No. 776,225. PATENTED NOV. 29, 1904.

W. L. D'OLIER.

FIREPROOF SHUTTER SYSTEM.

APPLICATION FILED JUNE 17, 1904.

NO MODEL. 3 SHEETS—SHEET 1.

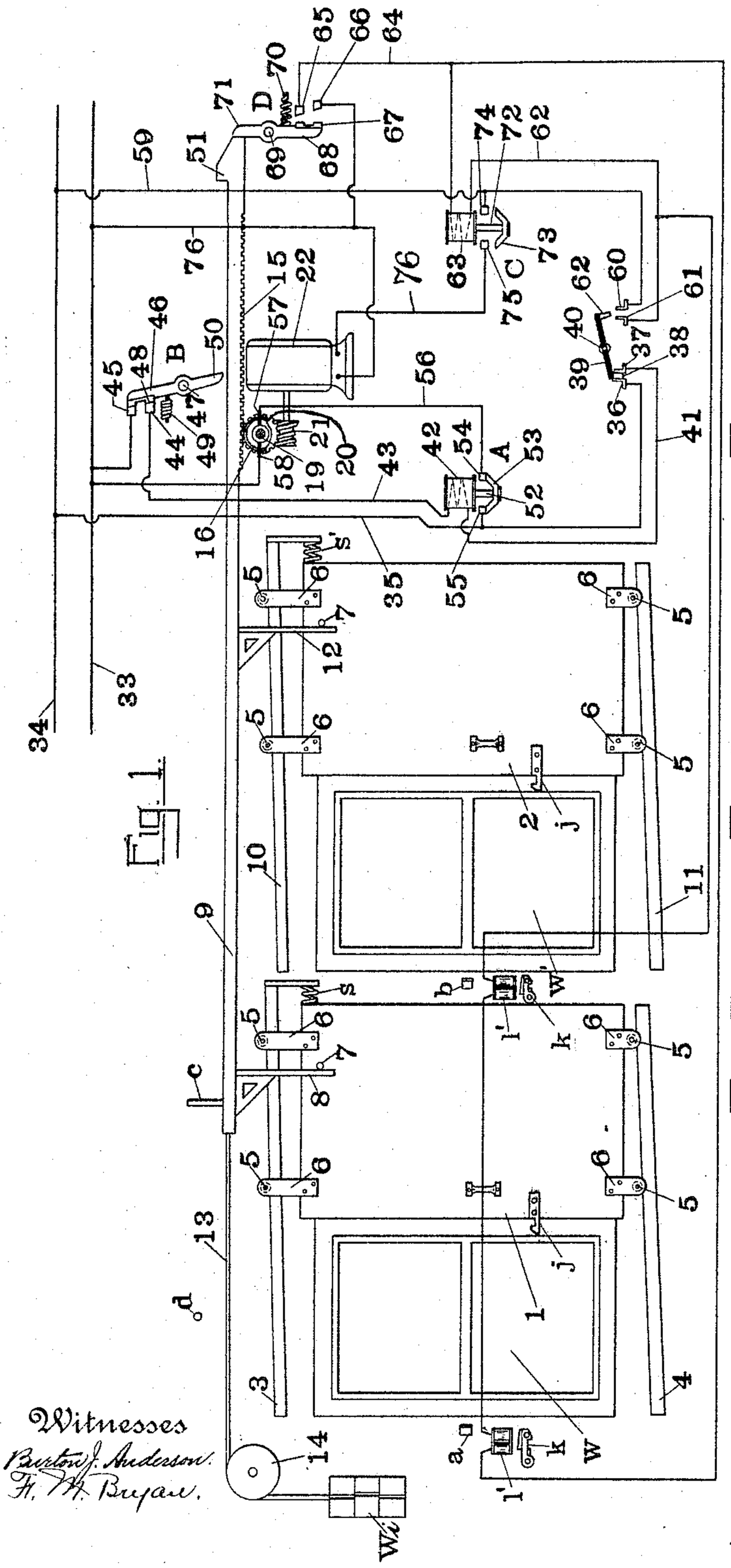

Fig. 1.

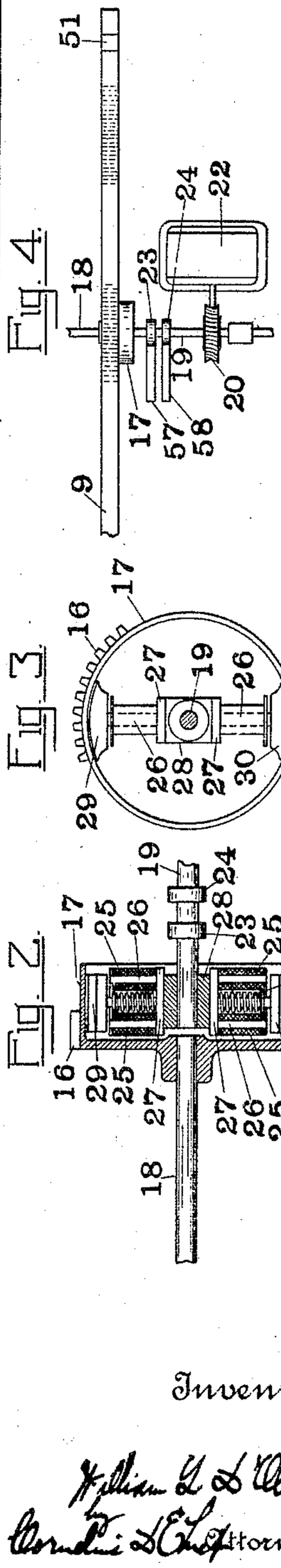

Fig. 4.

