

No. 774,855.

PATENTED NOV. 15, 1904.

H. C. SMITH.
AUTOMATIC WINDOW CLOSER.

APPLICATION FILED AUG. 17, 1903.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.

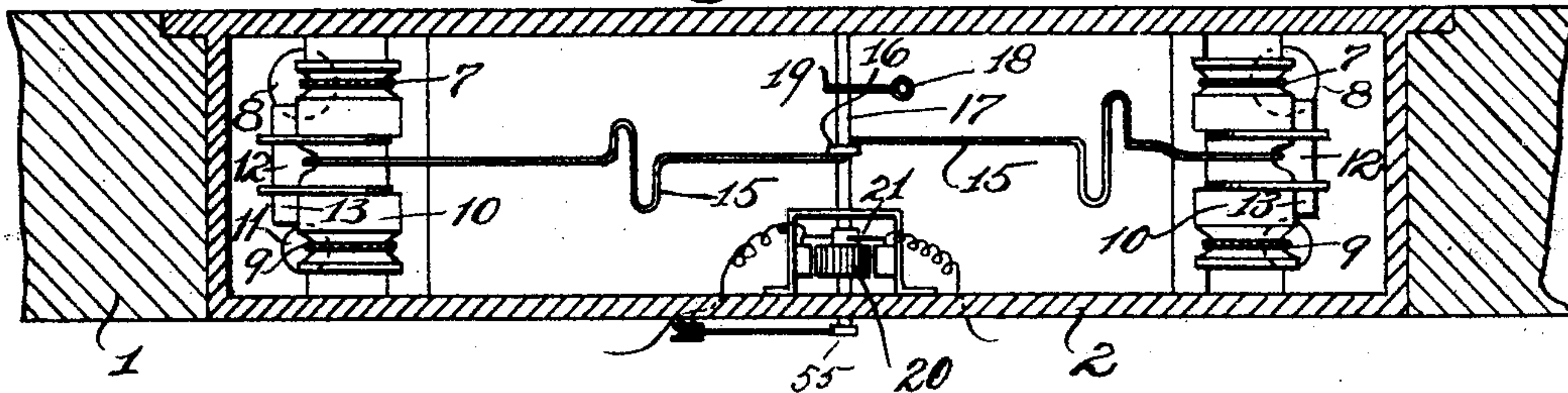


Fig. 2.

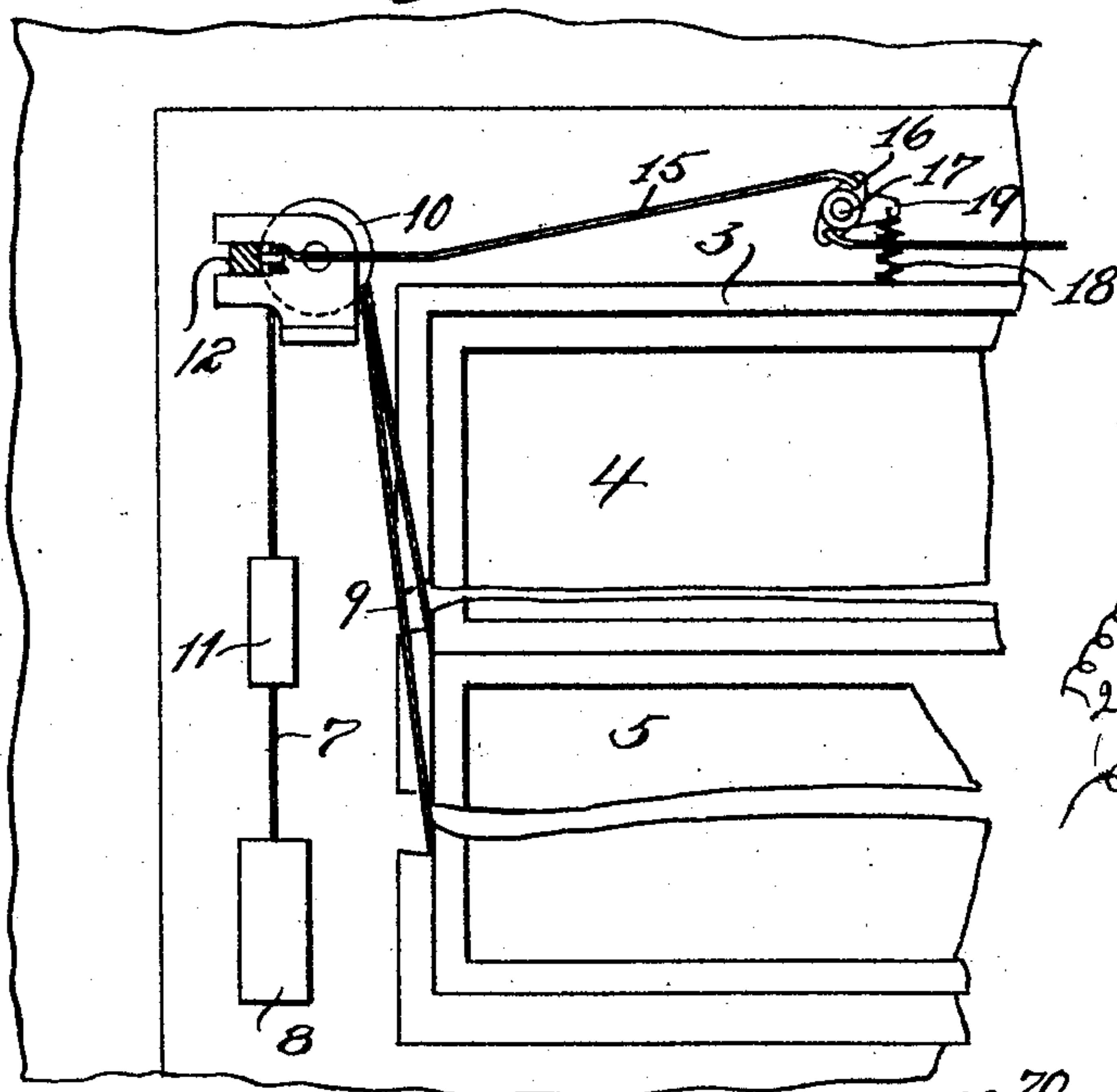


Fig. 3.

