(No Model.) 2 Sheets—Sheet 1.

C. BURGHER.

PROTECTIVE SYSTEM FOR BUILDINGS.

No. 567,577. Patented Sept. 15, 1896.

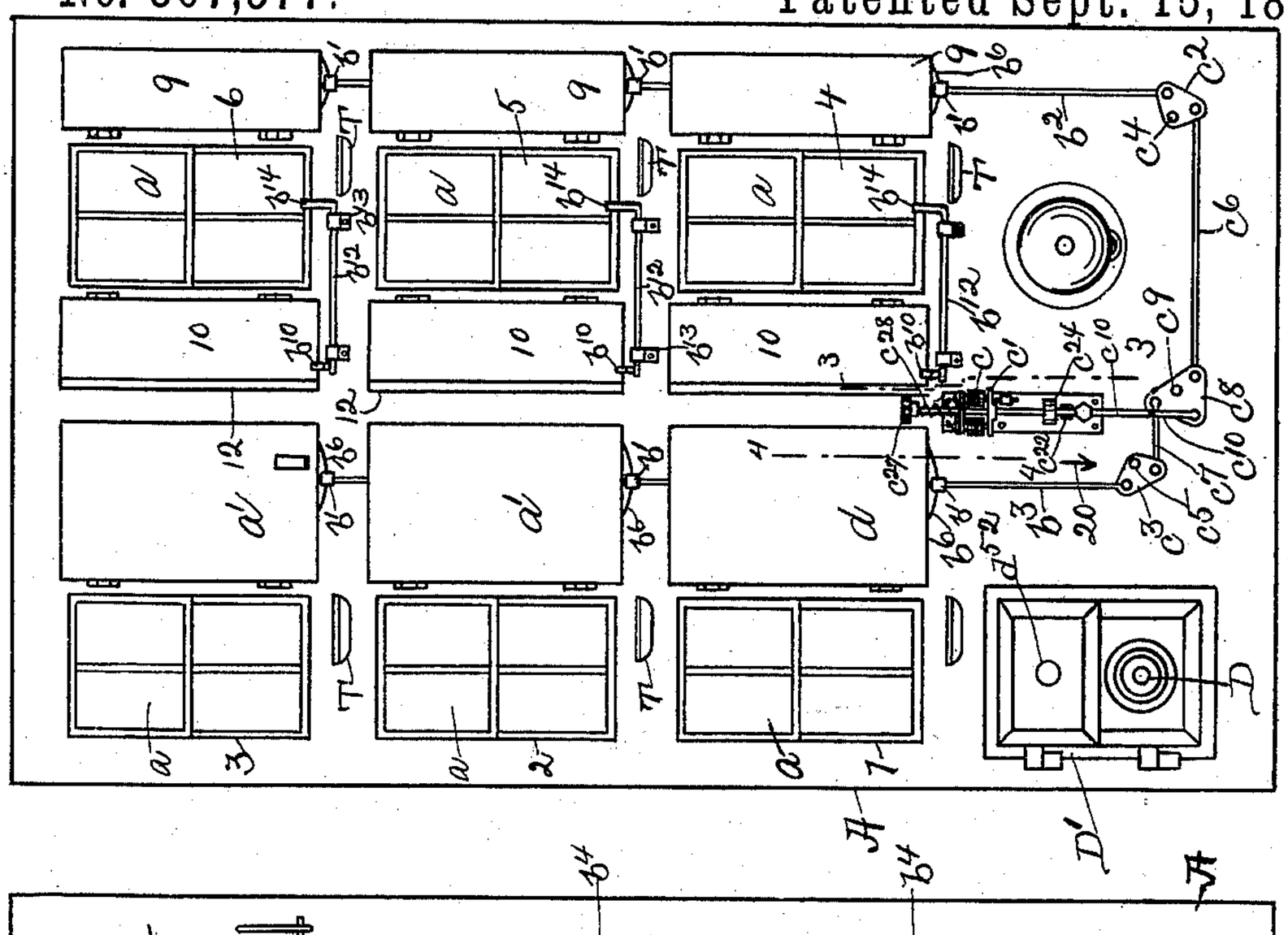

Fig. 1.