Fig. 3.

Fig. 2.

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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 12.

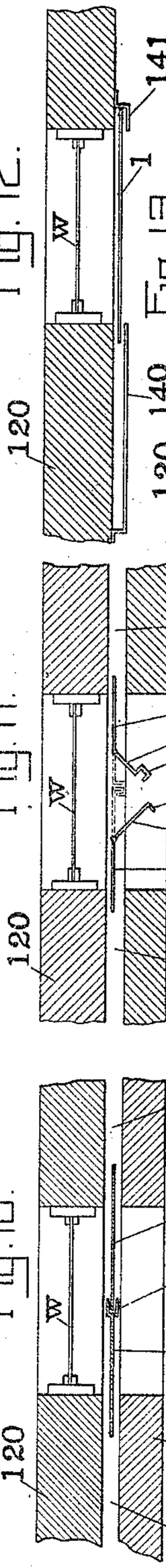


Fig. 13.

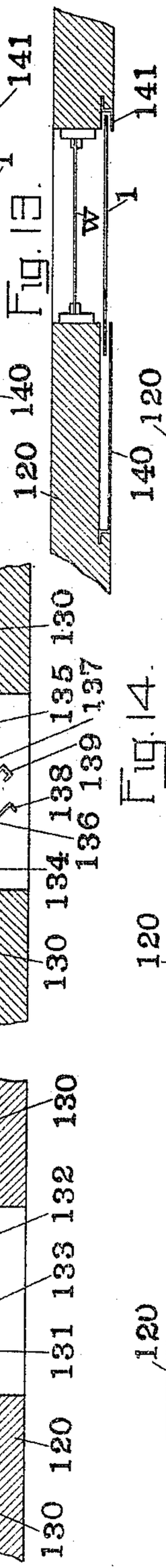


Fig. 14.

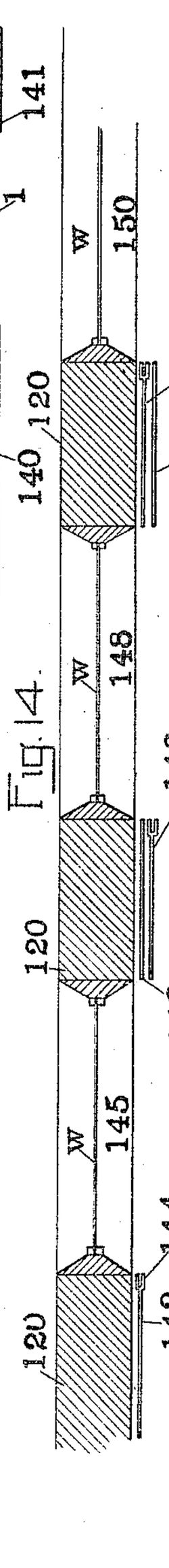
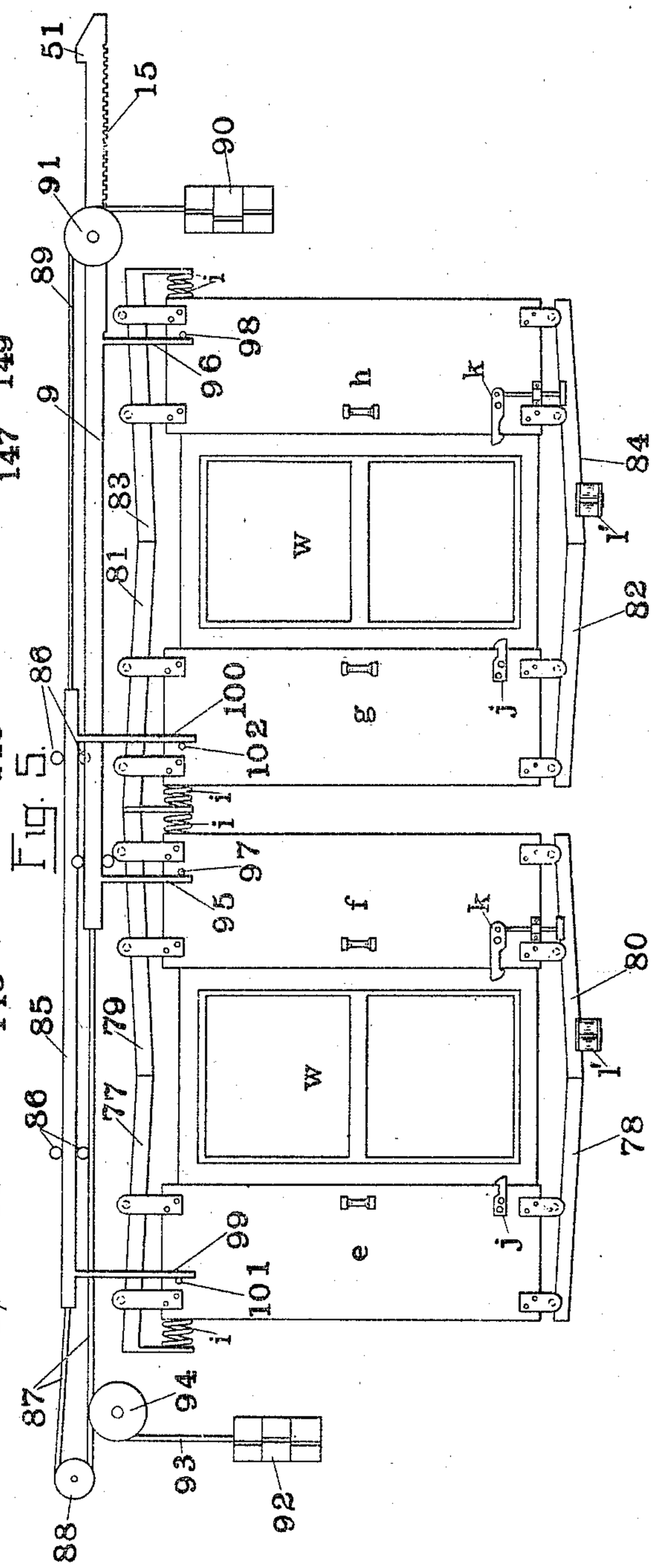