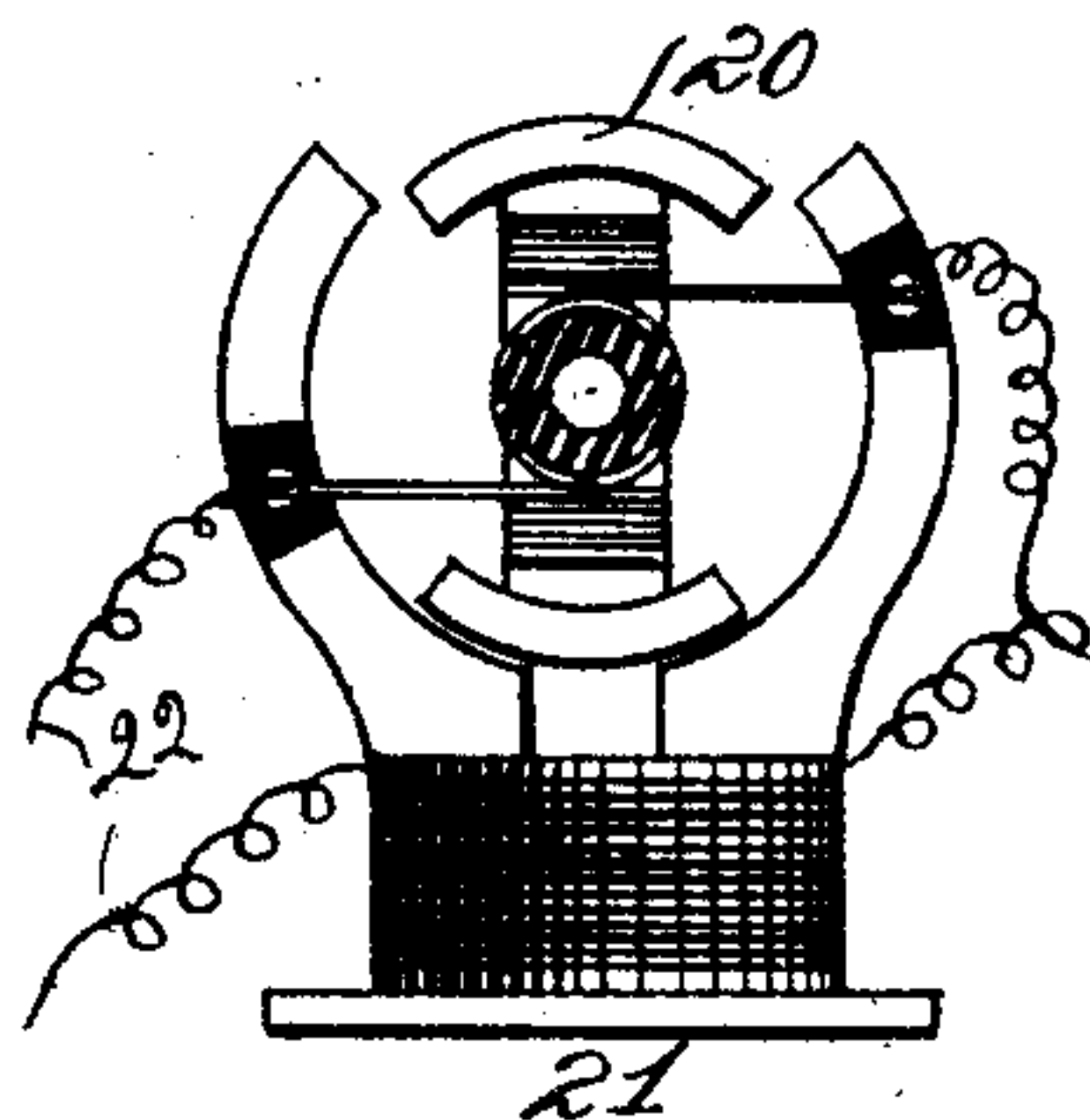


Fig. 4.

