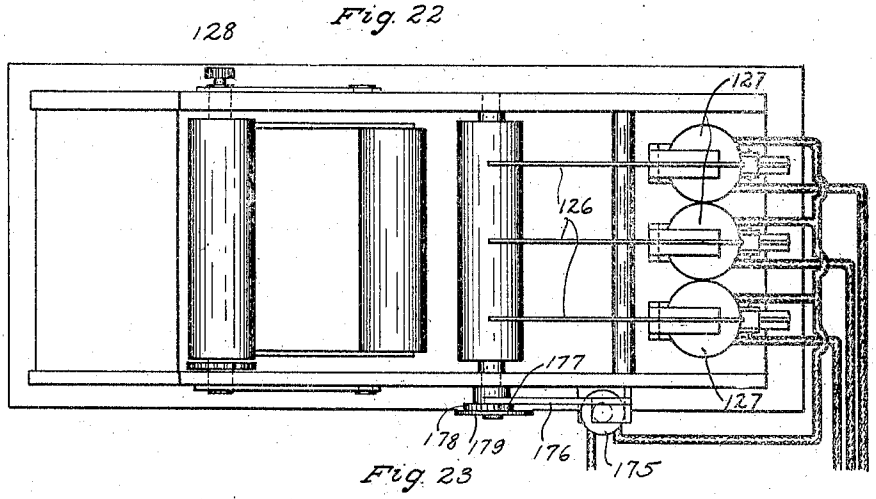
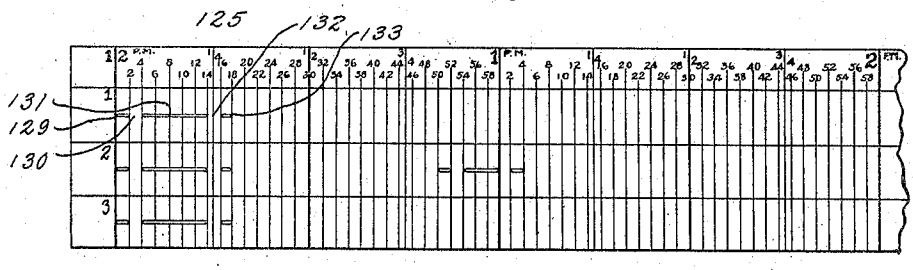


Fig. 23



Witness:
Walter F. Stone

Inventor:
Charles C. Lamb,
By Rummler & Rummler,
Attys.

C. C. LAMB.

LOCKING, SIGNALING, AND RECORDING CONSTRUCTION.

APPLICATION FILED NOV. 10, 1915.

1,302,384. Patented Apr. 29, 1919.