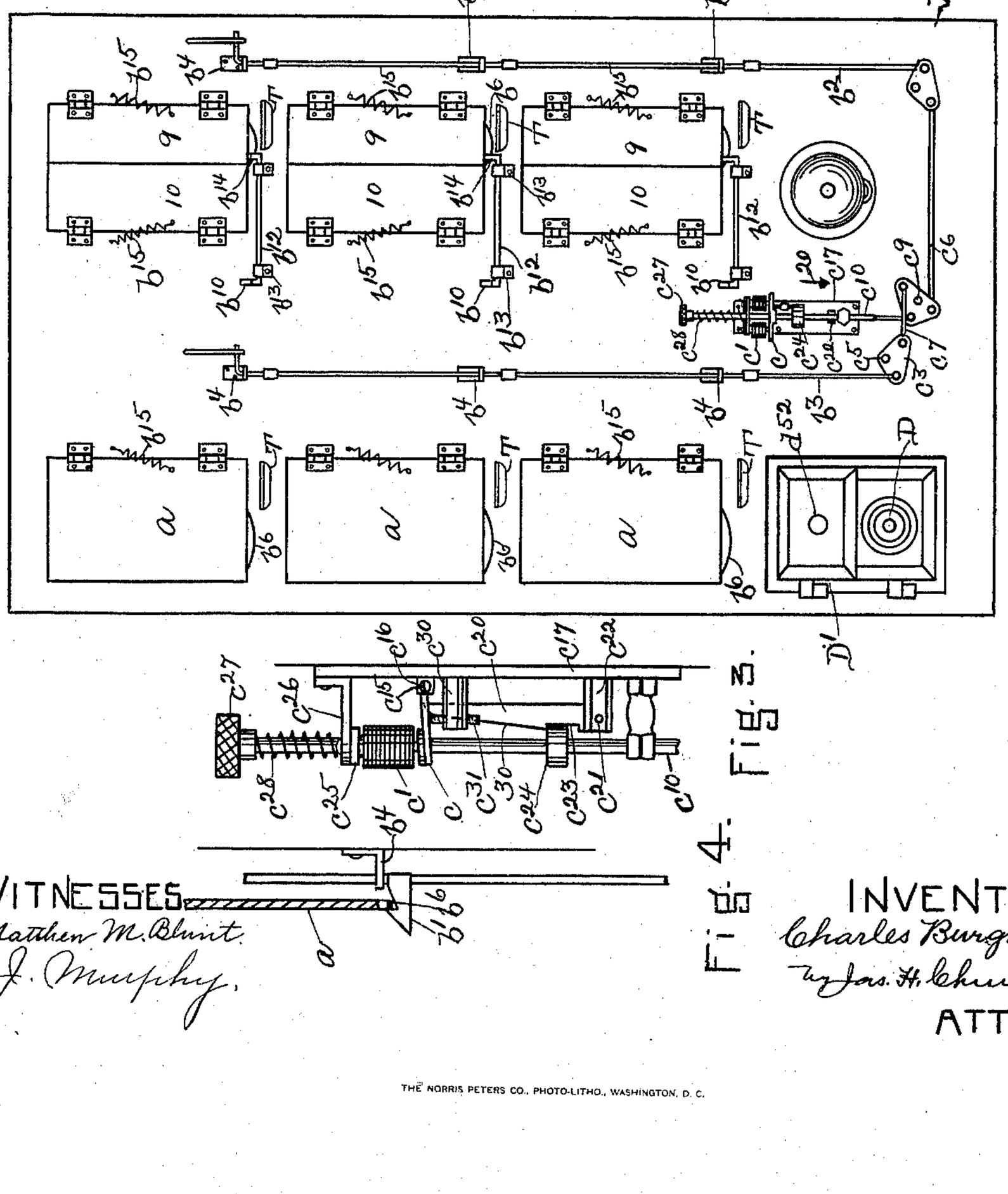

Fig. 2.

Fig. 3.

WITNESSES
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(No Model.) 2 Sheets—Sheet 2.