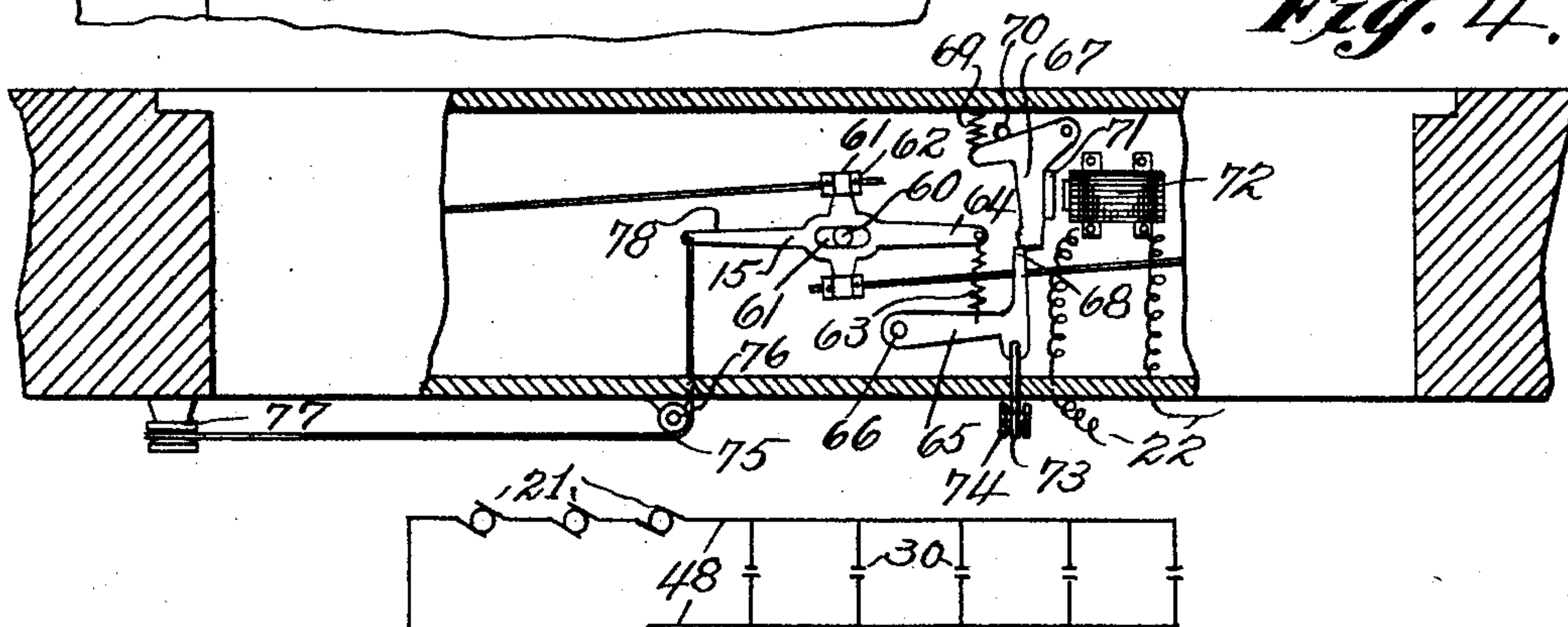


Fig. 5.

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2 SHEETS—SHEET 2.

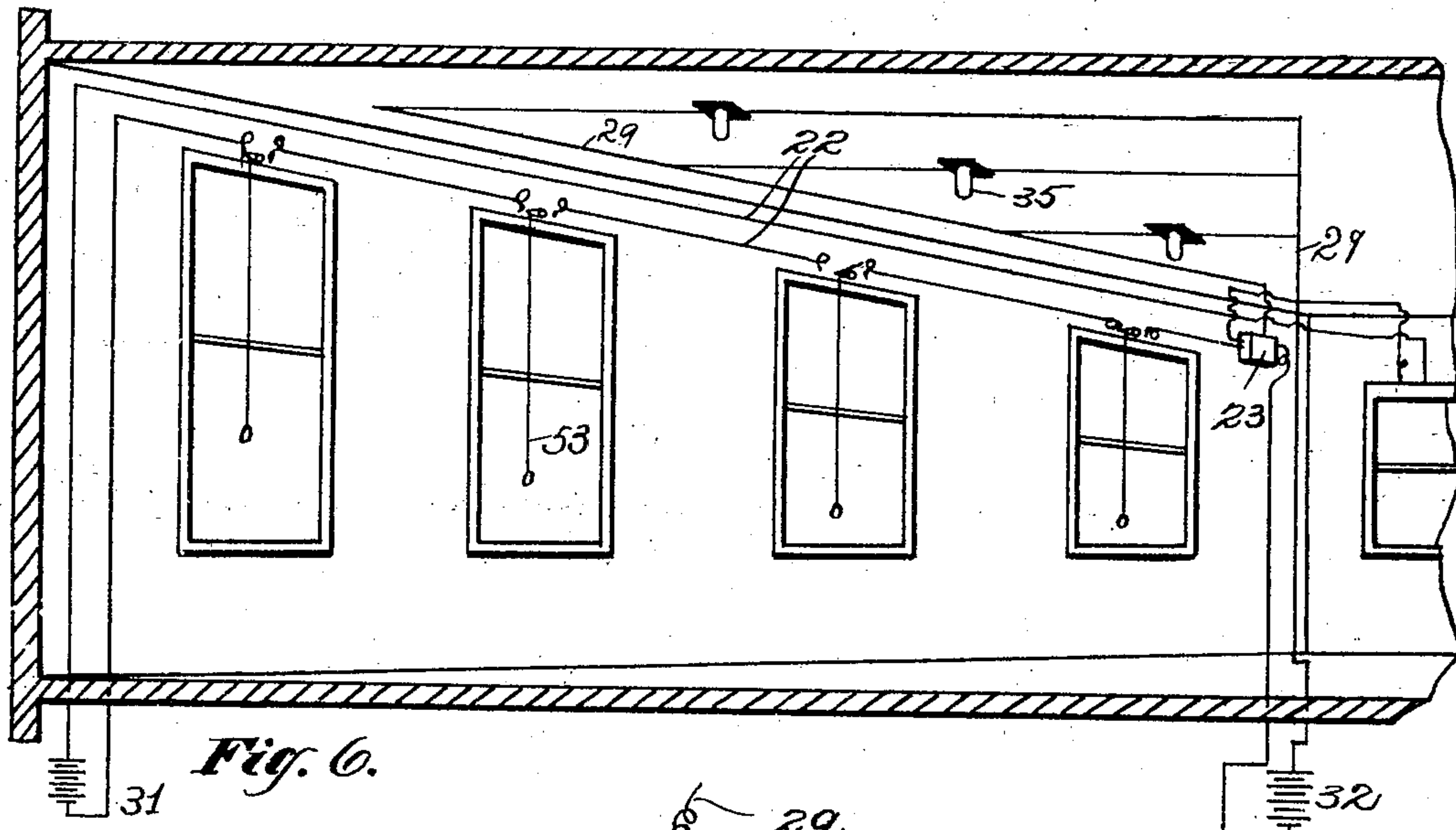


Fig. 6.