Fig. 11.

Fig. 10.

Fig. 5.



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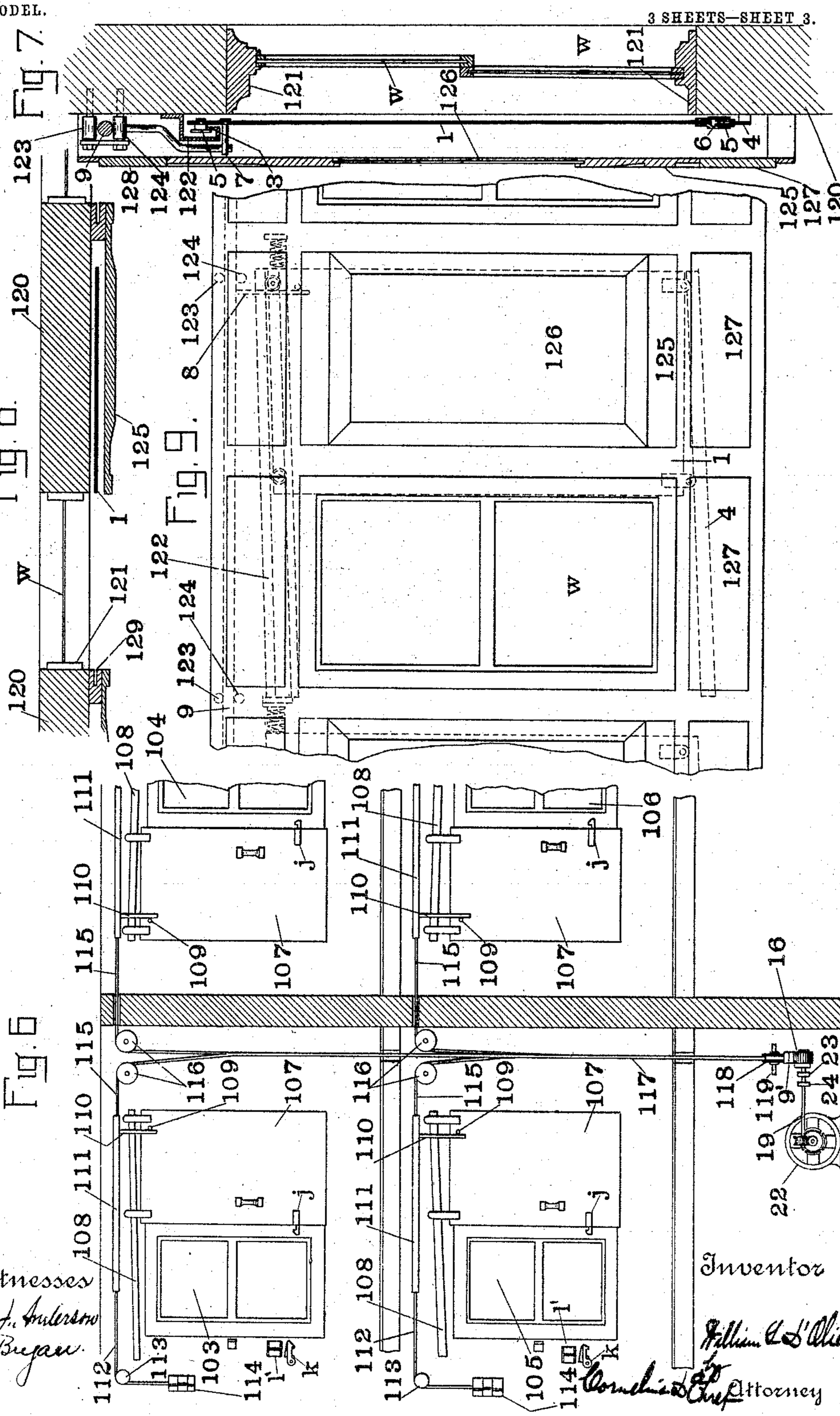
FIREPROOF SHUTTER SYSTEM.

APPLICATION FILED JUNE 17, 1904.

NO MODEL. 3 SHEETS—SHEET 3.

