

Dec. 25, 1928.

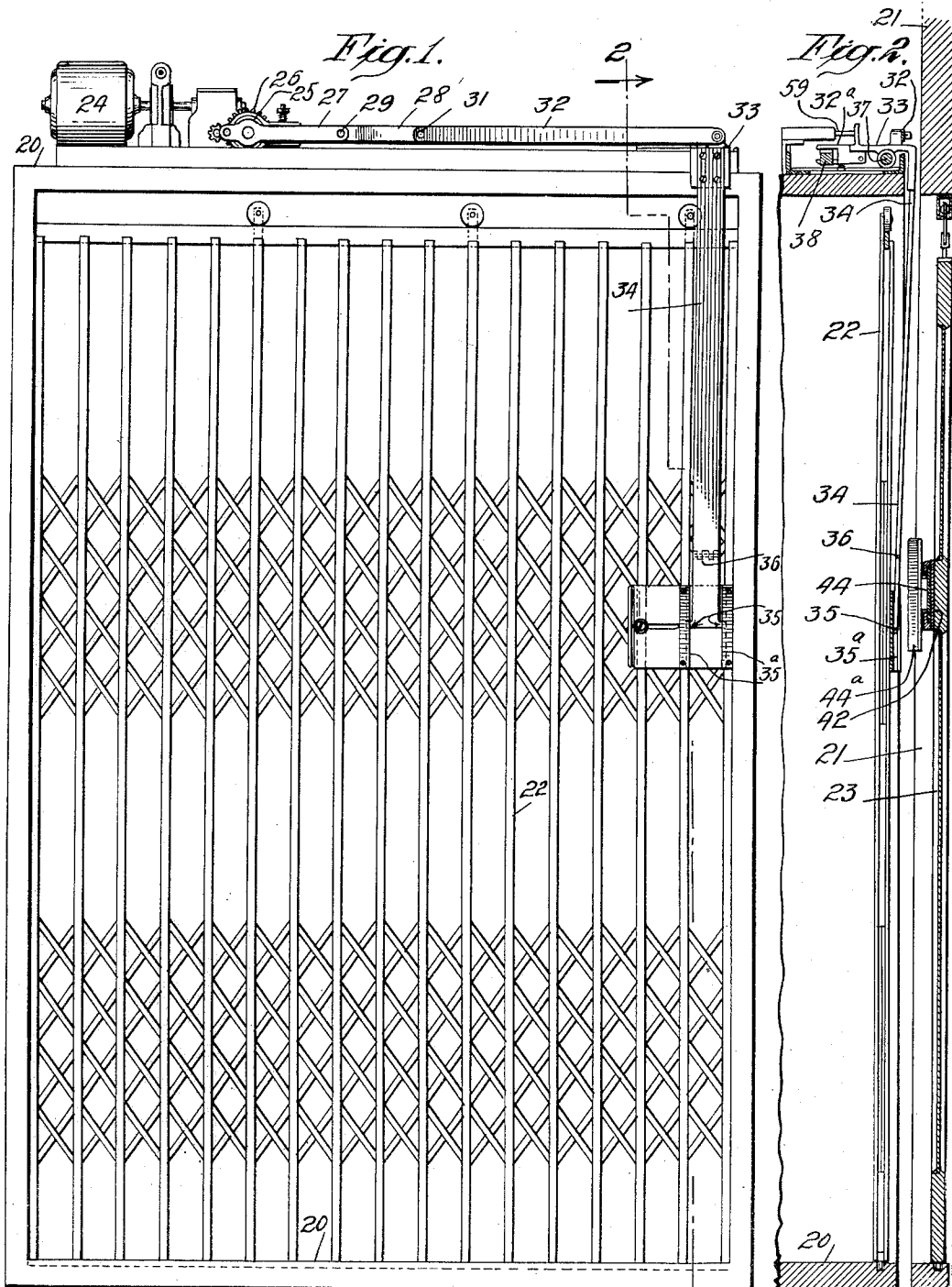
A. J. ROSENTERER

1,696,328

SAFETY MECHANISM FOR ELEVATOR SHAFT DOORS

Filed June 17, 1926

5 Sheets-Sheet 1



2 →

INVENTOR

ALBERT J. ROSENTERER

BY

Geo. L. Wheelock

ATTORNEY

Dec. 25, 1928.