8 SHEETS—SHEET 8.

Fig. 26



Fig. 24

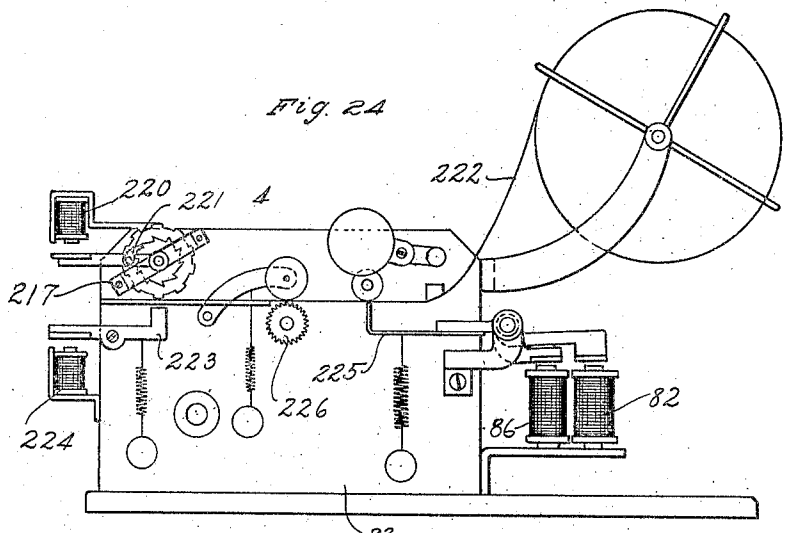


Fig. 25

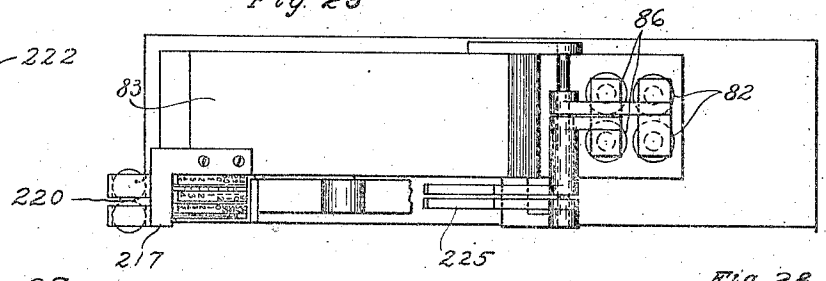


Fig. 27

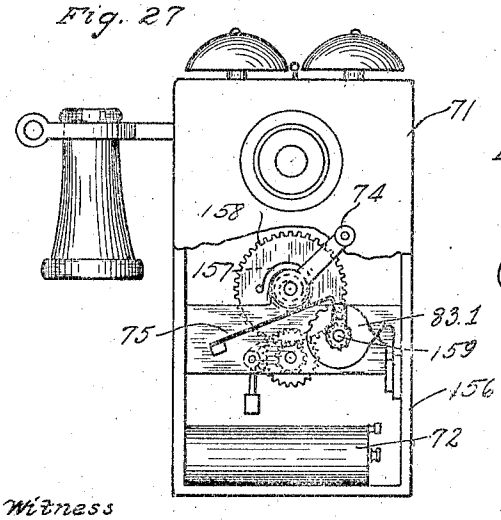


Fig. 29

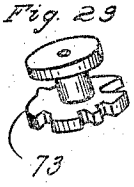
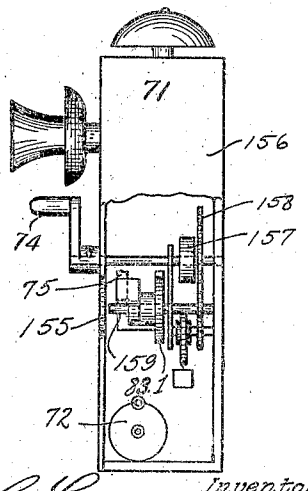


Fig. 28



Witness
Walter F. Stone

Inventor
Charles C. Lamb
By Rummler & Rummler
Attys

UNITED STATES PATENT OFFICE.

CHARLES CALVERT LAMB, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO WILLARD M. McEWEN, OF CHICAGO, ILLINOIS.

LOCKING, SIGNALING, AND RECORDING CONSTRUCTION.

1,302,384. Specification of Letters Patent. Patented Apr. 29, 1919.

Application filed November 10, 1915. Serial No. 60,686.

To all whom it may concern:

Be it known that I, CHARLES C. LAMB, a citizen of the United States of America, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Locking, Signaling, and Recording Constructions, of which the following is a specification.

This invention relates to a signaling and recording system for banks, prisons, jails, safes, etc., whereby the operations of doors are recorded and attempts to cut through bars or other inclosing structures, etc., may be quickly detected. The invention also relates to an improved cell construction which is practicable for installation in buildings of usual and modern construction.

The objects of the invention are to provide improved door operating means and signaling systems therefor; to provide an improved construction of prison bars suitably arranged in electrical circuits to signal and indicate either attempted cuts of the bars or complete cuts therethrough; to provide an improved construction of electrical conducting members within the cell structure for the purpose of avoiding possible breaking of the conductors through aging and continual expansion and contraction under weather changes; to provide an improved sanitary and multiple cell construction which may be wholly independent of the construction of the building; to provide a sectional cell construction permitting quick and easy repairs; to obviate the necessity of making steel or iron cell walls, and thereby provide a practically noiseless cell; to provide a cell construction which may be maintained in alinement irrespective of the settling of the building; to provide cell door operating mechanism which may be controlled from a distant central station; to provide indicating and recording devices at central stations for disclosing to the operator and other officials whether or not the cell locks and cell doors are operated as desired, and the time and length of time any door is open; to provide an improved hinged cell door which is mechanically operated but which cannot injure a prisoner or harm the mechanism if the prisoner should block the door; to provide identification keys for the prison officials and guards, these keys serving to control the operation of recording devices for making a record of the time that any outer prison door is opened, and identify the person responsible for the key; to provide an arrangement of outer prison doors and locks therefor which may be operated only from a central station after an identification key is inserted in the lock; and to provide in a locked casing, suitable recording devices for making a permanent record of the history of the operation of the various prison and cell doors.

A further object of the invention is to provide a prison system making it safe for the warden and officials when living within the prison, and also permitting them to leave the prison with the assurance that prisoners cannot get into the warden's quarters or offices and that orders cannot be disobeyed, since the entire operation of prison doors is placed in the hands of one central operator. The operator cannot leave the operating room until relieved from duty by another operator, since the operating room may be locked against access by means under the control of only the warden or one of his deputies.

An illustrative embodiment of this invention is shown in the accompanying drawings, in which:—

Figure 1 is a sectional plan view of one floor of a prison constructed according to this invention.

Fig. 2 is a detail in front elevation of the cell construction.

Fig. 3 is a sectional detail showing the construction of cell bars.

Fig. 4 is a sectional detail showing the construction of end supporting bars.

Fig. 5 is a diagrammatic plan of the wiring arrangement of one group of cells and the central station switchboard.

Fig. 6 is a wiring diagram of the telephone system employed in connection with outer door locks.

Fig. 7 is a detail in plan of the cell door operating mechanism.