Fig. 7.



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No. 776,225. Patented November 29, 1904.

UNITED STATES PATENT OFFICE.

WILLIAM L. D'OLIER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO GEORGE M. NEWHALL, OF PHILADELPHIA, PENNSYLVANIA.

FIREPROOF-SHUTTER SYSTEM.

SPECIFICATION forming part of Letters Patent No. 776,225, dated November 29, 1904.

Application filed June 17, 1904. Serial No. 212,999. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM L. D'OLIER, a citizen of the United States, and a resident of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Fireproof-Shutter System, of which the following is a specification.

My invention relates to means for rendering buildings or parts or compartments of building secure from fire existing outside of such buildings or compartments.

My invention comprises a shutter or group of shutters consisting of fireproof material mounted either upon a wall, within a wall, or upon a wall and covered by paneling and adapted to move in front of and cover any opening or openings, such as doors or windows, means being provided to control such shutter or shutters from a distance, both as to the opening and the closing movements.

My invention comprises a shutter or group of shutters normally locked in open position and provided with means for unlocking them from a distance and permitting them to be operated by gravity to the closed position.

My invention comprises also means for opening such shutter or group of shutters, the control being from a distance and automatic in that when the shutter or shutters have been moved to the open position they are there locked and the source of power shut off.

My invention resides also in other features of structure and arrangement hereinafter pointed out, and described in the claims.

Reference is to be had to the accompanying drawings, in which—

Figure 1 is a view in elevation of a plurality of shutters controlled and operated electrically, the electrical apparatus being illustrated diagrammatically. Fig. 2 is a cross-sectional view of the magnetic clutch. Fig. 3 is an end view of the same. Fig. 4 is a fragmentary view in plan of electric motor and clutch. Fig. 5 is a view in elevation of a plurality of shutters, each shutter being divided into two parts which travel in opposite directions. Fig. 6 is a view in elevation illustrating means for operating by a single source of power a plurality of different groups of shutters located on different floors and in different compartments. Fig. 7 is a vertical sectional view through wall, window, and the shutter, illustrating a fireproofing-hood and other features. Fig. 8 is a horizontal sectional view of a method of applying the shutters in a space included between the wall and ornamental paneling. Fig. 9 is a vertical elevational view of the same, the mechanism of Fig. 7 being shown on reduced scale. Fig. 10 is a horizontal sectional view showing the method of applying the shutters in a space within the wall. Fig. 11 is a horizontal sectional view illustrating shutters composed of parts hinged to each other and located within the wall. Fig. 12 is a horizontal sectional view showing the shutter located upon the wall and arranged to disappear into a housing of sheet metal or the like. Fig. 13 is a modification of Fig. 12, the wall being cut away so that the housing is flush with the surface of the wall. Fig. 14 is a horizontal sectional view of windows located relatively close to each other, wherein the shutters for the several windows overlap each other.

Referring to Fig. 1, *w* and *w'* represent neighboring windows in the wall of a building. 1 and 2 are shutters, of steel boiler-plate or the like or of asbestos or other refractory material, adapted to be moved from normal or open position to abnormal or closed position in front of the windows *w* and *w'*, respectively, in order that flames or fire shall not be communicated through said windows. The shutter 1 is mounted to travel on the inclined rails 3 and 4 on the rollers 5, mounted on roller-bearings in the straps 6. 7 is a pin extending at right angles to the surface of the door 1 and is engaged by the member 8, secured to and depending from the rod 9, which is movable horizontally on roller-guides. The door 2 is likewise supplied with rollers 5, straps 6, pin 7, and is adapted to roll down the inclined tracks 10 and 11. 12 is a member similar to 8 and is adapted to engage the pin 7 of the shutter 2. 13 is a cord or wire rope secured at one end to the bar 9 and passes over the pulley 14 and has secured at its other end the weight W'. On the bar 9 is cut a rack 15, with which engages the gear-wheel 16, whose teeth are on the circumference of