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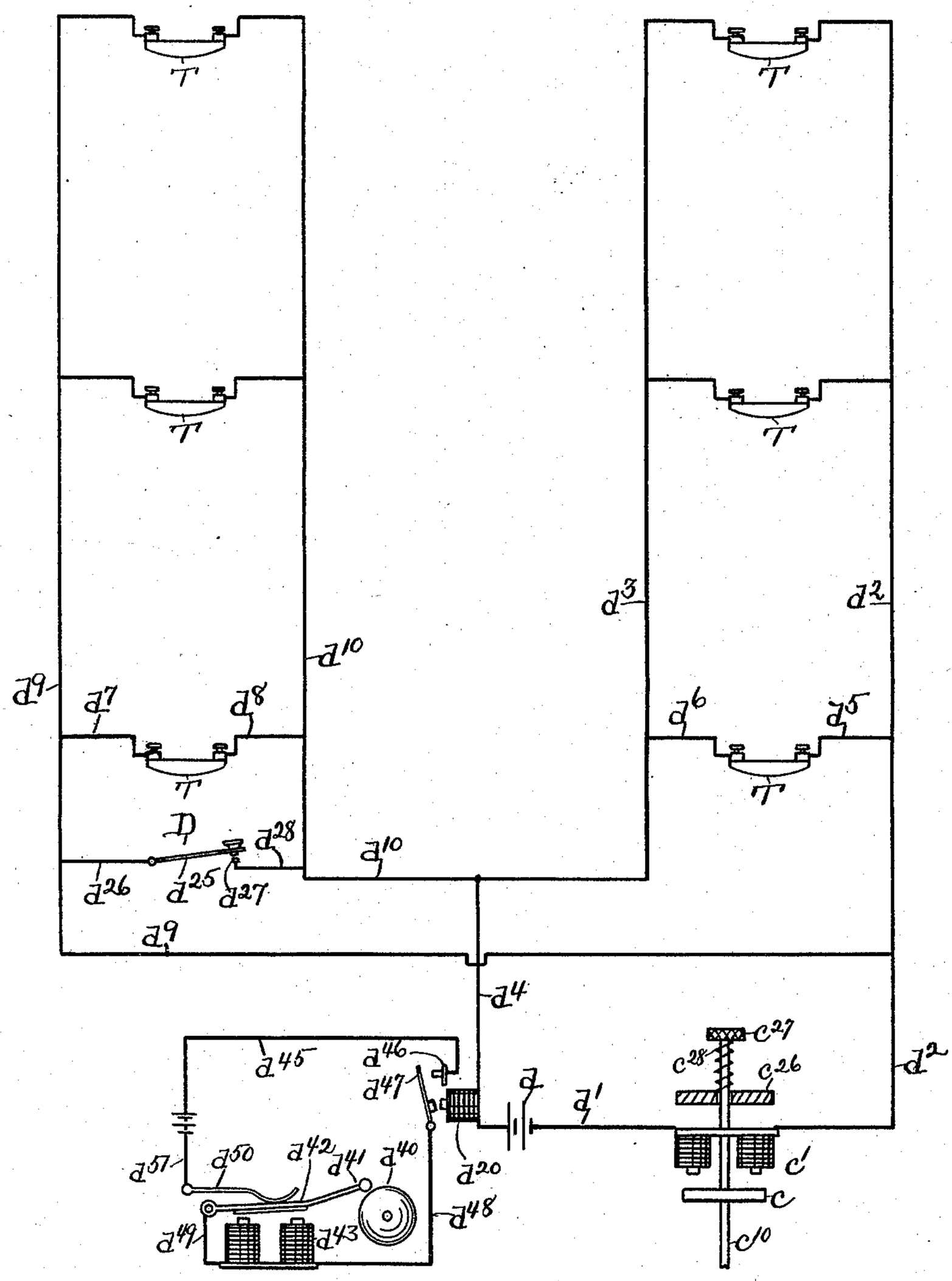

Fig. 5.

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UNITED STATES PATENT OFFICE.

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PROTECTIVE SYSTEM FOR BUILDINGS.

SPECIFICATION forming part of Letters Patent No. 567,577, dated September 15, 1896.

Application filed November 23, 1895. Serial No. 569,868. (No model.)