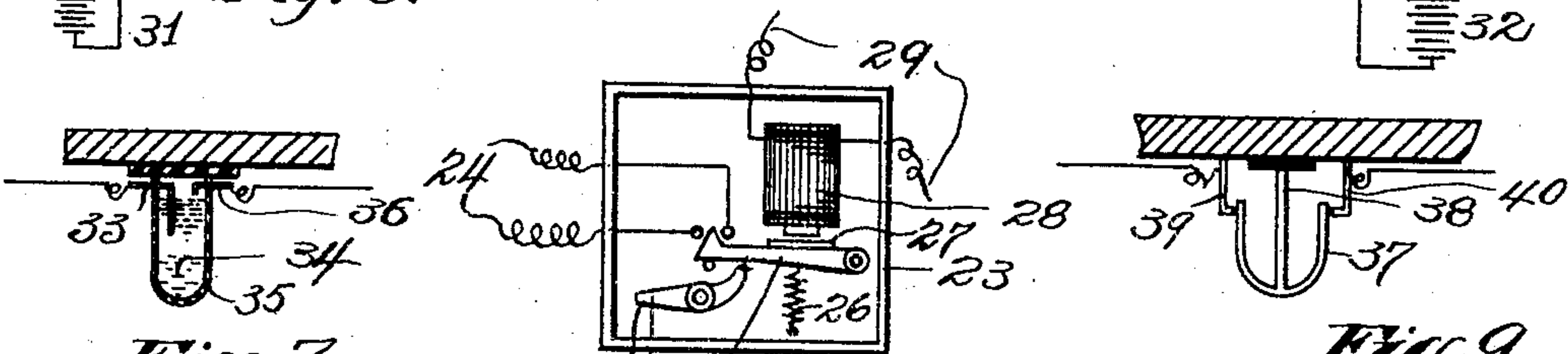


Fig. 7.

Fig. 8.

Fig. 9.

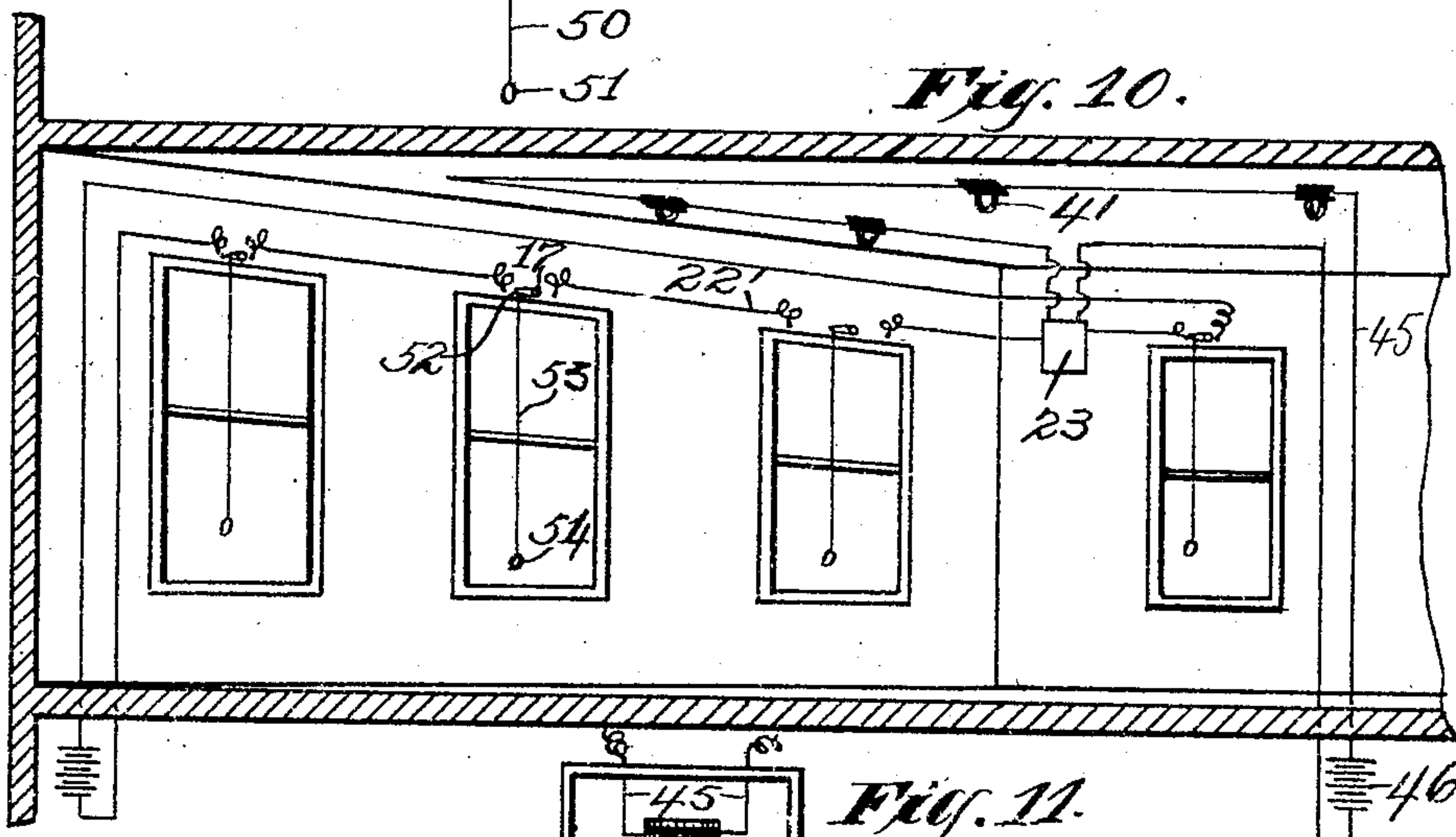
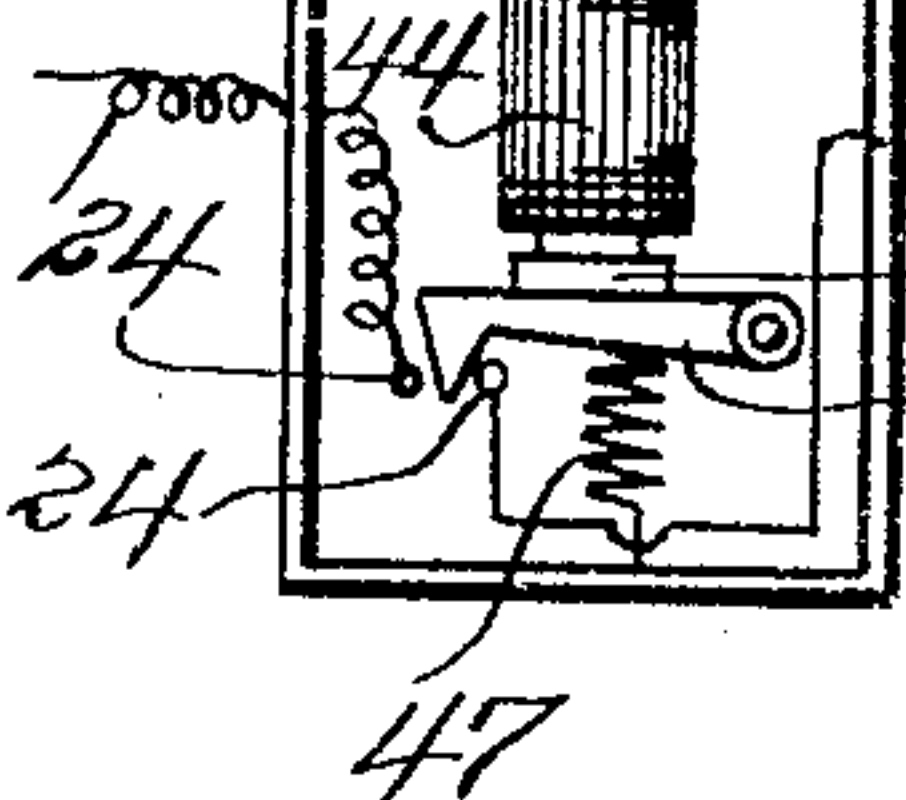