Fig. 8 is a detail of the cam appearing in Fig. 7 showing the cam in its movable position.

Fig. 9 is a detail of a spring appearing in Fig. 7 showing the cam in its movable position.

Fig. 10 is a sectional detail in side elevation of cell door operating mechanism and the cell door construction.

Fig. 11 shows in vertical section a cell door hinge.

Fig. 12 shows in side elevation a modified form of cell door operating mechanism.

Fig. 13 is a sectional detail in front elevation of part of the door operating mechanism shown in Fig. 12.

Fig. 14 is a sectional detail in side elevation of the mechanism shown in Fig. 13.

Fig. 15 is a detail in front elevation of a motor and gearing for driving the cell door operating mechanism shown in Figs. 13, 14 and 15.

Fig. 16 is a sectional detail taken on the line C—C of Fig. 12.

Fig. 17 is a detail of a motor and gearing for driving the cell door operating mechanism shown in Fig. 7.

Fig. 18 is a detail in front elevation with the casing in section of a cell door lock and motor for operating the same.

Fig. 19 is a sectional detail taken on the line A—A of Fig. 18.

Fig. 20 is a sectional detail taken on the line B—B of Fig. 3.

Fig. 21 shows in side elevation an electrical recording device for making records of the unlocking and opening and locking of cell doors.

Fig. 22 is a plan view of the recorder shown in Fig. 21.

Fig. 23 is a detail of the record strip for the recorder shown in Fig. 21.

Fig. 24 shows in side elevation an electrical recording device for keeping records of the operation of outer prison doors.

Fig. 25 is a plan view of the recorder shown in Fig. 24.

Fig. 26 is a detail of the record strip of the recorder shown in Fig. 24.

Fig. 27 shows in front elevation telephone and signaling instruments which are employed in connection with the outer door locking mechanism.

Fig. 28 shows in side elevation the device appearing in Fig. 27.

Fig. 29 is a detail of a key for coöperating with the signaling mechanism appearing in Figs. 27 and 28.

Fig. 30 is a detail view of the annunciator shown in Fig. 1.

Prisons as ordinarily constructed make it advisable and necessary on the part of prison officials to deprive the prisoners of many privileges which could to advantage be given them, if it were not for the danger of escapes and commission of further crimes. It has also been found necessary in the conduct of such prisons to permit the guards to come more or less in contact with the prisoners. The present invention is designed to keep the guards and prisoners separated by bar constructions and control the opening and closing of cell doors and other doors within the prison from a central station. It therefore becomes impossible for guards to disobey certain orders, such as against secret conferences with prisoners, providing them with liquor, drugs, accepting bribes, and permitting meetings between prisoners and outside associates. The entire control of the prison is accomplished from a central station, and the carrying out of orders is thus more or less guaranteed by mechanical and electrical means.

In the drawings, the invention is shown by way of example, as applied to a prison. In Fig. 1, which represents one floor of a prison, 1 indicates the warden's office, having a safe 2 in which are located recording instruments 3 and 4 for making permanent records of the operation of all cell and outer doors of the prison and key identification numbers of those passing through the outer doors. The operator's room 5 contains a switchboard 6 by means of which all prison doors are controlled, and includes certain signaling devices for signaling a cut through any of the cell bars, or attempted cuts, and also whether or not the cell doors and outer doors are operating as intended by the operator.

A motor generator and auxiliary power supplying devices 7 and 8 are shown in room 5. The reception room 9 is opposite the warden's room 1 and the operator's room 5, while the cell rooms 10 and 11 are shown located in the outer wings of the building. Each cell room contains a double row of cells 12 which are arranged back to back, but spaced apart to provide a space 13 in which plumbing fixtures may be located. The solid walls 14 of the cells may be formed of concrete or any desired material, since each double series of cells is surrounded by a row of bars 15 which prevent escapes, even if the solid walls are broken through. The cell doors 16 are included in the row of surrounding bars 15.

A few feet distant from the bars 15 is a row of bars 17 providing an inclosed space or exercising court between the bars 15 and 17, and also preventing guards and visitors from getting near the cells. Doors 18 are shown located at the ends of these courts. Between the outer row of bars surrounding the cells and the prison walls 19 is a space 20 to provide a passage for guards, prison officials and visitors.

Cell construction.

The cells, as mentioned above, have a common surrounding bar structure, the remaining three walls of each cell being formed of concrete or any other desired material. Each bar of the double row of bars 15 and 17 surrounding the cells, and also the cell doors, are constructed as shown in Figs 3 and 10.

These bars have outer shells 21 surrounding tubes 22 and insulated therefrom by the gaskets 23 and 24. Within tube 22 is a tube 25 of fiber or other insulating material surrounding a metallic bar or rod 26. The bars 26 are preferably within a high tension electric circuit 27, and may be in series, whereas the tubes 22 are in series within an ordinary signaling circuit of low tension indicated by the dash and dot lines 28 (Fig. 5). The outer shell 21 is included in a common ground return for the circuits 27 and 28. Electrical connections between the bars are effected through conduits 200 and 201 comprising the upper and lower supporting members for the bars, as shown in Fig. 3.