the driven member 17 of a magnetic clutch. Member 17 is secured to the shaft 18, which serves to maintain the member 17 in proper position. 19 is the driving-shaft, which has secured to it the worm-gear 20, which is driven by the worm 21, driven by the electric motor 22. 23 and 24 are slip-rings mounted upon and insulated from the shaft 19 and from each other and from the terminals of the magnet-windings 25, which surround the cores 26, whose back armatures 27 are secured to the shaft 19 through the member 28. 29 and 30 are friction-shoes, which are forced against the inner circumference of the member 17 by the spiral springs 31 and 32, respectively. The shoes 29 and 30 serve also as armatures to the cores 26, and when current is passed through windings 25 the shoes 29 and 30 are attracted inwardly toward the shaft 19 in opposition to the springs 31 and 32, thus disengaging the gear 16 from the shaft 19. When the current through the windings 25 is interrupted, shoes 29 and 30 engage the member 17, and the gear 16 is accordingly coupled or clutched to the shaft 19. In consequence when no current is passing through windings 25 motor 22 is able to actuate the bar 9. 33 and 34 represent conductors leading to a source of current. The conductor 35 leads from conductor 34 to the contact 36 of an electrical switch, whose other contact is shown at 37, said contacts 36 and 37 being bridged by a conducting-piece 38, mounted upon the insulating member 39, pivoted at 40. The conductor 41 connects the contact 37 with the winding of the solenoid 42 of the electric switch A, whose other terminal communicates, through conductor 43, with the contact 44 of the switch B, whose other contact, 45, is in communication with the conductor 33. The switch B comprises the member 46, pivoted at 47 and carrying the member 48 for bridging contacts 44 and 45. 49 is a spiral spring tending to close the switch B, as shown. 50 is an extension of the member 46 and is in the path of travel of the extension 51 on the bar 9. The switch A comprises the solenoid 42 and the core 52, carrying the laminated member 53, adapted to engage and bridge the contacts 54 and 55. Contact 55 is connected with conductor 35, and contact 54 connects by conductor 56 with the brush 57, bearing upon the slip-ring 23 of the magnetic clutch. 58 is a brush bearing upon the slip-ring 24 and connects with conductor 33. The conductor 59 joins conductor 34 with contact 60, which is brought into electrical communication with contact 61 by the conducting member 62, carried by the pivoted member 39. Contact 61 connects, through conductor 62, with one terminal of the solenoid 63 of the switch C. The other terminal of the solenoid 63 connects with the contact 65, which contact and contact 66 are adapted to be bridged by the member 67, mounted on the member 68, pivoted at 69. 70 is a spiral spring tending to hold member 67 in engagement with contacts 65 and 66. 71 is an extension of the member 68 and extends into the path of travel of the bar 9. The switch C comprises the solenoid 63 and the core 72, carrying the laminated bridging member 73, adapted to engage and bridge the contacts 74 and 75. Contact 74 communicates with conductor 34 through 59, and contact 75 joins conductor 33 through conductor 76, the windings of the motor 22 being connected in series between contact 75 and conductor 33. On each shutter is secured a hook member *j*, which when the shutter reaches the end of its closing movement passes under a latch *k*, pivoted to the wall or framing, such latch dropping into the hook *j*, thus locking the shutter. Each latch member *k* is provided with an armature adapted to be attracted or lifted by an electromagnet *l'* for the purpose of withdrawing the latch member *k* from the hook members *j*, The electromagnets for a series of shutters may be connected in series of each other and in parallel with the winding of the solenoid 63 or may all be joined in parallel with each other and in parallel with the winding 63. In either case the electromagnets are energized at the same time that winding 63 is energized.

The operation is as follows:

To close the shutters.—The circuit through solenoid 42 of the switch A is closed by tilting member 39 to the position shown in Fig. 1, in which case current flows through switch B and solenoid 42. The core 52 of switch A is attracted upwardly and member 53 bridges contacts 54 and 55, permitting current to flow through the slip-rings 23 and 24 and the windings 25 of the magnet. In consequence the gear 16 is freed from the shaft 19 and the weight W pulls the bar 9 toward the left, rotating the gear 16, but not the shaft 19. The members 8 and 12 no longer restrain the pins 7, and the shutters 1 and 2 roll down the inclined tracks 3 4 and 10 11, receiving initial impulses from the springs *s s'*, secured to and supported from the rails 3 and 10, respectively. The shutters 1 and 2 move toward the left under the influence of gravity and come to rest against the stops *a* and *b*, in which position they completely cover the windows *w w'*. The extension 51 on the bar 9 engages the extension 50 of the switch B, opening such switch when the bar 9 has nearly reached its limit of travel toward the left. The travel of the bar 9 toward the left may be limited by any suitable means, such as the member *c*, which engages the pin *d*, secured in the wall or in any other manner. The opening of the switch B interrupts the current through the solenoid 42, with the result that the current through the windings 25 is interrupted, with the resultant reëngagement or clutching of the gear 16 to shaft 19.

To open the shutters.—By tilting member 39

until contacts 60 and 61 are bridged by 62 (38 being simultaneously withdrawn from 36 and 37) current passes from conductor 33 through switch D (which has been moved to closed position by spring 70 after rod 9 has started toward the left in the closing movement) and solenoid 63 of the switch C, resulting in the energization of the electromagnets l', thus lifting the latches k and unlocking the shutters, and simultaneously the attraction of core 72 and the bridging of contacts 74 and 75 by laminated member 73. Current may now pass from conductor 33, through motor 22, switch C to conductor 34. The motor 22 will then drive the gear 16 and move the bar 9 toward the right, the members 8 and 12 engaging the pins 7 on the shutters 1 and 2, thus moving the shutters 1 and 2 toward the right and up the inclined rails. As the bar 9 nears the end of its travel toward the right the springs s and s' are compressed preparatory to giving starting impulses, as heretofore described. As the bar 9 reaches the end of its travel toward the right it engages the extension 71 and opens the switch D, thus cutting off the current through the solenoid 33, from which results the opening of the switch C and the interruption of the current through the motor 22. Since the circuit through the windings 25 of the magnetic clutch is still interrupted, the gear 16 is clutched to the shaft 19, and therefore the bar 9 is locked in the position shown in Fig. 1, since the worm-gearing prevents the weight W^1 from rotating the armature of the motor 22. Soon after the bar 9 has started on its travel toward the right extension 51 is withdrawn from engagement with extension 50 of the switch B, and the consequence is that spring 49 closes switch B, as shown in Fig. 1. The circuit of solenoid 42 is therefore again closed except at contacts 36 and 37, and all circuits and parts are again in readiness for a further closure of the shutters, which will follow upon the tilting of the member 39 to the position shown in Fig. 1.