Fig. 10.

Fig. 11.

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UNITED STATES PATENT OFFICE.

HENRY COLLIER SMITH, OF NEW YORK, N. Y.

AUTOMATIC WINDOW-CLOSER.

SPECIFICATION forming part of Letters Patent No. 774,855, dated November 15, 1904.

Application filed August 17, 1903. Serial No. 169,783. (No model.)

To all whom it may concern:

Be it known that I, HENRY COLLIER SMITH, a citizen of the United States, residing in New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Automatic Window-Closers, of which the following is a specification.

This invention relates principally to electric systems for closing windows, and particularly to means for closing them automatically in case of fire; and its objects are to effect improvements in the construction and operation and reduction in cost of maintaining the system.

Other objects will hereinafter appear.

In the drawings forming part of this specification, Figure 1 is a sectional plan of a window-head provided with my present improvements. Fig. 2 is a diagrammatic elevation of the window structure seen at Fig. 1. Fig. 3 is a detail of one form of motor employed in releasing the window-sashes. Fig. 4 is a view resembling Fig. 1, but showing another form of electric sash-releasing apparatus. Fig. 5 is a diagram illustrating a single electric circuit, including window-closers in series and thermotic circuit-closers grouped in parallel. Fig. 6 is a perspective of a room in a building, showing the windows provided with my improved electric closing system. Fig. 7 is a detail of one form of thermotic circuit-closer. Fig. 8 illustrates means whereby the closing of an auxiliary thermotic circuit may effect the closing of a main circuit, including a series of window-closers. Fig. 9 illustrates another form of thermotic circuit-closer. Fig. 10 is a perspective of a room showing a form of window-closing system in which the auxiliary circuit is normally closed and when broken by the action of a thermotic device effects the closing of the main window-closing circuit. Fig. 11 is a detail of the main circuit-closer used in the form of the invention illustrated at Fig. 10.

In the several views like signs denote like parts.

The wall of the building is designed as 1.

2 is a window-frame, 3 the head thereof, and 4 and 5 are the upper and lower sliding

sashes mounted in said window-frame. The upper sash is provided with side cables 7, running over pulleys and attached to counterbalances 8, which are heavier than the sash, so as to be capable of closing the same. The lower sash is provided with cables 9, running over pulleys 10 and attached to partial counterbalances 11, so that the sash may close by its own weight when released.

At each side of the window I provide an equalizing-bar 12, extending from pulley to pulley and formed integral with brake-shoes 13, which bear upon the pulleys. In said bars at points between the shoes are caught the outer ends of rods or links 15, which at their inner ends are pivoted to a cross-lever 16, which is fixed upon a horizontal rock-shaft 17, journaled in the front and rear walls of the window-head. The lever is intended to act through the rods to cause the brakes to bear upon the pulleys with sufficient power to prevent the window-sashes from closing because of their disproportionately-counterbalanced condition. By movement or pressure of the lever in one direction all four brake-shoes may be set against the pulleys, while by a reverse movement thereof all the brakes may be released. For setting the brakes I connect a draw-spring 18 to an arm 19, fixed upon the shaft 17, the other end of the spring being attached to the floor of the window-head.

Upon the lever-shaft 17 I fix the movable armature 20 of an electric motor 21 in such a manner that when the current traverses the motor the shaft is caused to turn in a direction to release the brakes in opposition to the tension of the brake-spring 18. For this purpose the motor or its equivalent may be of any suitable construction or design, and it may be so connected, if desired, as to turn to a greater extent in order to release the brakes.

A motor 21 is provided at each window, and all are included in series in an electric circuit 22, normally open and provided within a casing 23 with terminals 24, Fig. 8. A pivoted circuit-closer 25, held in a normally ineffective position by a spring 26, is provided with an armature 27, adapted to be attracted by an electromagnet 28, thereby to close the circuit 22. Said magnet 28 is included in an auxil-

iary electric circuit 29, which is normally open and includes a plurality of thermotic circuit-closers 30, grouped in parallel, so that the heating of any one of them, effected by fire in the vicinity thereof, closes the auxiliary circuit, energizing the magnet 28 and causing the closer 25 to close the main circuit 22, thereby energizing the motors or other magnetic devices in the several windows and releasing the brakes and permitting the sashes to close. It will be understood that while the thermotic closers are illustrated as located at different points upon the ceiling of the room they may be disposed near the windows, or outside of the windows, or in a different room, or at any desired points in a building and that the windows in several stories in a building may be controlled by a single thermotic circuit. The battery 31 for the window-closing circuit may be powerful without incurring great expense, since it is used only when the windows are to be closed, and the battery 32 for the thermotic circuit need be only strong enough to operate the circuit-closer 26, and since its use is only occasional it will be seen that the entire window-closing system may be maintained at trifling expense.