These conduits are preferably rectangular tubes in which are inserted strips of insulating fiber 202 carrying the spring contacts 33 and 44. As appears in Fig. 2, the bar construction of cells comprises a plurality of sections, each consisting of top and bottom conduits 200 connected together by the flat end bars 203, which in turn are braced by the transverse flat connecting bars 204. The tubes 21 pass through apertures in the bars 204 and their ends are slightly reduced in diameter to fit in sockets 205 in the conduits 200 and 201. By this construction the sections comprising a cell construction may be easily assembled by first inserting the fiber insulating strips 202 with the contacts 33 and 44 mounted thereon into the metallic conduits 200 and 201. Then all of the tubes 21, with their inner tubes and rods assembled therein, are inserted through the apertures in cross bars 204 and the sockets 205 in conduit 200. Finally, the lower conduit 201 is placed into position fitting over the lower ends of tubes 22 and is secured to the vertical bars 203.

The upper conduits 200 are preferably provided with apertured ears 206 whereby the sections may be bolted into the concrete structure of the prison. The sections of the cell structure are also hinged in the concrete wall above the cells, as shown in Fig. 2, by the hinges 207. The purpose of this hinge arrangement of the sections is to enable their repair or the renewal of bars without removing the section. When repairs are made to cell sections, the bolts are removed from ears 206, and also cleats 208 on which the lower conduits 201 rest, are removed from the floor. A section may then be swung outwardly around its hinges 207 and the bottom conduit 201 removed. Any of the bars may then be easily removed and new ones inserted without requiring any special work in connecting them in their respective circuits, since the mere insertion of a bar causes the inner rod 26 to engage spring contacts 33 and the tube 22 to engage the spring contacts 44 in the upper and lower conduits. The heads of the bolts passing through cleats 208, and also the ears 206, are preferably countersunk in the same, to require that in removing a bolt it must be drilled or burned out. If desired, the upper conduit 200 may be provided with a removable plate 209, as shown in Fig. 4, for the purpose of inspecting or changing circuit connections in the conduit without removing the fiber strip 202.

An important feature of this particular construction of cells is that the lower transverse conduits 201 are spaced upwardly from the floor and provide no corners in which dirt could collect.

Mechanism for operating the cell doors and locks will be described further on.

Switchboard, wiring plan and arrangement of recording devices.

In Fig. 5, the square 29 represents the outline of a switchboard from which the operation of the jail doors is controlled. In this diagram the generator or motor generator 30 is shown connected by conductors 31 and 32 and circuit breaker 32.1 to one of the rods 26. This rod is connected to all of the other rods 26 in the cell bars through the contact springs 33 (Fig. 3), these springs being arranged to connect the rods 26 at their upper and lower ends in alternate pairs, as appears in Fig. 5. The return circuit for these rods is represented by the conductor 34, including lamp 34.1, and through which the current normally flows. A conductor 35, grounded on one of the outer tubes of the cell structure, is connected by conductor 35.1 to the return side of the motor line 36, and forms a shunt around lamp 34.1. One of the purposes of this high tension circuit is that if in sawing through a bar, the signaling apparatus which includes in its circuit tubes 21 and 22, fails to operate, the saw would be destroyed while in contact with both rod 26 and one of the tubes 21 or 22, or at least to permit a temporary rush of current sufficient to operate circuit breaker 32.1 and extinguish lamp 34.1. In this manner the operator at the switchboard is apprised of the attempted cuts of the cell bars.

The circuit 28, shown by the dot and dash lines in Fig. 5, receives energy from battery 37. One side of this battery is connected by conductor 38 to an electro-magnetic switch device 39 for controlling the circuit of signaling lamps 40 and 41. The conductor 38, after passing around the electromagnet 39 connects with a conductor 42, which is in metallic contact with one of the tubes 22, and these tubes are connected at their upper and lower ends in alternate pairs by the contact springs 44. The last tube in the series is in electrical connection with the return conductor 45 of bat-

tery 37. By this arrangement, a current is constantly flowing through the circuit 27, maintaining armature 46 of electro-magnet 39 in the position shown in Fig. 5.

The armature is connected by conductor 47 to one side of generator 30. The opposite side of the generator 30 is connected by conductor 48, with lamps 40 and 41 in parallel. The circuit may be completed through lamp 40 and conductor 49 through the armature 46 to conductor 47, or the circuit may be completed through lamp 41, conductor 50, signaling bell 51 and conductor 52 to armature 46. Since the current normally flows through electro-magnet 39, the circuit through the white lamp 40 is normally closed, but if the low tension circuit 28 for electro-magnet 39 is opened, for instance by cutting through one of tubes 22, or grounded by a saw connecting it with an outer tube 21, armature 46 will be released and under the action of its spring, open circuit of lamp 40 and close the circuit through red lamp 41, thus signaling to the switchboard operator that one of the cell bars is being cut.