To all whom it may concern:

Be it known that I, CHARLES BURGHER, residing in Newton, county of Middlesex, and State of Massachusetts, have invented an Improvement in Protective Systems for Buildings, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention relates to a protective system for buildings and other structures having windows or other openings which it is desirable to cover in case of fire.

The invention has for its object to provide a system for controlling the shutters or covers for the windows or other openings, whereby preferably a series of shutters may be automatically closed simultaneously when the temperature in the vicinity of the shutters has reached a predetermined point, and whereby the said shutters may be simultaneously closed by manually operating the mechanism which normally holds the shutters from closing.

In accordance with this invention the shutters, which are normally open, are held from closing by mechanism under the control of an electromagnet which may be included in a normally open or a normally closed electric circuit provided with suitable thermostats adapted to operate when the temperature in their vicinity has reached a predetermined point, and the operation of which actuates the electromagnet and, through suitable mechanism, releases the shutters, thereby permitting all the shutters under control of the said electromagnet to be closed by springs or weights or in any other suitable or desired manner. The circuit of the shutter-controlling magnet preferably also includes an indicator-electromagnet, which may be located in any desired portion of the building, as, for instance, in the office, and the said indicator-magnet preferably controls one or more alarm operating or controlling magnets, as will be hereinafter more specifically described. The shutters referred to may be single or double, that is, in two halves or parts, and when made double one half of the shutter will lap by the other, and one of the said halves will preferably be controlled by a secondary release mechanism automatically operated by the other half of the shutter, as will be described. The circuit of the shutter-controlling magnet is also preferably provided with a manually-operated circuit-controller for a purpose that will be described.

These and other features of this invention will be pointed out in the claims at the end of this specification.

Figure 1 represents a sufficient portion of a building or structure provided with windows and equipped with a protective system embodying this invention to enable it to be understood, the parts of the system being shown in their normal positions. Fig. 2 is a view similar to Fig. 1 with the parts of the system in the position they occupy, the shutters being closed. Figs. 3 and 4 are details, on an enlarged scale, to be referred to; and Fig. 5, a diagram of the circuits, to enable the operation of the system to be more readily understood.

Referring to Fig. 1, A represents the wall of a building, and for the purpose of illustration the wall A may be supposed to be one wall of an air or light shaft. The wall A in the present instance is represented as provided with a series of windows or openings *a*, arranged in two rows of three each and marked 1 to 6, inclusive. The windows *a* are provided with shutters *a'*, those coöperating with the windows marked 1 to 3 being single shutters and those coöperating with the windows marked 4 to 6 being double shutters, each composed of the two parts or halves 9 10, the part or half 10 of each double shutter being provided, as shown, with a lap or strip 12, which is adapted to overlap the half 9 when the double shutters are closed, as represented in Fig. 2.

In accordance with this invention the shutters are held in their open position (shown in Fig. 1) by a suitable mechanism, that herein shown consisting of catches or hooks *b'*, (see Fig. 4,) attached to movable rods b^2 b^3, extended upward and guided in their movements by brackets b^4, suitably secured to the wall A, the said brackets having holes through which the rods b^2 b^3 extend. The rod b^2 and its attached hooks or catches *b'* coöperate, as herein shown, with the halves or parts 9 of the double shutters, and the rod b^3 and its hooks or catches *b'* coöperate with

the single shutters for the windows 1 2 3. The hooks or catches b' constitute one form of locking device for the shutters in their open position and are adapted to engage suitable devices on the said shutters. In the present instance the shutters a', with which the catches b' coöperate, are provided with spring-strips b^6, which are secured to the lower ends of the said shutters and which are adapted to yield so as to pass behind the hooked point of the catch b' when the window-shutter is thrown back into its open position. The halves or parts 10 of the double shutters are adapted to have their lower ends engaged by hooks or catches b^{10}, secured to or operated by rock-shafts or rods b^{12}, extended under each window 4 5 6 and having bearings in suitable brackets b^{13}, fastened to the wall A, the said rock-shafts having cranks or arms b^{14} extended into the path of movement of the parts 9 of the double shutters, so as to be struck by said parts when the latter are closed to thereby rock the shafts b^{12} and remove the hooks or catches b^{10} from engagement with the parts 10 of the double shutters. The parts 9 10 of the double shutters and the single shutters are each adapted to be automatically closed when released from their locking devices, and this result may be accomplished, as herein shown, by means of springs b^{15}, represented as having one end fastened to the shutters and the other end fastened to the wall A. The release of the shutters may and preferably will be effected electromechanically, and in the present instance this result is effected by operatively connecting the rods b^2 b^3 to the armature c of an electromagnet c'. The connection referred to may be accomplished as herein shown. Referring to Figs. 1 and 2, the rods b^2 b^3 are shown as connected to substantially triangular plates c^2 c^3, pivotally secured, as at c^4 c^5, to the wall A, the said plates being connected by links or rods c^6 c^7 to a substantially-triangular plate c^8, pivoted, as at c^9, to the wall A, and having connected to it one end of a rod or link c^{10}, which is operatively connected to the armature c, as as will be described. The substantially triangular plates referred to constitute a simple and convenient form of levers for joining the rods and links referred to.