At Fig. 7 is shown one form of thermotic circuit-closer in which one terminal, 33, dips into mercury 34, contained in a cup or tube 35, while the other terminal, 36, is out of contact with the mercury, but so close thereto that heating and consequent expansion of the mercury causes it to rise and contact with the terminal 36, thereby closing the auxiliary circuit with the result above set forth.

In the form shown at Fig. 9 a strip of suitable metal is bent into U form, as at 37, and suspended by a stem 38 between the terminals 39 and 40, the bent strip being out of contact with at least one of the terminals. When heated, the bent strip tends to open out, thereby making a contact with the terminals and closing the auxiliary circuit.

In the form shown at Figs. 10 and 11 the auxiliary circuit is normally closed and includes in series a plurality of fusible devices 41, the fusing of any whereof by the action of heat of moderate degree breaks the circuit, and by means of the devices shown in detail at Fig. 11 the main circuit 22 is closed and the windows caused to close. At Fig. 11 a circuit-closer 42 is normally held out of contact with the terminals 24 of the main circuit by an armature 43, provided upon the circuit-closer, and an electromagnet 44, included in the auxiliary circuit 45, said magnet being normally energized by a suitable battery or other source of power 46. Upon the breaking of the circuit a draw-spring 47 causes the device 42 to contact with both terminals 24, thereby completing the main circuit with the results stated.

At Fig. 5 a single circuit 48 is employed, including in series the window-closing motors

or other devices 21 and also including thermotic circuit-closers 30, grouped in parallel, the group of thermotic devices being so related to the battery 31 and to the series of motors 21 that the closing of the circuit by any thermotic device enables the current to traverse all of the devices 21. It will be understood that the thermotic portion of the circuit may be extended to any desired portions of the building.

At Fig. 8 is illustrated a cord 50, provided with a bob 51 and connected to a lever 52 within the casing 23, said lever being in position to operate the circuit-closer 25 when pulled by the cord. Thus the electric current may be employed to close all the windows in the building at will.

Means are also preferably provided at each window for releasing its brakes, so as to enable both sashes to close, said means comprising a cord 53, having a bob 54 and connected to the free end of an arm 55, fixed upon a projecting end of the brake-shaft 17.

Referring now to Fig. 4, the brake-controlling lever is mounted upon a vertical pivot 60 by means of a slot 61, extending longitudinally of the brake connections 15, so as to enable the lever to adjust itself evenly to the brakes at both sides of the window, and each connection is connected by a swivel-eye 61 and nuts 62 to the lever, so as to permit length adjustment of the connections. The brake-setting spring 63 is connected to an arm 64, formed upon the lever, and at its other end is attached to a trip-lever 65, pivoted at 66 to the framing. Said spring is normally held distended by means of a trip 67, engaging a nose 68, formed upon said trip-lever, said trip being held by a spring 69 against a stop 70. The trip is provided with an armature 71, adapted to be attracted by an electromagnet 72, which is included in the circuit 22 in place of the motor illustrated at Fig. 1. Upon the closing of the circuit 22 by means heretofore described the trip-armature is attracted and the trip caused to release the nose 68 of the lever 65, whereby the spring 63 is relaxed and the pressure of the sash-brakes is relieved, so that the sashes close automatically. The trip-lever may be returned to its normal position by a cord 73, attached thereto and running over a pulley 74, and the current being off the trip will snap into normal position by the action of its spring 69. In this construction the brake-setting spring 63 is released by the operation of the electric current, while in the Fig. 1 construction the brake-setting spring 18 is put under even greater tension by the operation of the motor when the latter is excited by the electric current; but it will be seen that in both of these constructions the brakes themselves are released, this being accomplished in both instances by electromagnetic means, which at Fig. 4 include the magnet 72 and at Fig. 1 in-

clude the motor 21, which usually consists of two electromagnets, one fixed and the other rotary, as illustrated, both magnets being usually excited or affected by the electric current.

5 For releasing the brakes in opposition to the tension of the spring 63 a releasing-cord 75, running over pulleys 76 and 77, may be connected to an arm 78, formed upon the brake-controlling lever.

10 Portions of my improvements may be used without others, and many other variations may be resorted to within the scope of my invention.

Having thus described my invention, I 15 claim—

1. The combination with a plurality of windows each having a vertically-adjustable window-sash, said sashes being adjustable independently one of another and each provided 20 with means, including a counterbalance, for maintaining the sash stationary at any position to which it may be adjusted up or down, of a main electric circuit controlling sash-closing devices at each window, an auxiliary electric circuit including a plurality of thermotic devices, and means also included in said 25 auxiliary circuit for controlling said main circuit.

2. The combination with a plurality of windows each having a vertically-adjustable window-sash, said sashes being adjustable independently one of another and each provided 30 with means, including a counterbalance, for maintaining the sash stationary at any position to which it may be adjusted up or down, of a main electric circuit normally open and controlling sash-closing devices at each window, an auxiliary circuit including a plurality 35 of thermotic devices, and means also included in said auxiliary circuit for closing said main circuit.

3. The combination with a plurality of windows each having a vertically-adjustable window-sash, said sashes being adjustable independently one of another and each provided 45 with means, including a counterbalance, for maintaining the sash stationary at any position to which it may be adjusted up or down, of sash-closing means extending from window to window, and an electric circuit having 50 means for controlling said sash-closing means and also inclusive of a plurality of thermotic devices.

