No. 840,344. PATENTED JAN. 1, 1907.

C. W. KIRSCH.

ELEVATOR GATE CLOSING MEANS.

APPLICATION FILED APR. 2, 1906.

2 SHEETS—SHEET 1.

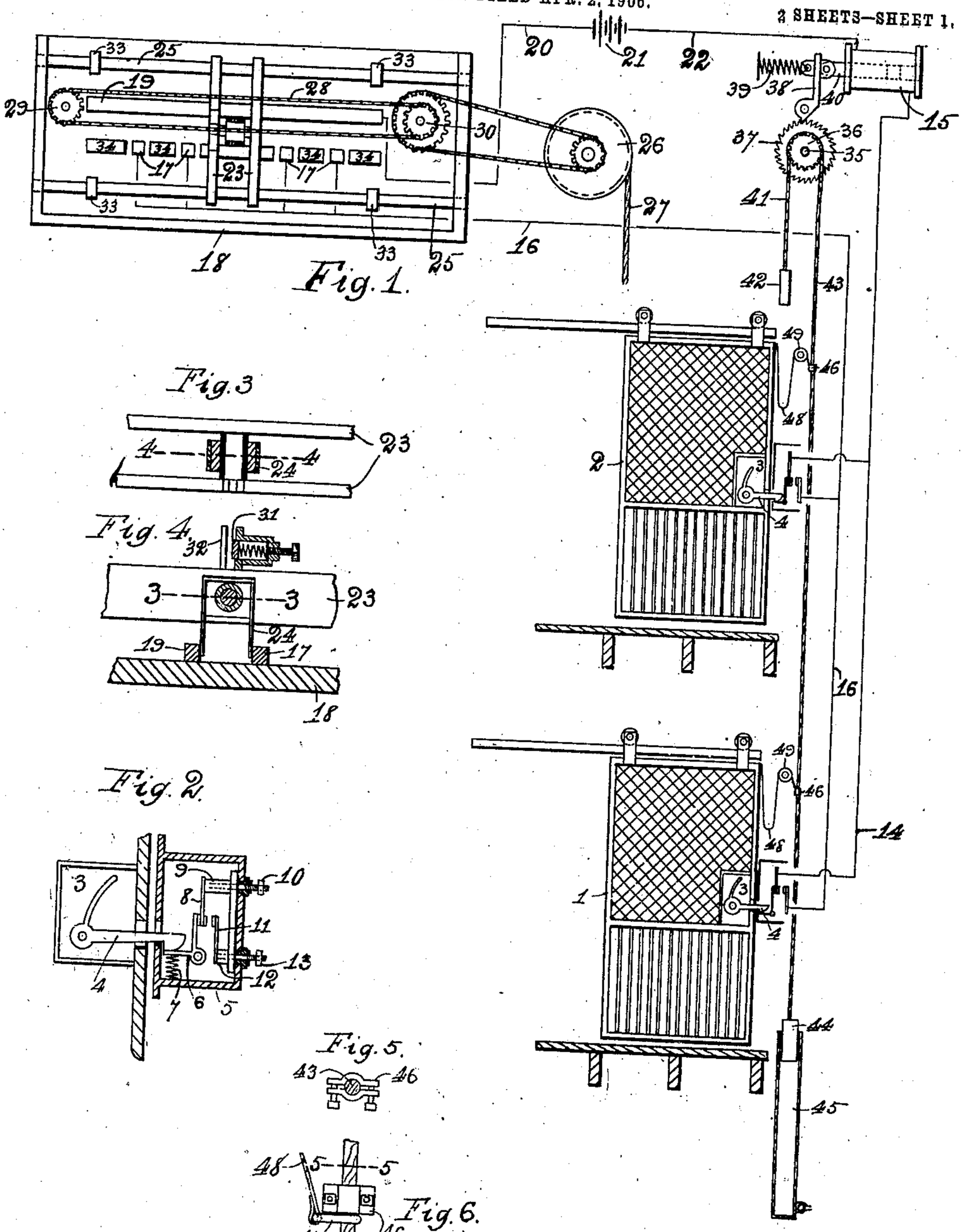

Fig. 1.