The rod c^{10}, as herein shown, is adapted to be positively moved in one direction, in the present instance in a downward direction, as indicated by the arrow 20, Figs. 1 and 2, to turn the lever or plate c^8 from the position shown in Fig. 2 to that shown in Fig. 1, and when in the position shown in Fig. 1 the rods b^2 b^3 have been elevated so as to place their catches or hooks b' into position to be engaged by the spring-strips b^6 to thereby lock the shutters, carrying said strips in their open position. The rod c^{10} is designed to be locked in the position shown in Fig. 1, which is also shown in Fig. 3 on an enlarged scale, by means of the armature c of the electromagnet c', the said armature being pivoted, as at c^{15}, to a bracket or lug c^{16}, fastened to a back piece or board c^{17}, which is suitably fastened to the wall A. The armature c is provided with a slot or opening into which extends the upper end of a lever c^{20}, pivoted, as at c^{21}, to a lug or projection c^{22} on the board c^{17}, the said lever having its front face provided with a notch c^{23}, into which extends a projection c^{24} on the rod c^{10}, the projection c^{24} being shown as a disk or collar. The rod c^{10} extends up through the opening in the armature c and through a suitable opening in the back piece c^{25} of the electromagnet c', and through a suitable opening in the bracket c^{26}, which sustains the electromagnet, the said rod above the said bracket being provided at its end with a cap or thumb-piece c^{27}, between which and the bracket c^{26} is interposed a spring c^{28}, which encircles the rod c^{10} and bears against the said bracket and the cap c^{27}. The back piece or board c^{17} is represented as provided with an arm c^{30}, having connected to it a cross-piece c^{31}, which forms a front stop for the lever c^{20} and also forms a back stop for the armature c. The lever c^{20} is preferably made, as herein shown, with its front edge 30 tapering. In the normal position of the apparatus the projection or collar c^{24} is extended into the notch c^{23} in the lever c^{20}, and the latter is at such time in its forward position, (shown in Fig. 3,) and it is locked in its forward position by means of the armature c, which, owing to the electromagnet c' being demagnetized, is permitted to drop by gravity until it strikes the cross-piece c^{31}, constituting the back-stop for the said armature. When the armature c is in the position shown in Fig. 3, which is its normal position, the end of the lever c^{20} projects up into the said armature and is prevented from moving backward by the rear wall of the slot, with which the end of the lever c^{20} engages. As soon as the magnet c' is energized the armature c is attracted to it and is lifted up sufficiently far to clear the upper end of the lever c^{20}, thereby placing the rod c^{10} under control of the spring c^{28}, which expands and carries the rod c^{10} upward. As the rod c^{10} is moved upward the lever c^{20} is thrown back and disengaged from the projection c^{24} on the rod c^{20}, thereby leaving the rod free to respond to the movement of the spring. When the rod c^{10} is moved upward under the influence of the spring c^{28}, the substantially triangular plate is turned from the position shown in Fig. 1 into that shown in Fig. 2, and it will be seen that the rods b^2 b^3 are moved downward when the rod c^{10} is moved upward by the spring. The downward movement of the rods b^2 b^3 carries the hooks or catches b' down and out of engagement with the shutters, thereby leaving the latter free to be closed by their springs b^{15}. In the present instance it will be seen that by the movement of the rod c^{10} under the influence of the spring c^{28} the single shutters coöperating with the windows 1, 2, and 3 will be released and