4. The combination with a plurality of windows each having a vertically-adjustable window-sash, said sashes being adjustable independently one of another and each provided 55 with means, including a counterbalance, for maintaining the sash stationary at any position to which it may be adjusted up or down, of an electric circuit normally open and controlling sash-closing devices at each window, and thermotic means for closing said circuit.

5. The combination with a plurality of windows each having a vertically-adjustable win-

dow-sash, said sashes being adjustable independently one of another and each provided with means, including a counterbalance, for maintaining the sash stationary at any position to which it may be adjusted up or down, 70 of an electric circuit normally open and controlling sash-closing devices at each window, and means for closing said circuit; said closing means including a series of separated thermotic devices connected independently of 75 said circuit.

6. The combination with a plurality of windows each having a plurality of sashes, each adjustable independently of the others, of an electric circuit controlling means for closing 80 all of the sashes, from any positions to which they may be adjusted, and an auxiliary electric circuit including a plurality of thermotic devices and having means for controlling said sash-closing circuit. 85

7. The combination with a plurality of windows each having a vertically-adjustable window-sash, said sashes being adjustable independently one of another and each provided 90 with means, including a counterbalance, for maintaining the sash stationary at any position to which it may be adjusted up or down, of a main electric circuit normally open and controlling means for controlling said counterbalances, and an electric circuit including 95 means for closing said main circuit and also including a plurality of thermotic devices.

8. The combination with a plurality of windows each provided with a pair of sliding sashes and counterbalancing means therefor, 100 each sash being adjustable independently of the others, of a main electric circuit including a single electromagnetic device at each window for controlling all the counterbalances there located, to close the sashes from any 105 positions to which they may be adjusted, and an auxiliary controlling-circuit including a plurality of thermotic devices.

9. The combination with a plurality of windows, each having a disproportionately-counterbalanced sash, of a brake for each sash, a main electric circuit including means at each window for controlling its brake, and an auxiliary electric circuit including a plurality of thermotic devices and also including means 115 for closing said main circuit.

10. The combination with a plurality of windows, each having a pair of disproportionately-counterbalanced sashes, of a brake for each sash, an electric circuit normally open 120 and including means for setting all the brakes, and an auxiliary electric circuit including means for closing said open circuit and also including a plurality of thermotic devices.

11. The combination with a plurality of 125 windows, each provided with a sliding sash, disproportionate counterbalancing means for the sash inclusive of a cable and a pair of pulleys, and a brake for each pulley, of a main electric circuit normally open and including 130

at each window a device for releasing said brakes, and an auxiliary circuit including means for closing said main circuit and also including a plurality of thermotic devices.

5 12. The combination with a plurality of windows, each provided with a pair of window-sashes, disproportionate counterbalancing means therefor including weights, pulleys and cables, and brakes for the pulleys, of a
10 main electric circuit including at each window an electromagnetic device common to all of its brakes for controlling the same, and an auxiliary electric circuit including means for controlling said main electric circuit and also
15 including a plurality of thermotic devices.

13. The combination with a plurality of windows each having a vertically-adjustable window-sash, said sashes being adjustable independently one of another and each provided
20 with means, including a counterbalance, for maintaining the sash stationary at any position to which it may be adjusted up or down, of a normally open electric circuit including a plurality of thermotic circuit-closers
25 grouped in parallel, and means controlled by said circuit for closing all of the sashes.

14. The combination with a plurality of windows each having a disproportionately-counterbalanced sliding sash and a brake therefor, of means for setting the brakes, and a
30 normally open electric circuit including a plurality of thermotic circuit-closers grouped in parallel, and means rendered effective by the closing of said circuit for releasing all of said
35 brakes.

15. The combination with a plurality of windows each having a pair of disproportionately-counterbalanced sliding sashes, a pair of brakes for each sash, and means common to
40 the brakes for rendering them effective, of a normally open electric circuit including a plurality of thermotic circuit-closers grouped in parallel, and electromagnetic means rendered effective by the closing of said circuit by any
45 of said circuit-closers, for releasing said brakes.

16. The combination with a plurality of windows each having a vertically-adjustable window-sash, said sashes being adjustable
50 independently one of another and each provided with means, including a counterbalance, for maintaining the sash stationary at any position to which it may be adjusted up or down, of an open electric circuit controlling means
55 for closing all of the sashes, and an auxiliary electric circuit including means for closing said circuit and also including a plurality of thermotic circuit-closers grouped in parallel.

17. The combination with a disproportionately-counterbalanced window-sash, of a brake therefor, a spring for setting the brake, and an electromagnetic device for releasing the
60 brake.

18. The combination with a plurality of
65 windows, each having a pair of disproportion-

ately-counterbalanced sliding sashes, a pair of brakes for each sash, and a spring common to all the brakes for setting the same, of an electric circuit extending from window to window and including means for releasing all of said
70 brakes.

19. The combination with a plurality of windows, each having a disproportionately-counterbalanced sash, brakes therefor, and a spring for setting the brakes, of electromag-
75 netic devices for releasing the brakes, and a normally open circuit including a plurality of thermotic devices grouped in parallel and each capable when heated of closing said circuit and rendering said electromagnetic releasing
80 devices effective.

20. The combination with a plurality of windows, each having a pair of disproportionately-counterbalanced sliding sashes, a pair of
85 brakes for each sash, and a spring common to said brakes for setting the same, of a normally open electric circuit including electromagnetic devices for releasing all the brakes, and a normally open auxiliary circuit including means for closing said brake-releasing cir-
90 cuit, and also including a plurality of thermotic circuit-closers grouped in parallel.

21. The combination with a disproportionately-counterbalanced window-sash, of a brake therefor, and an electric circuit including a
95 motor for controlling said brake.

22. The combination with a pair of disproportionately-counterbalanced window-sashes, of a brake for each of said sashes, and an electric circuit including a motor provided with
100 means for controlling both of said brakes.

23. The combination with a pair of disproportionately-counterbalanced window-sashes, of a pair of brakes for each of said sashes, and an electric circuit including a motor provided with means for controlling all of said
105 brakes.