Referring to Fig. 5, two windows w and w' are shown. The shutter for the window w comprises the two parts $e\,f$, and the shutter for the window w' comprises the two parts $g\,h$. These half-shutters are mounted similarly to shutters 1 and 2 of Fig. 1, the parts $e\,f$ moving in opposite directions, however, along the oppositely-inclined rails 77 78 and 79 80. Similarly the half-shutters $g\,h$ move in opposite directions along the oppositely-inclined rails 81 82 and 83 84. The bar 9, similar to that shown in Fig. 1, is operated and controlled by mechanisms and circuits, as shown in Fig. 1. A horizotally-movable bar 85, guided on rollers 86, similar to bar 9, is connected to one end of bar 9 by the wire rope or cord 87, passing over the pulley 88. The cord 89 is connected to the right-hand end of bar 85 and supports the weight 90 after passing over the pulley 91. The cords or ropes 87 89, and, in fact, all others shown herein, are of wire, metal, asbestos combination, or any other suitable non-inflammable material. The weight 92 is supported by the cord 93, passing over the pulley 94 and connected with the bar 9. The members 95 and 96 depend from the bar 9 and engage the pins 97 and 98, secured to the shutters $f\,h$. Similarly members 99 and 100 depend from the bar 85 and engage pins 101 and 102 on the shutters e and g. When the bar 9 is permitted to move toward the left under the influence of weights 90 and 92, the bar 85 moves toward the right, and each of the four shutters is given an initial impulse by the springs 1, after which said shutters roll down the inclined rails, e and f meeting each other to cover the window w, and g and h meeting each other to cover the window w'. When the bar 9 is moved toward the right by the motor, the members 95 and 96 engage the pins 97 and 98 and move the shutters $f\,h$ toward the right, the springs i being compressed when said shutters reach the open position. Simultaneously the bar 85 moves toward the left and the members 99 and 100 engage the pins 100 and 102 in the shutters e and g, moving such shutters toward the left to the position shown in Fig. 5, the springs i being compressed by the latter part of such movement.

Referring to Fig. 6, 103, 104, 105, and 106 are windows located on different floors and in different compartments of a building. Each is provided with a shutter 107, hung upon an inclined rail 108 in a manner heretofore described. Each shutter is provided with a pin 109, engaged by a member 110, secured to and depending from a horizontally-movable member 111. To the outer end of each member 111 is secured a cord 112, passing over a pulley 113 and supporting a weight 114. To the inner end of each member 111 is secured a cord 115, passing over a pulley 116, said cords uniting, as shown, in the cord 117, passing over a pulley 118, mounted on the horizontal shaft 119. The lower end of the cord 117 is then secured to the horizontal rack-bar 9', similar to that shown in Fig. 1, engaged by the gear 16, secured by magnetic clutch to shaft 19, driven by the motor 22. The movement of the bar 9' of Fig. 6 is caused and controlled by the same mechanism and circuits as shown in Fig. 1. In consequence all of the shutters 107 may be opened or closed by the actuation of the tilting member 39, Fig. 1.

Referring to Fig. 7, 120 is the wall of a building in which is located the window w, the window-casing being shown at 121. 1 represents the shutter, of boiler-plate or the like, at whose lower edge is mounted the roller 5 in the strap 6, the roller 5 traveling on the inclined rail 4, all as in Fig. 1. At the upper edge of the shutter 1 is the roller 5, traveling on the inclined rail 3, which is integral with the hood member 122, secured to the wall. This member 122 serves both as a rail and as

means for preventing flames from passing upwardly between the shutter 1 and the wall or window. 7 is a pin engaged by the downwardly-extending member 8, secured to the horizontally-traveling bar 9, supported and guided on rollers 123 and 124, all as in Fig. 1. The shutter 1 being applied on the interior of the building, the paneling 125 is provided to give a finished appearance, a mirror 126 being employed for ornamental purposes, if desired. 127 and 128 are horizontally-extending members of the panel.

In Figs. 8 and 9 a horizontal section and a front elevation of the arrangement of Fig. 7 are shown on reduced scale. The shutter 1 when closed engages in the member 129, which is channeled to receive the edge of the shutter.

In Fig. 10 the wall 120 is shown recessed at 130 to permit the shutter portions 131 and 132 to operate as in Fig. 5. The shutter 131 has the jaw 133 to receive and embrace the edge of the shutter 132.

In Fig. 11 the arrangement is similar to that of Fig. 10, with the exception that the shutter is divided into two portions 134 and 135, each having a hinged portion 136 and 137. The hinged portion 136 has one edge turned up at 138, which is embraced by the jaw 139 on the member 137, as shown in dotted lines. The portions 136 and 137 fold back onto the parts 134 and 135 and slide with them back into the recess 130.

In Fig. 12 the shutter 1 slides into a pocket formed between a member 140 and the wall 120 and when in closed position engages in the recess between member 141 and the wall 120.

Fig. 13 is similar to Fig. 12 except that the members 140 and 141 are arranged with their outer surfaces flush with the surface of the wall, the wall 120 being cut away sufficiently to form a pocket or recess.