closed, while the parts 9 of the double shutters coöperating with the windows 4, 5, and 6 will also be released and closed, as above described. The closing of the parts 9 will automatically disengage the parts 10 of the double shutters by striking the cranks or arms b^{14} on the rock-shafts b^{12}, so that the parts 10 of the double shutters will close under the influence of their springs b^{15} and the lips 12 will lap by the parts 9. The electromagnet c' will be included in a circuit which may and preferably will include thermostatic instruments T, (represented in Figs. 1, 2, and 5, and which may be of any suitable or usual construction, but preferably a normally open thermostat of the well-known Watkins construction.) I may prefer to arrange a thermostat in the vicinity of each window in the wall A, and have represented in Figs. 1 and 2 the thermostats arranged below the windows. In Fig. 5 the thermostats are represented as arranged in two series of three each, connected in multiple arc and included in a circuit with the electromagnet c', which circuit is provided with a suitable source of supply or battery d, having connected to one of its poles, (shown as the negative pole,) a wire d', connected to one end of the coil of the electromagnet c', the other end of the coil being connected to one line-wire d^2, which is connected through the thermostats T to a companion line-wire d^3, joined by the wire d^4 to the positive pole of the battery d. One series of thermostats, which may be supposed to be those corresponding to the windows 4, 5, and 6, are arranged in multiple between the wires d^2 d^3, and have their terminals connected to the said wires by the branch wires d^5 d^6. The thermostats corresponding to the windows 1, 2, and 3 have their terminals connected by branch wires d^7 d^8 to line-wires d^9 d^{10}, the line-wire d^9 being connected to the wire d^2 and the line-wire d^{10} being connected to the wire d^4. From an inspection of Fig. 5 it will be seen that when a thermostat is operated by a rise in temperature to a predetermined point, such as would be occasioned by a fire in its vicinity, the circuit of the magnet c' will be closed, in the present instance it being understood that the thermostats T are supposed to be normally open. The closure of any one thermostat will effect the energizing of the electromagnet c' and preferably also of an electromagnet d^{20}, included in circuit with the electromagnet c' and herein shown as located in the line d^4. The circuit of the thermostats being practically the same, I will specifically trace but one, namely, the lowest thermostat of the series corresponding to the window 4. When this thermostat is closed, the circuit may be traced from the positive pole of the battery d through the magnet d^{20}, wire d^4, wire d^3, branch wire d^6 through the thermostat, thence by branch wire d^5, line-wire d^2, through the magnet c', and by wire d' to the negative pole of the battery d.

In many instances it is desirable to be able to close the shutters on the wall manually, so that in case of fire precaution may be taken against the entrance of the fire into a building before the temperature in the vicinity has reached such a limit as will operate the thermostats, and this result may be accomplished by including in circuit with the electromagnet c' a manually-operated switch, which may be of any usual or suitable construction, and which in Figs. 1 and 2 is represented as a push-button, while in Fig. 5, for sake of clearness, it is shown as a lever or arm d^{25}, connected by the branch wire d^{26} to one line-wire, as d^9, and coöperating with the terminal d^{27}, connected by the branch wire d^{28} to the other line-wire d^{10}. When the manually-operated switch D is closed, the circuit may be traced as follows: from the positive pole of the battery d through the electromagnet d^{20}, thence by wires d^4 d^{10}, branch wire d^{28}, terminal d^{27}, switch-lever d^{25}, branch wire d^{26}, wire d^9 to wire d^2, thence through the magnet c', and by wire d' to the negative pole of the battery d. When the electromagnet c' is energized, either manually or automatically by the thermostats, it is desirable that notification should be given to the occupants of the building, and this result may be effected by providing an audible alarm, which is shown as a bell d^{40}, adapted to be struck by the hammer d^{41}, represented as secured to the armature d^{42} of the electromagnet d^{43}, which is included in a local circuit controlled by the magnet d^{20}, the said local circuit being provided with a battery d^{44}, having one of its poles, as, for instance, the positive pole, connected by wire d^{45} to a front stop d^{46} for the armature d^{47} of the magnet d^{20}, the said armature being connected by wire d^{48} to one coil of the magnet d^{43}, the other coil of which is connected by the wire d^{49} to the armature d^{42} of the magnet d^{43}, the said armature having coöperating with it a contact-spring d^{50}, connected by wire d^{51} with the negative pole of the battery d^{44}. By an inspection of Fig. 5 it will be seen that when the magnet d^{20} is energized the armature d^{47} will be attracted and the local circuit containing the bell-magnet d^{43} will be closed, thereby setting the latter in operation and giving an audible alarm in the case of a fire. I have herein shown one bell or audible alarm as controlled by the magnet d^{20}, but it is evident that any desired number of electromagnets d^{43} and coöperating bells may be included in the local circuit controlled by the magnet d^{20}, and that these audible signals may be located in any desired or convenient places in the building. The magnet d^{20} may and preferably will be placed in a suitable box D', and the armature d^{47} of the said magnet may control an indicator which is adapted to register with an opening d^{52} in the said box or case.