Fig. 3

Fig. 4

Fig. 2.

Fig. 5.

Fig. 6.

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2 SHEETS—SHEET 2.

Fig. 7.

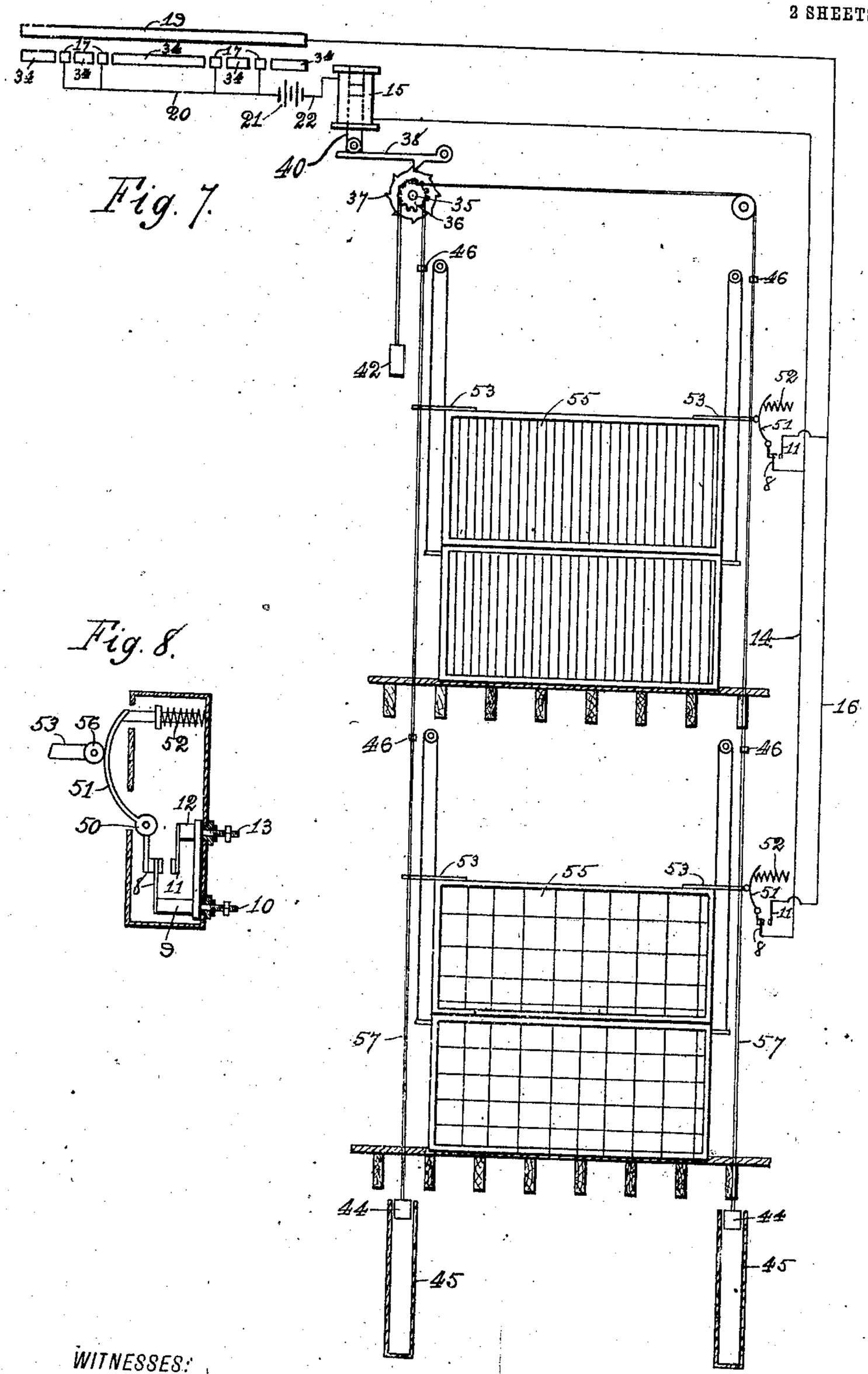

Fig. 8.