In Fig. 14 the windows *w* are separated by distances less than their own width. In this case the shutters 142 and 143 move toward each other in front of the window-space 145, closing the same by the engagement of 143 in the jaw 144. Similarly the shutters 146 and 147 close the window-space 148, the arrangement being such that shutter 143 moves in a space intermediate the wall 120 and shutter 146. Similarly the shutter 149 for the window-space 150 operates in a space intermediate the shutter 147 and the wall 120. By this arrangement of overlapping of shutters for different windows my shutter system may be adapted to those constructions in which relatively wide windows are separated from each other by relatively narrow spaces.

Though I have shown the shutter-operating mechanism and circuits as controllable from one point only, as at member 39, it is to be understood that any number of switches, such as 39, may be distributed throughout a building or district, any one of which will exercise the same control, as explained in connection with switch 39. To this end it is simply necessary to connect these other switches in parallel with switch 39. Though I have shown an electric motor for supplying the power for operating the shutters, it is to be understood that any other type of motor, such as a pneumatic or steam engine suitably controlled, may be employed. It is to be understood also that the shutters shown in Figs. 7 to 14, inclusive, are operated in a manner and by means similar to those described in connection with Figs. 1, 5, and 6. It is to be understood also that the motor need not act directly upon the operating-bar 9 of Figs. 1 and 5, but that any suitable mechanical connection between the bars 9 and a rack-bar 15 may be made, as exemplified in Fig. 6.

By the term "motor" as used in the claims is to be understood an instrumentality which receives energy in one form and converts such energy into work or energy of another form as distinguished from mere transmission-gearing.

It is preferred that the shutters be applied on the interior of buildings or within the walls, except in mild climates, where there is no freezing, in which case the shutters may be applied to the outside of buildings.

What I claim is—

1. In combination, a wall, an opening in said wall, a shutter, an inclined rail along which said shutter is adapted to move under the influence of gravity to close said opening, means for locking said shutter in open position, means for releasing said shutter, a motor for moving said shutter to open position, and means for controlling said motor.

2. In combination, a wall, an opening in said wall, a shutter for closing said opening, means for locking said shutter in open position, means for releasing said shutter to the action of gravity, whereby said shutter is moved to close said opening, and means for opening said shutter, said means comprising a suitably-controlled motor.

3. In combination, a wall, a plurality of openings in said wall, a plurality of shutters for closing said openings, means for holding said shutters in open position, means for releasing said shutters to the action of gravity whereby said openings are closed, and a motor for moving said shutters to open position.

4. In combination, a wall, a plurality of openings in said wall, a plurality of shutters movable parallel to said wall to close said openings, a member for locking said shutters in open position, means for releasing said member, whereby said shutters are operated by gravity to close said openings, and a motor for actuating said members to open all said shutters.

5. In combination, a wall, a plurality of openings in said wall, a plurality of shutters

for closing said openings, a motor for opening said shutters, a plurality of springs compressed by said shutters when in open position, means for locking said shutters in open position, and means for releasing said shutters, whereby said shutters are started by said springs to move to closed position.

6. In combination, a wall, an opening in said wall, a shutter for closing said opening, a member for moving said shutter to open position, a motor for actuating said member, and motor-controlling means controlled by said member when said shutter has reached open position.

7. In combination, a wall, an opening therein, a shutter for closing said opening, a member for moving said shutter to open position, a motor for actuating said member, and means for disengaging said member from said motor, whereby said shutter may move to closed position.

8. In combination, a wall, an opening therein, a shutter for closing said opening, a member for moving said shutter to open position, a motor for actuating said member, a weight operating on said member in opposition to said motor, and means for disengaging said member from said motor, whereby said shutter may move tc closed position.

9. In combination, a wall, an opening therein, a shutter for closing said opening, an inclined rail along which said shutter moves under the influence of gravity to close said opening, a member for moving said shutter to open position, a motor for actuating said member, and means for concealing said rail and member, and said shutter when in open position.

10. In combination, a wall, an opening therein, a shutter for closing said opening, an inclined rail along which said shutter moves under the influence of gravity to close said opening, a member for moving said shutter to open position, a motor for actuating said member, and paneling for concealing said rail and member, and said shutter when in open position.

11. In a shutter system, a shutter held in normal position, an inclined rail along which said shutter may travel, means for releasing said shutter, a motor for moving said shutter to normal position, and automatic means for deënergizing said motor when said shutter has reached normal position.

12. In a shutter system, a shutter held in normal position, an inclined rail along which said shutter may travel, a motor for operating said shutter, means for releasing said shutter to permit movement to abnormal position, and automatic means for recoupling said motor to said shutter when it has reached abnormal position.

13. In a shutter system, a shutter held in normal position, an inclined rail along which said shutter may travel, means for releasing said shutter, a motor for returning said shutter to normal position, automatic means for recoupling said shutter to said motor when said shutter has reached abnormal position, and means for deënergizing said motor when said shutter has regained normal position.

14. In a shutter system, a movable shutter, an inclined rail along which said shutter may travel, a motor for moving said shutter to normal position, means for releasing said shutter to permit motion to abnormal position, and automatic means for coupling said shutter with said motor when said shutter has reached abnormal position.

15. In a shutter system, a movable shutter, a motor for operating said shutter, means for releasing said shutter from said motor to permit motion to abnormal position, automatic means for recoupling said shutter and said motor when said shutter has reached abnormal position, and automatic means for locking said shutter in abnormal position.