When circuit 28 is thus grounded on one of tubes 21, it finds a return to battery 37 through conductor 28.1 which, as shown in Fig. 5, is connected to one of a series of tubes 21. Conductor 28.1 connects bell 28.2 with battery 37. This bell accordingly gives an audible alarm when a bar is being cut.

Circuits 53, one of which is represented by full lines, also receives energy from generator 30 and include cell door lock operating motors 55. A circuit 53.1 is provided for cell door operating motor 56. These circuits are controlled by line switches 57 and 58 and a plurality of selecting switches 59 and a switch 60. By manipulation of switches 59 the cell door locking bolts 61 may be selected and operated as described further on, and by means of the reversing switch 60 the cell door operating mechanism may be operated in either direction as desired from the switchboard. Motor 56 is common to a plurality of cell doors which may be selected and clutched therewith as desired.

The circuit 62, represented by the dotted lines, receives energy from battery 63 and controls the operation of an annunciator 64 on the switchboard, the function of which is to indicate to the operator whether or not locks and doors selected for operation are operated as desired. This circuit also includes visual signals 64.1 and a recording instrument 3 whereby a permanent record of the operations of the cell doors and locks may be secured, and is controlled by switches 66 and 121 operated by the cell door locking devices, and switches 67 operated by cell door clutches 68. The various operating and recording devices mentioned in the above description of the electrical circuits will be described.

A circuit 210 including preferably colored lamps 211, shown in Figs. 1 and 5, is controlled by switch 212 on switchboard 6. This circuit is provided so that the operator may quickly signal guards at times that attempted cuts of bars are indicated at the switchboard.

Telephone system and outer door operating circuits.

Fig. 6 represents diagrammatically, a telephone system providing means of communication between the outer prison doors and the switchboard operator who controls the operation of these doors.

The operator's telephone 69 is in a circuit 70 including in multiple telephone sets 71 located at the various outer prison doors. This circuit may be energized by the batteries 72 and preferably includes the customary signaling devices in telephone systems. Each prison official or guard is provided with an identification key 73, such as shown in Fig. 29. When one of these keys is inserted in one of the local telephone sets at an outer prison door and handle 74 (Fig. 27) given a turn, the key will rotate relatively to contact 75 (Figs. 6 and 27) causing a number of impulses to be sent over the circuit 76 and causing the operation of an impulse bell 77 located on the operator's switchboard and the operation of electro-magnet 78, the armature 79 of which serves to close the local circuit 80, including a battery 81, an electro-magnet 82 and recording mechanism 83 shown in Figs. 24 and 25. Keys 73 also serve to control the circuits of corresponding door lock operating motors 55, which circuits are finally closed by the switchboard operator.

Mounted on the same shaft with key 73 is a contact member 83.1 in circuit with electro-magnet 84. This magnet serves to operate armature 85 and close the circuit of electro-magnet 86. This magnet operates means for recording a door number as described further on. The circuits including magnets 78 and 84 receive energy from battery 87.

The local telephone sets located at the outer prison doors and the warden's door are constructed as shown in Figs. 27 and 28. An aperture 155 is provided in the casing 156 of the local telephone sets to receive the identification key 73 for engaging the spring contact member 75 and thereby causing the key member to be transmitted to the operator when this key is rotated. The key is rotated by means of a spiral spring 157 in gearing 158 connecting the spring with the rotatably mounted spindle 159 which receives the key. After a key is placed on spindle 159, crank 74 is rotated, causing spring 157 to impart a single rotation to shaft 159. The key may

then be withdrawn. When the key 73 is in place on spindle 159, it serves to close the circuit 160 of the corresponding door lock operating motor 55. By this arrangement it is impossible for the central operator to unlock one of the outer doors or the warden's door, except when an identification key is inserted in the local telephone set.

Cell doors.

The cell doors comprise a frame structure including surrounding metallic conduits 88 connected by the cross braces 89 (Fig. 2), and the vertically extending bars 90. These bars are constructed as previously mentioned and include the outer shells 21, inner tubes 22 and rods 26 insulated therefrom. The wires for carrying the current for energizing the bars pass through the rotatably mounted hollow bar 91 (Fig. 10) on which the door is mounted.

The upper ends of bars 91 extend into fixed boxes 92 containing brushes 93 and collector rings 94 by means of which the door may be energized regardless of its rotation. Connected to the rotatable bar 91 is a worm wheel 95 meshing with a worm 96 loose on shaft 97, but which may be clutched therewith by clutch 98. The operation of this clutch is effected by means of electro-magnet 99 controlled by switch 66 (Fig. 5). By this means if the central operator selects and unlocks one of the cell doors, the operation of latch 61 for such door will cause the closing of corresponding switch 66 energizing magnet 99 which in turn effects the clutching of worm 96 with shaft 97. This shaft is common to a plurality of cell doors as indicated in Fig. 2. It is rotated by a motor 56 located in the housing 100 at one end of a tier of cells.