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ELEVATOR-GATE-CLOSING MEANS.

No. 840,344. Specification of Letters Patent. Patented Jan. 1, 1907.

Application filed April 2, 1906. Serial No. 309,527.

To all whom it may concern:

Be it known that I, CHARLES W. KIRSCH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Elevator-Gate-Closing Means; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to a novel construction in means for automatically closing hand-operated elevator-gates, the object being to provide means for insuring closure of such gates before the elevator-car shall have passed so far beyond the floor on which a gate may have been carelessly left open as to render accident to a passenger possible, and, furthermore, to insure closure of the so-called "Meeker" doors employed on freight-elevator shaft to guard against spread of fire or accident; and it consists in the features of construction and combinations of parts hereinafter fully described and claimed.

In the accompanying drawings, illustrating my invention, Figure 1 is a diagrammatic view showing elevator-gates disposed on various floors of a building, circuit-controlling means actuated thereby, a commutator coacting with said circuit-controlling means to close an electric circuit through a solenoid, and trip mechanism controlled by said solenoid and adapted to throw gate-closing means into action. Fig. 2 is a detail vertical section of a gate-latch suited to my purpose and circuit-controlling means actuated thereby. Fig. 3 is a fragmentary detail plan section of the commutator on the line 3 3 of Fig. 4. Fig. 4 is a fragmentary detail vertical transverse section of the commutator on the line 4 4 of Fig. 3. Fig. 5 is a detail plan section on the line 5 5 of Fig. 6 showing a collar disposed on the cable by means of which the gate is closed. Fig. 6 is a fragmentary detail side elevation of said door-closing cable, showing the manner of engaging the cord connecting the gate therewith. Fig. 7 is a view similar to Fig. 1 showing my invention as applied to Meeker doors. Fig. 8 is a detail vertical section of the circuit-closing means employed in connection with said Meeker doors.

It is desirable, in order to avoid accidents and spread of fire, that the closure of elevator-gates should be assured, as otherwise such gates are entirely useless. The closure of such gates is mainly sought by both casualty and fire insurance companies; and the object of my invention is therefore to provide simple, cheap, and efficient means for effecting such closure in the event that the operator should omit to perform this part of his duty, but which so long as proper care is exercised by the operator remains inactive and out of operative relation to the elevator-gates.

My said invention comprises, briefly, a commutator or traveling circuit-closing means actuated in accordance with the movements of the car and adapted to close at one point an electric circuit through a solenoid, which is maintained normally open at another point by circuit-closing means controlled by the position of the elevator-gate and closing the circuit at said point when the gate is opened. The commutator is so arranged that when the car stops at a floor the circuit is maintained open. The solenoid controls trip mechanism, which in turn controls a cable, on which a weight is suspended and which is connected with each of the elevator-gates, so that when said cable is released and drops it will draw taut all of the cords connecting the same with the gates, and thus any open gate will be closed. If the gate is left open at any floor after the car starts, the circuit will be closed to energize the solenoid, and thus release the cable. As a consequence of his carelessness the operator must, in order to open another gate, raise said weight, and to avoid this additional exertion his memory and caution will be trained, and so long as he exercises care the mechanism will remain out of operation and will waste no power nor suffer wear and tear.

In the accompanying drawings I have illustrated a suitable embodiment of mechanism adapted to the purpose of my invention, the same being shown more diagrammatically than with particular attention to details of construction, as any mechanism suitable to my purpose is included in my invention.

The gates 1 and 2 are each provided with a suitable latch 3, the dog 4 of which enters and engages the casing 5, disposed on the framing. In the latter a bell-crank lever 6 is disposed in the path of said dog 4 and is maintained thereby at one limit of its movement against the action of a spring 7, engaging the free end of one of its arms. In the path of the free

end of the other arm of said lever 6 the free end of a light flat spring 8 is disposed, the latter being mounted upon the free end of a projection 9 in said casing 5 and being connected with a terminal 10. Disposed in the path of the free end of said spring 8 is the free end of another flat spring 11, mounted on a projection 12 in said casing and connected with a terminal 13. Both said terminals and said springs are insulated from said casing and from the latch in any suitable manner.