16. In a shutter system, a movable shutter, a motor for operating said shutter, means for disengaging said shutter from said motor when in normal position to permit motion of said shutter to abnormal position, automatic means for recoupling said shutter and motor when said shutter has reached abnormal position, means for energizing said motor to move said shutter to normal position, and automatic means for deënergizing said motor when said shutter has reached normal position.

17. In a shutter system, a movable shutter, a motor for operating said shutter, means for disengaging said motor from said shutter when in normal position to permit the movement of said shutter to abnormal position, automatic means for recoupling said shutter and said motor when said shutter has reached abnormal position, means for locking said shutter in abnormal position, means for unlocking said shutter and energizing said motor, whereby said shutter is returned to normal position.

18. In a shutter system, a movable shutter, a motor for operating said shutter, means for releasing said shutter from said motor to permit movement of said shutter to abnormal position, automatic means for locking said shutter in abnormal position, automatic means for recoupling said motor and said shutter, and means for simultaneously unlocking said shutter and energizing said motor, whereby said shutter is returned to normal position.

19. In a shutter system, a movable shutter, a member for actuating said shutter, a motor for operating said member, means for disconnecting said member from said motor to permit the movement of said shutter to abnormal position, automatic means for recoupling said motor and said member when said shutter has reached abnormal position, and means for locking said shutter in abnormal position.

20. In a shutter system, a plurality of mov-

able shutters, a member for actuating said shutters, a motor for operating said member, means for disconnecting said member from said motor to permit the movement of said shutters to abnormal position, automatic means for recoupling said member and said motor when said shutters have reached abnormal position, and means for energizing said motor, whereby said shutters are returned to normal position.

21. In a shutter system, a movable shutter, a member for actuating said shutter, a motor for operating said member, means for disconnecting said motor from said member to permit the movement of said shutter to abnormal position, automatic means for recoupling said motor and said member when said shutter has reached abnormal position, means for energizing said motor to return said shutter to normal position, and automatic means for deenergizing said motor when said shutter has returned to normal position.

22. In a shutter system, a movable shutter, an electric motor for operating said shutter, electrically-controlled means for disconnecting said motor from said shutter to permit the movement of said shutter to abnormal position, automatic means for recoupling said motor with said shutter when said shutter has reached abnormal position, and a switch for closing the circuit of said motor, whereby said shutter is returned to normal position.

23. In a shutter system, a movable shutter, an electric motor for operating said shutter, electrically-controlled means for disconnecting said motor from said shutter to permit the movement of said shutter to abnormal position, automatic means for recoupling said shutter and said motor when said shutter has reached abnormal position, a switch for causing the energization of said motor to return said shutter to said normal position, and automatic means for breaking the circuit of said motor when said shutter has reached normal position.

24. In a shutter system, a movable shutter, an electric motor for operating said shutter, a switch for disconnecting said motor from said shutter to permit the movement of said shutter to abnormal position, automatic means for recoupling said shutter and said motor when said shutter has reached abnormal position, a switch for energizing said motor to return said shutter to normal position, and means preventing the simultaneous closure of said switches.

25. In a shutter system, a movable shutter, an electric motor for operating said shutter, a switch for causing the movement of said shutter to abnormal position, and a switch for causing the return of said shutter to said normal position.

26. In a shutter system, a movable shutter, an electric motor for operating said shutter, a switch for causing the movement of said shutter to abnormal position, a switch for causing the return of said shutter to normal position, and means for preventing the simultaneous closure of switches.

27. In a shutter system, a movable shutter, an electric motor for operating said shutter, a switch for causing the movement of said shutter to abnormal position, automatic means for locking said shutter in abnormal position, and a switch for simultaneously unlocking said shutter and energizing said motor, whereby said shutter is returned to normal position.

28. In a shutter system, a movable shutter, an inclined rail upon which said shutter is adapted to travel, a motor for operating said shutter, means for releasing said shutter from said motor to permit the movement of said shutter by gravity to abnormal position, automatic means for recoupling said motor and said shutter when said shutter has reached abnormal position, and means for energizing said motor to return said shutter to normal position.

29. In a shutter system, a movable shutter, an inclined rail on which said shutter is adapted to travel, a motor for operating said shutter, means for releasing said shutter from said motor to permit its movement by gravity to abnormal position, means for energizing said motor for returning said shutter to normal position, and a spring compressed by said motor for assisting gravity in moving said shutter to abnormal position.

30. In a shutter system, a plurality of groups of movable shutters, a motor for operating all said groups, means for disengaging said shutters from said motor to permit their movement to abnormal position, and means for energizing said motor for returning said shutters to normal position.

31. In a shutter system, a plurality of groups of movable shutters, a motor for actuating all said groups, means for disengaging said groups from said motor to permit said shutters to move to abnormal position, automatic means for recoupling said groups with said motor, and means for energizing said motor to return said shutters to normal position.

32. In a shutter system, a plurality of shutters locked in normal position, an electric motor for operating said shutters, a switch for unlocking and permitting the movement of said groups to abnormal position, and a switch for energizing said motor to return said shutters to normal position.

WILLIAM L. D'OLIER.

Witnesses:
F. M. BRYAN,
JOHN CONNELL.