Fixed on each cell door shaft 91 is a cam 101 coöperating with a switch 67 serving to hold the switch in closed position when the door is in either its wide open or closed positions. Switch 67 controls the operation of annunciator 64 on the switchboard and also the operation of a recording device 3 located in the warden's office. The central operator is thus apprised of the proper working of a cell door, and a permanent record is made of the length of time that any cell door is open. A housing 92 surrounding each door operating mechanism is preferably made from a plurality of interfitting metallic casings insulated from each other by fiber walls 103. The inner metallic casing 104 has metallic connection with one of the inner tubes 26 of the cell bars, and accordingly if an attempt is made to saw through one of the boxes 92 the saw would ground the inner casing on the outer casing and in this manner effect the operation of signals on the switchboard as previously described.

The worm wheel 95 is preferably journaled on bar 91 for the purpose of permitting the use of a flexible connection between the bar and the worm wheel so that the door operating mechanism will not be injured if the operation of the door is blocked, and also to prevent injury to a prisoner in case he should stand in the way of the door. This resilient connection comprises a spring 213 bent into the form shown in Fig. 9. The central portion 214 of the spring passes through a hole 215 in the rotatable bar 91 which carries the door. The free ends 216 of spring 213 are engaged by pins 217 carried by worm wheel 95, depending upon the direction of rotation of the worm wheel. This spring accordingly provides a resilient driving connection serviceable both in opening and closing a door.

Shaft 97 comprises a plurality of sections of the width of the cell sections and coupled together as shown in Fig. 2.

The door mechanism shown in Figs. 12 to 15 inclusive is somewhat similar to the door operating mechanism above described, but shows an altered arrangement adapted for sliding doors. In this arrangement the door operating motor 135 through the worm 136 drives worm wheel 137 which carries fast a pinion 138 meshing with gear 139. A pitman 140 is pivoted at one end to gear 139 and at its opposite end to a reciprocating bar or shaft 141. Racks 142 are carried by this bar and pass through boxes 143 located above each sliding cell door 144.

Each rack 142 meshes with a pinion 145 which may be clutched to a gear 146, in turn meshing with a rack 147 fast to the upper transverse bar 148 of the corresponding cell door. Pinion 145 and gear 146 may be clutched together by a magnetically operated clutch 149 controlled from the central switchboard in the same manner as clutches 98 (Fig. 7) employed in connection with the oscillating doors. Contacts 150 shown in Fig. 13 serve the same function as contact 67, shown in Fig. 7, mainly to control the circuit of recording mechanism to indicate the time that any door is opened.

The switches 170, shown in Fig. 16, normally contact with slidable plungers 171, which are connected with the conductors passing through the sliding door and serve the function of the brushes and connector rings 93 and 94 of the oscillating door shown in Fig. 10. Plungers 171 move outwardly when the door is opened, thus breaking the circuit connections with the wiring in the door, and permitting spring contacts 170 to close and thereby by short-circuiting the door, preventing the circuit from being opened upon the opening of sliding doors.

Cell door locks.

The cell door locks are each mounted in a housing 105 (Figs. 2 and 18), constructed

similar to housing 92 (Fig. 10) and having similar circuit connections with signaling devices on the switchboard. The motors 55 are located in housings 105 and drive worms 106 meshing with the worm wheels 107. These wheels are rigid with gears 108 meshing with gears 109. The gears 109 are connected to the locking bolts 61 by links 111. Thus, a half rotation of gear 109 serves to withdraw bolt 61 from the recess 110 in the fixed frame member 112 of the cell. After the cell door is closed, the bolt is returned to its normal position by a continued operation of the motor, causing gear 109 to make another half turn. The bolt 61 carries a cam member 110.2 serving to close switch 66 when the bolt is in unlocked position. Switch 66 serves to select and operate the clutch magnet 99 for the corresponding cell door operating mechanism. Bolt 61 also carries pins 113 coöperating with a pivoted switch arm 114 in the motor circuit insuring that the circuit will open after the desired operation of the motor. The switch arm 114 is given the desired connecting action by means of the pivoted cam arm 115 coöperating with pin 116 on the switch arm and urged into engagement therewith by spring 117. With this arrangement to operate the motor for the purpose of unlocking the door, switch 59 (Fig. 5) is closed at the contact 117 permitting the current to flow from the line down through conductor 118 to the motor and conductors 53 and 32 back to the line. When the motor has operated sufficiently to unlock the door, this circuit is opened by switch arm 114 which moves to position to connect the motor with conductor 119. Then to again lock the cell door the operation may, by reversing the switch 59, again connect the motor in circuit with the line. A cam 120 for operating a switch 121 is rigid with gear 109. This switch is in the circuit 62 including the annunciators and recording device 3 and serves to indicate and record the length of time any one cell door is unlocked.

Recording devices.