The terminal 10 is connected, by means of a wire 14, with a solenoid 15, disposed in the upper end of the elevator-shaft, and said terminal 13 is connected, by means of a wire 16, with terminals 17 on a commutator 18, also disposed in the upper end of the elevator-shaft. A terminal strip 19 on said commutator is connected, by means of a wire 20, with one side of a source of energy 21, the other side of which is connected, by means of a wire 22, with said solenoid 15. A carriage 23, movable reciprocally over said commutator and carrying an inverted-U-shaped brush 24, engaging said terminals 17 and said terminal strip 19, is disposed on guide-rods 25 and is geared, by means of sprocket-gearing, with the sheave 26, over which the cable 27, on which the car is suspended, is trained, said car being omitted from illustration. The said sprocket gearing includes a sprocket-chain 28, trained over the idler 29 and the pinion 30, which latter is geared to said sheave. The said sprocket-chain is frictionally engaged by a suitable clutch disposed on said carriage 23, the said clutch including a spring-pressed block 31, between which and a rigid projection 32 on said carriage said chain is clamped. The movement of said carriage in either direction is limited by means of adjustable collars 33 on said guide-rods 25. Alternating with said terminals 17 are what I will term "dead-blocks" 34, which serve merely as guides for one arm of the brush 24 between the intervals of its engagement with said terminals 17. The latter and the gearing with said sheave 26 are relatively so disposed and arranged that when the car-floor is flush with, or nearly so, with any floor of the building the position of the carriage will be such that the brush 24 is in contact with none of said terminals 17; but when said car-floor is disposed a few feet above any floor of the building said brush 24 will be in contact with one of said terminals 17, and thus close the circuit between the same and the terminal strip 19. Disposed in the upper end of said elevator-shaft is a shaft 35, on which a sprocket-wheel 36 is mounted, the latter being rigid with a ratchet-wheel 37, adapted to revolve therewith. A dog 38 is maintained normally in engagement with the said ratchet-wheel 37 by means of a tension-spring 39 and serves to hold said ratchet and sprocket against revolution in one direction. Said dog is connected with the armature 40 of said solenoid 15, which serves, when the latter is energized, to actuate said dog 38 against the action of said spring 39 to throw the same out of engagement with said ratchet-wheel. Trained over said sprocket-wheel 36 is a sprocket-chain 41, carrying a weight 42 at one end and connected at its other end with a cable 43, suspended therefrom and upon the lower end of which a weight 44, heavier than said weight 42, is suspended, there being preferably a dash-pot 45 disposed in the path of said weight 44 to cushion the fall thereof. At intervals corresponding to the number and height of the floors of the building the said cable 43 carries split collars 46 clamped thereon and which are adapted to engage rings 47, through which said cable passes, said rings being each disposed upon one end of a cord 48, connected at its other end with the one of said elevator-gates, said cords being trained over idlers 49, supported in proper position on the walls of the elevator-shafts relatively to the gates and said cords. Said cords are sufficiently long to permit the gates to be opened fully and are then substantially taut, the rings 47 being then in engagement with the said collars 46.