I have herein described the electromagnet c' d^{20} as located in a normally open circuit, but it is evident that the same may be lo-

cated in a normally closed circuit which is adapted to be opened by a fusible connection or other thermostat when the heat has reached a predetermined point or by the breaking of the circuit manually, and when the normally closed circuit is employed the mechanical parts of the apparatus would be so arranged that they will release the shutters when the magnet c' is demagnetized.

I have herein represented one wall of a building provided with six windows, which may and will in practice be designated a section, and each wall of the building may be a section by itself and have its own particular apparatus, or all the sections may be suitably connected together so as to be placed under control of one magnet c'.

I claim—

1. In a protective system for buildings, the combination of the following instrumentalities, viz: a series of shutters arranged in a number of rows, a movable rod or bar for each row of shutters provided with a plurality of catches adapted to engage said shutters and hold them open, a common actuating device or rod connected to the vertically-arranged catch-carrying rods, an electromagnet provided with an armature, means controlled by the said armature to lock the common actuating bar or rod, a circuit-controller in circuit with said electromagnet to effect the release of the common actuating-rod, and means to operate the said common actuating-rod and thereby move the catch-carrying rods to release the shutters, substantially as described.

2. In a protective system for buildings, the combination of the following instrumentalities, viz: a series of shutters arranged in a number of rows, a movable rod or bar for each row of shutters provided with a plurality of catches adapted to engage said shutters and hold them open, a common actuating device or rod connected to the vertically-arranged catch-carrying rods, means to normally lock said common actuating-rod, and means to release said common actuating-rod and move it to operate the catch-carrying rods to release the said shutters, substantially as described.

3. In a protective system for buildings, the combination of the following instrumentalities, viz: a shutter, mechanism to hold the shutter open, an electromagnet to operate said mechanism to effect the release of the shutter, a circuit-controller governing the action of the electromagnet, and a local circuit provided with an electromagnet operated by the energizing of the circuit in which the shutter-controlling magnet is included, substantially as described.

4. In a protective system for buildings, the combination of the following instrumentalities, viz: a shutter comprising two parts or halves, mechanism to hold open one half or part of the shutter, an electromagnet to operate said mechanism to release the said part or half of the shutter, mechanism to hold open the second part or half of the shutter and operated to release its half of the shutter by the closing of the other half or part of the shutter, and a circuit-controller governing the operation of the said electromagnet, substantially as described.

5. In a protective system for buildings, the combination of the following instrumentalities, viz: a shutter comprising two parts or halves, mechanism to hold open one half or part of the shutter, means to operate said mechanism to release the said part or half of the shutter, mechanism to hold open the second part or half of the shutter and operated to release its half of the shutter by the closing of the other half or part of the shutter, substantially as described.

6. In a protective system for buildings, the combination of the following instrumentalities, viz: a series of shutters arranged one above the other and open, a vertically-movable rod provided with a plurality of catches adapted to engage said shutters and hold them open, means to lock the said rod in its elevated position, means to lower said rod and disengage the catches from the said shutters, and means to automatically close said shutters when released, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHAS. BURGHER.

Witnesses:
JAS. H. CHURCHILL,
J. MURPHY.