The recording device shown in Figs. 21 and 22 includes a clock driven record strip 125 arranged to pass below perforating devices 126 operated by the electro-magnets 127. The clock for driving record strip 125 is indicated by the gearing 128 and may, if desired, include time printing mechanism, or the strip may be arrangd with time intervals permanently printed thereon, as indicated in Fig. 23. Upon opening of any door lock, its corresponding magnet 127 is given a single impulse, cutting the paper as indicated at 129. While the door is opening, this circuit is opened by cam 101, (Figs. 5 and 7) and the corresponding blank space 130 on record strip 125 indicates the time employed in opening the door. When the door is in its full open position, cam 101 serves to hold the contact 67 in closed position, thus causing the operation of the corresponding perforator 126, making a cut 131 in the record strip as the same is fed forwardly and thereby making a record of the time that a door remains open. The circuit is again opened during the closing of the door, resulting in the blank space 132 on the record strip, and when the door is fully closed, the circuit is closed by cam 101, causing the perforator 126 to again operate and perforate the paper as indicated at 133. The circuit is finally opened at switch 121 when the door locking bolt is returned to its normal locking position.

An electro-magnet 175 is shown in Fig. 22 in circuit with each of magnets 127, and the armature 176 of this magnet is thereby given an impulse each time one of the magnets 127 is energized. Armature 176 carries a pawl 177 for engagement with a ratchet 178 fixed to a number disk 179. By glancing at this disk, the warden may learn whether or not any of the cell doors have been opened during some predetermined lapse of time, such as between 5:00 o'clock at night and 5:00 o'clock in the morning, during which time the cell doors ordinarily should remain closed and locked.

The recording device shown in Figs. 24 and 25 for recording the time of operation of outer prison and the number of the identification key employed, includes a time printing mechanism 218 driven by a clock controlled circuit (not shown), but it serves to energize magnets 220 for operating a ratchet feeding device 221 for the type wheels. The impressions are taken on record strip 222 by a magnetically operating platen 223. The magnet 224 for operating platen 223 is in circuit with magnets 82 and 86, consequently, when the perforating knives 225 are actuated by magnets 82 and 86, an impression of the time is simultaneously taken on the record strip. The feeding devices 226 for the record strip may be driven by the coil spring or any other suitable means under the control of circuit 80 (Fig. 6), which includes the electro-magnet 82 and 86.

Operation.

In the operation of the prison recording and signaling system, the operator is locked in room 5 (Fig. 1), the door of this room being under the control of switchboard 6.1 in the warden's office 1. Likewise, the door to the warden's office and all outer doors of the prison are controlled from switchboard 6 in the operator's room. Telephone sets 71, as appear in Fig. 1, are located near each of the main doors of the prison, and when persons desire to pass through any of these

doors, they may signal the operator by lifting the receiver from the hook, who, when satisfied of the identity of the person, may either open the door or instruct such person to insert his identification key in the local telephone set 71. Such person then rotates crank 74 (Fig. 27), causing his number to be signaled to the operator in room 5 and also to be recorded by one of the recording devices 4 in the warden's office 1. These instruments, through circuit connections with the locks of the prison doors, also serve to record the time that any door is unlocked.

In controlling individual cell doors, any one of these doors may be unlocked by closing the circuit of the motor 55 (Fig. 18) for operating such lock. The locking bolt 61 removed to unlocked position, closes the circuit of the corresponding magnetic clutch 99 (Fig. 5), causing the door operating mechanism to be clutched to shaft 97 (Fig. 2). This shaft is then rotated by motor 56 (Fig. 17) by an operation of switch 60 on switchboard 6 (Fig. 5). By reversing the position of this switch, the door may be closed and again relocked by a further rotation of motor 55 (Fig. 18). Since the recording device shown in Figs. 21 to 23 inclusive is controlled to make records of the unlocking and operation of any of the cell doors, the warden may keep himself informed as to whether or not these doors are operated at usual times and as required by the rules of the prison.

I claim:—

1. A construction of the class described, comprising a plurality of cells, a door for each of said cells, electrically operated locking means for each of said doors, electrically operated means for opening and closing said doors and including an operating shaft common to all of said doors, and electrically operated means for clutching any one of said doors to said shaft, said means being under the control of the respective door locks and remaining clutched with said shaft as long as the door remains open.

2. A cell door construction, comprising a hollow frame rigidly secured to a rotatably mounted hollow supporting shaft, tubular bars connecting said frame members, electrical conductors passing through said tubular bars and hollow shaft, collector rings mounted on said shaft, and a circuit including signaling devices and brushes engaging said collector rings.

3. A cell door construction, comprising a supporting shaft journaled in a rigid frame, a door carried by said shaft, an electric circuit including signaling apparatus, contact members in said circuit, and a cam carried by said shaft arranged to engage said contact members for the purpose of opening and closing said circuit to indicate when the door is in its open and closed positions.