The operation is as follows: If the gate 1 is left open or partially open, the circuit from the solenoid 15 to a terminal 17 will be closed by reason of the fact that the spring 7 will force the bell-crank lever 6 over, so that the spring 8 will be forced into contact with the spring 11. As soon as the elevator-car travels a short distance above or below any floor of the building the circuit will be closed from a terminal 17 to the terminal strip 19 and thus completed, thereby energizing the solenoid 15, releasing the ratchet-wheel 37, and thereby causing said cable 43 to be drawn down by the weight 44. As said cable moves downwardly it will draw all cords taut, and thus the gate or gates open at this time will be closed, and as soon as all are closed the circuit will obviously be again opened. The downward movement of said cable will be completed before the brush 24 will have passed the terminal 17, through which the circuit was closed. The weight 42 acts as a counterweight, so that when any of the gates is again opened and the cable 43 and weight 44 raised said weight 42 will serve to return said ratchet-wheel 37 to its normal position, where it will be again maintained by the dog 38, as will be obvious. The rings 47 will serve to maintain those cords 48 taut which are connected with the gates remaining closed during the time that said cable 43 is being raised, thus preventing the slack in said cords 48 from depending where entanglement with the collars 46 is liable to occur, said rings being each in turn raised as each gate is again opened, and when such gates

are closed by the operator the slack in said cords will be disposed between said gates and said idlers 49. The number of said terminals 17 corresponds with the number of elevator-gates or floors of the building. The frictional engagement of the carriage 23 with the sprocket-chain 28 serves, in conjunction with said collars 33 on the guide-rods 25, to automatically adjust the position of said carriage with relation to said sprocket-chain in the event that the creeping of the cable 27 on the sheave 26 should cause said carriage to lose part of its movement in either direction. Similar readjusting means are well known.

In Fig. 7 I have illustrated my invention as applied to the vertically-moving or Meeker doors generally employed on freight-elevator shafts. In applying my invention to doors of this class I substitute for the bell-crank lever 6 a lever 50, pivotally supported between its ends and having a cam-arm 51, maintained by a spring 52 in the path of a projection 53 on the door 55, the other arm of said lever 50 being adapted to engage the flat spring 8 and force the same into contact with the spring 11, when the door is opened and said arm 51 released from engagement with said projection 53 or the antifriction-roller 56, disposed at the free end thereof. The said projections 53 are horizontally disposed on upper ends of the upper doors 55 and on both sides thereof and are provided adjacent their free ends with openings through which the cables 57 pass, there being two of the latter, which operate simultaneously and correspond with the cable 43 before described. In all other details the construction and operation of the device as applied to doors of this character correspond with the same as applied to passenger-elevator gates with the exception that the cords 48, rings 47, and idlers 49 are omitted, and the collars 46 are brought into direct engagement with said projections 53 when the cables 57 are released.

I claim as my invention—

1. A device of the kind specified comprising a supported member, gate-operating means disposed in operative relation to said supported member, supporting means disposed in operative relation to said supported member, electrically-actuated releasing means disposed in operative relation to said supporting means, an electric circuit controlling said releasing means, and circuit-closing means controlled by the gates and the car and disposed in operative relation to said circuit to control the same.

2. Automatic elevator-gate-closing means comprising electrically-controlled means normally maintained out of operative relation to the gates, a normally open circuit controlling the same, circuit-closing means controlled by the gates, and circuit-closing means controlled by the car and coacting with said first-named circuit-closing means to throw the said electrically-controlled means into operative relation to said gates to close the same.

3. Elevator-gate-closing means comprising electrically-controlled gate-closing devices normally maintained out of operative relation to the gates, a normally open circuit controlling the same, traveling circuit-closing means controlled by the car and adapted to close said circuit at one point at intervals, and circuit-closing means controlled by the gates and adapted to close said circuit at another point when a gate is opened, said circuit when closed at both points being adapted to throw said gate-closing devices into operative relation to the open gate to close the same.

4. Elevator-gate-closing means comprising a supported member, coacting means disposed thereon and on said gates to close the latter when said supported member is released, electrically-controlled supporting means disposed in operative relation to the said supported member, an electric circuit normally open at two points controlling said supporting means, circuit-closing means controlled by said gates for closing said circuit at one point when a gate is opened, and traveling circuit-closing means controlled by the movements of the car to close said circuit at another point, both said circuit-closing means coacting to cause said supported member to be released when a gate is open after the elevator passes a floor in either direction.

In testimony whereof I have signed my name in presence of two subscribing witnesses.

CHARLES W. KIRSCH.

Witnesses:
RUDOLPH WM. LOTZ,
LEE MITCHELL.