24. The combination with a plurality of windows each having a disproportionately-counterbalanced sash, a brake, and a spring
110 for setting the brake, of a normally open electric circuit including a thermotic circuit-closing device and also including a motor at each window for releasing the brake.

25. The combination with a plurality of
115 windows each having a pair of disproportionately-counterbalanced window-sashes, and a pair of brakes for each sash, of an electric circuit including at each window a motor provided with means for controlling all of said
120 brakes, and thermotic means for controlling said circuit.

26. The combination with a plurality of windows each having a disproportionately-counterbalanced sash, a pair of brakes, and a
125 spring for setting the brakes, of a motor at each window for releasing the brakes, and a normally open circuit including a plurality of thermotic circuit-closers, the heating of any of which renders said motors effective.
130

27. The combination with a disproportionately-counterbalanced window-sash and a pair of brakes therefor, of a lever operatively connected to said brakes, an electric motor whose
5 revoluble member is rigid with said lever, and thermotic means for controlling said motor.

28. The combination of a movable window-sash, a brake at each side thereof, a lever disposed between said brakes, connections from
10 said lever to said brakes, a shaft whereon said lever is mounted between said connections, an electric circuit including a motor whose revoluble part is mounted upon said shaft, and thermotic means for controlling said circuit.

29. The combination with a window-frame, of a sliding sash mounted therein, disproportionate counterbalances for said sash, cables connecting said sash to said counterbalances, pulleys over which said cables run, a brake for
20 each pulley, a lever disposed between said brakes, connections from said lever to said brakes, a shaft whereon said lever is fixed, a spring for setting said brakes, an electric circuit normally open and including a motor
25 whose revoluble member is fixed upon said shaft, and thermotic means for closing said circuit.

30. The combination with a plurality of window-frames, each having a pair of sliding sashes, disproportionate counterbalancing means for said sashes, cables connecting said sashes to said counterbalancing means, pulleys over which said cables run, a brake for each pulley, means directly connecting the brakes
35 at adjoining pulleys, a lever, connections from said lever to said connecting means, and a shaft whereon said lever is fixed between said connections, of an electric circuit including at each window a motor whose revoluble member is
40 mounted on said shaft, and thermotic means for controlling said circuit.

31. The combination with a plurality of window-frames, each having a pair of sliding sashes, disproportionate counterbalancing
45 means for said sashes, cables connecting said sashes to said counterbalancing means, pulleys over which said cables run, a brake for each pulley, means directly connecting the brakes at adjoining pulleys, a lever, connections from
50 said lever to said connecting means, a spring connected to said lever for setting the brakes, and a shaft whereon said lever is fixed between said connections, of a normally open electric circuit including at each window a motor
55 whose revoluble member is mounted on said shaft, and a plurality of thermotic devices connected in parallel and each capable, when heated, of closing said circuit.

32. The combination with a plurality of
60 windows each having a vertically-adjustable window-sash, said sashes being adjustable independently one of another and each provided with means, including a counterbalance, for maintaining the sash stationary at any position to which it may be adjusted up or down,

of a normally open electric circuit including a plurality of thermotic circuit-closers grouped in parallel, and means controlled by said circuit for closing all of the sashes; each of said circuit-closers comprising a cup, mercury
70 therein, and a pair of electrodes, whereof one is in contact with the mercury and the other is not.

33. The combination with a plurality of windows each having a disproportionately-
75 counterbalanced sliding sash and a brake therefor, of means for setting the brakes, a normally open electric circuit including a plurality of thermotic circuit-closers grouped in parallel, and means rendered effective by the
80 closing of said circuit for releasing all of said brakes; each of said circuit-closers comprising a cup, mercury therein, and a pair of electrodes, at least one whereof is out of contact with the mercury but close thereto.
85

34. The combination with a plurality of windows, each having a disproportionately-counterbalanced sash, of a brake for each sash, an electric circuit including electromagnetic means at each window for controlling its brake,
90 and manually-operative means at each window for releasing the brake.

35. The combination with a plurality of windows, each having a pair of disproportionately-counterbalanced sashes, of a brake for
95 each sash, an electric circuit including means for controlling all the brakes, and manually-operable means at each window for releasing the brakes.

36. The combination with a plurality of
100 windows, each having a pair of disproportionately-counterbalanced sliding sashes and a pair of brakes for each sash, of an electric circuit, a spring and an electromagnetic device at each window, one for setting and the other for releasing all the brakes, said circuit including
105 said electromagnetic devices, and manually-operable means at each window for releasing all the brakes.

37. The combination with a plurality of
110 windows, each having a disproportionately-counterbalanced window-sash, a brake therefor, a spring for setting the brake, and an electromagnetic device for releasing the brake, of an open electric circuit in which said electromagnetic devices are included, and a switch
115 for closing said circuit.

38. The combination with a plurality of windows, each having a disproportionately-counterbalanced sash, a brake therefor, a
120 spring for setting the brake, and an electromagnetic device for releasing the brake, of an open electric circuit in which said electromagnetic devices are included, a switch for closing said circuit, thermotic devices for closing
125 said circuit, and manually-operable means at each window for releasing the brake.

39. The combination with a window-frame, of a sliding sash mounted therein, disproportionate counterbalances for said sash, cables
130

connecting said sash to said counterbalances, pulleys over which said cables run, a brake for each pulley, a lever disposed between said brakes, connections from said lever to said
5 brakes, a shaft whereon said lever is fixed, an arm on said shaft outside of the window-frame, and a releasing-cord connected to said arm.

40. The combination with a window-frame, of a sliding sash mounted therein, disproportionate counterbalances for said sash, cables
10 connecting said sash to said counterbalances, pulleys over which said cables run, a brake for each pulley, a lever disposed between said

brakes, connections from said lever to said brakes, a spring for setting said brakes, a shaft 15 whereon said lever is fixed, electromagnetic means for moving said lever to release said brakes, thermotic devices for controlling said electromagnetic means, an arm on said shaft outside of the window-frame, and a releasing- 20 cord connected to said arm.

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