4. A construction of the class described, comprising a plurality of cells, a cell door for each of said cells, electrically operated locking means for each of said doors, door opening and closing mechanism comprising a drive shaft common to all of said doors, means for clutching any one of said doors to said drive shaft, said means being under the control of the respective door locks, and a circuit under the control of said locking means for indicating when said locking means is in unlocked position.

5. A construction of the class described, comprising a plurality of doors, electrical means for opening and closing any of said doors, means controlled by movement of the doors for indicating whether the same are open or closed, and means for recording the movement of said doors.

6. A construction of the class described, comprising a plurality of doors, electrically controlled locks for said doors, circuits for said locks including a switchboard located at a distance from the doors, and indicating means controlled by said locks for indicating and recording the condition of the same.

7. A construction of the class described, comprising a door, electrically controlled operating means for opening and closing said door, an electrically controlled lock for said door, circuits for said door operating and locking means, means for controlling said circuits, and mechanism under the control of said door locking means for indicating to an operator whenever the door locking means is in locked or unlocked position and for indicating when the door is being opened.

8. A cell door construction, comprising a bar grating, a rigid frame at one side of said bar construction, a shaft journaled in said frame, said door being secured to said shaft, operating means for said shaft loosely journaled thereon, and a resilient connection between said operating means and shaft whereby the shaft may be rotated in either direction through said resilient connection.

9. A cell door construction, comprising a bar grating, a rigid frame at one side of said bar construction, a shaft journaled in said frame, said door being secured to said shaft, operating means for said shaft loosely journaled thereon, and a coil spring rigidly secured to said shaft and having oppositely extending parts in position to be engaged by said operating means in either direction of movement of the same.

10. A grating or bar construction of the class described, comprising hollow end supporting members, a plurality of tubular bars connecting said supporting members, sockets in said supporting members for receiving said tubular bars whereby said bars may be individually removed, electrical conductors passing through said tubular bars, contact devices slidably mounted in said tubular

end members and arranged to engage said conductors, and separate means for connecting said hollow end members for the purpose of retaining the bars in place.

11. A construction of the class described, comprising a plurality of sections of grating, each of said sections including a door and door operating mechanism, a shaft for driving the door operating mechanism, and mountings for said grating sections permitting independent adjustment thereof for the purpose of maintaining alinement of the sections.

12. A construction of the class described, comprising a plurality of sections of grating, each of said sections having a hinge connection to the permanent structure of a building, and means for securing said sections against movement around their hinges.

13. In a system of the character described, the combination of a compartment having a door, electrically actuated locking means for said door, electrically actuated means for opening and closing said door, means for indicating when said locking means is in unlocked position and for indicating when said door starts to open, and a circuit including said locking means and said indicating means.

14. In a system of the character described, the combination with a compartment having a door, of electrically operated locking means for said door, electrically operated means for opening and closing said door, means for indicating when said locking means is in unlocked position and for indicating when said door starts to open, means for making a record of the time when the door locking means is moved into unlocked position and the time consumed in opening and closing said door, and a circuit including said indicating and recording means.

15. In a system of the character described, the combination of a plurality of compartments, each having a door, electrically actuated locking means for each of said doors, electrically operated means for opening and closing said doors, either simultaneously or independently, means at a central station for indicating when each of said locking means is in unlocked position and for indicating when each of said doors starts to open, and a circuit including said locking and indicating means.

16. In a system of the character described, the combination of a plurality of compartments, each having a door, electrically actuated locking means for each of said doors, electrically operated means for opening and closing said doors, either simultaneously or independently, means located at a central station for indicating when each of said locking means is in unlocked position and for indicating when each of said doors starts to open, means out of the control of the operator at the central station for recording the time that each door is locked and unlocked and the time consumed in the opening and closing of the door, and a circuit including said door locking mechanism and said indicating and said recording means.

17. In a system of the character described, the combination of a compartment, at least one wall of which is composed of a plurality of bars, electrically actuated means at a central station for indicating whenever any of said bars is cut, and a circuit including said bars and said indicating means.

18. In a system of the character described, the combination of a compartment, at least one wall of which is composed of a plurality of bars, electrically actuated means for indicating at a central station whenever any of said bars is cut, means for recording the time of cutting of any of said bars, and a circuit including said bars and said indicating and recording means.

19. In a system of the character described, the combination of a plurality of bars, each having an inner tube and an outer tube insulated from each other, a bell at a central station to render an audible signal whenever an attempt is made to cut any of said bars, an electric lamp adapted to be ignited when any bar is cut to a sufficient distance to open the circuit through said inner tube, a second bell adapted to give an audible signal when the circuit is broken through said inner tube, and a circuit including said bars and said indicating means.

20. In a system of the character described, the combination of a plurality of bars, each being composed of an inner and an outer tube insulated from each other, electrically actuated means for indicating whenever any of said bars is cut, means for recording the time that any of said bars is cut, and a circuit including said bars and said indicating and recording means.

Signed at Chicago this 5th day of Nov., 1915.

CHARLES CALVERT LAMB.