1,696,328

A. J. ROSENTERER

SAFETY MECHANISM FOR ELEVATOR SHAFT DOORS

Filed June 17, 1926

5 Sheets-Sheet 2

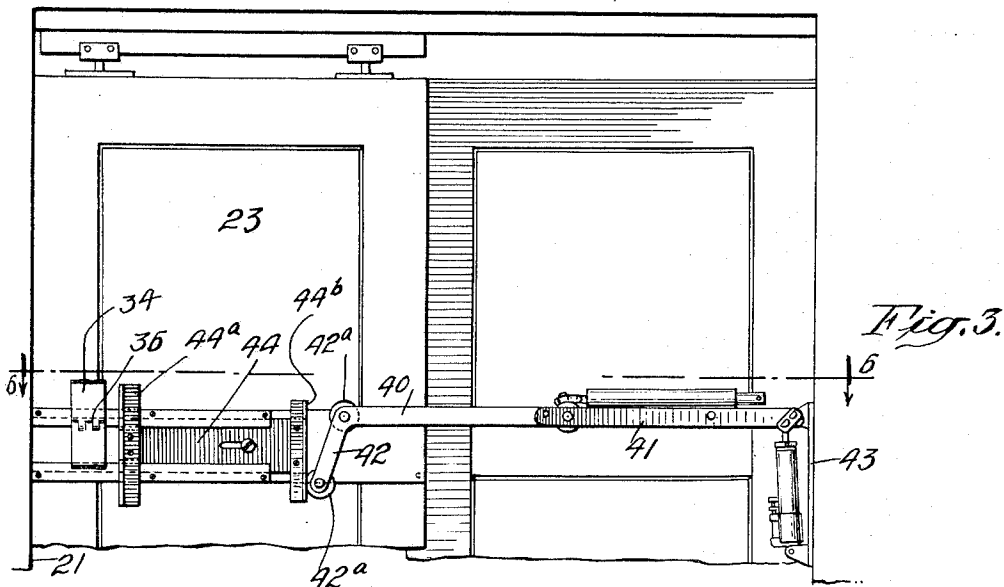


Fig. 3.

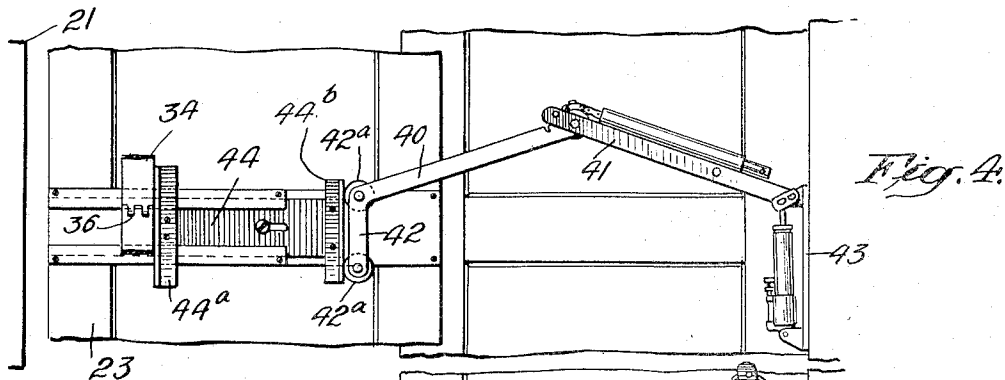


Fig. 4.

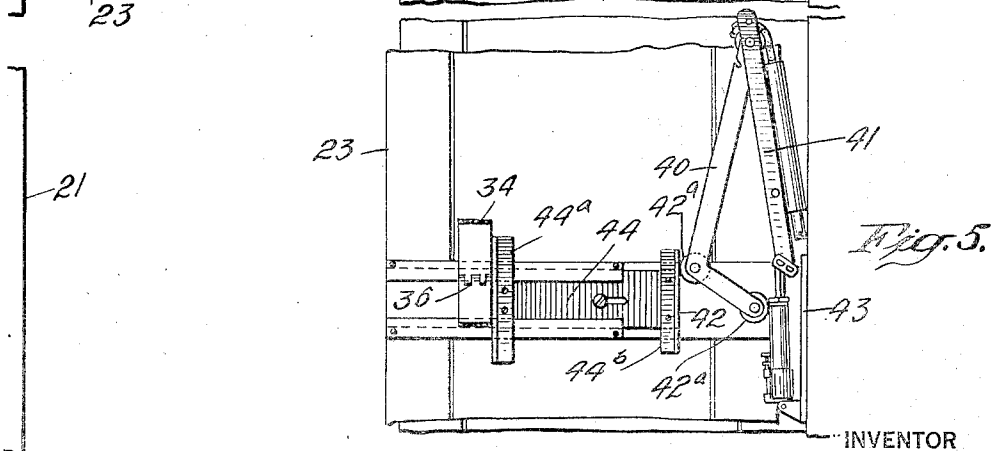


Fig. 5.

INVENTOR
ALBERT J. ROSENTERER
BY
Geo. S. Wheeler
ATTORNEY

Dec. 25, 1928.

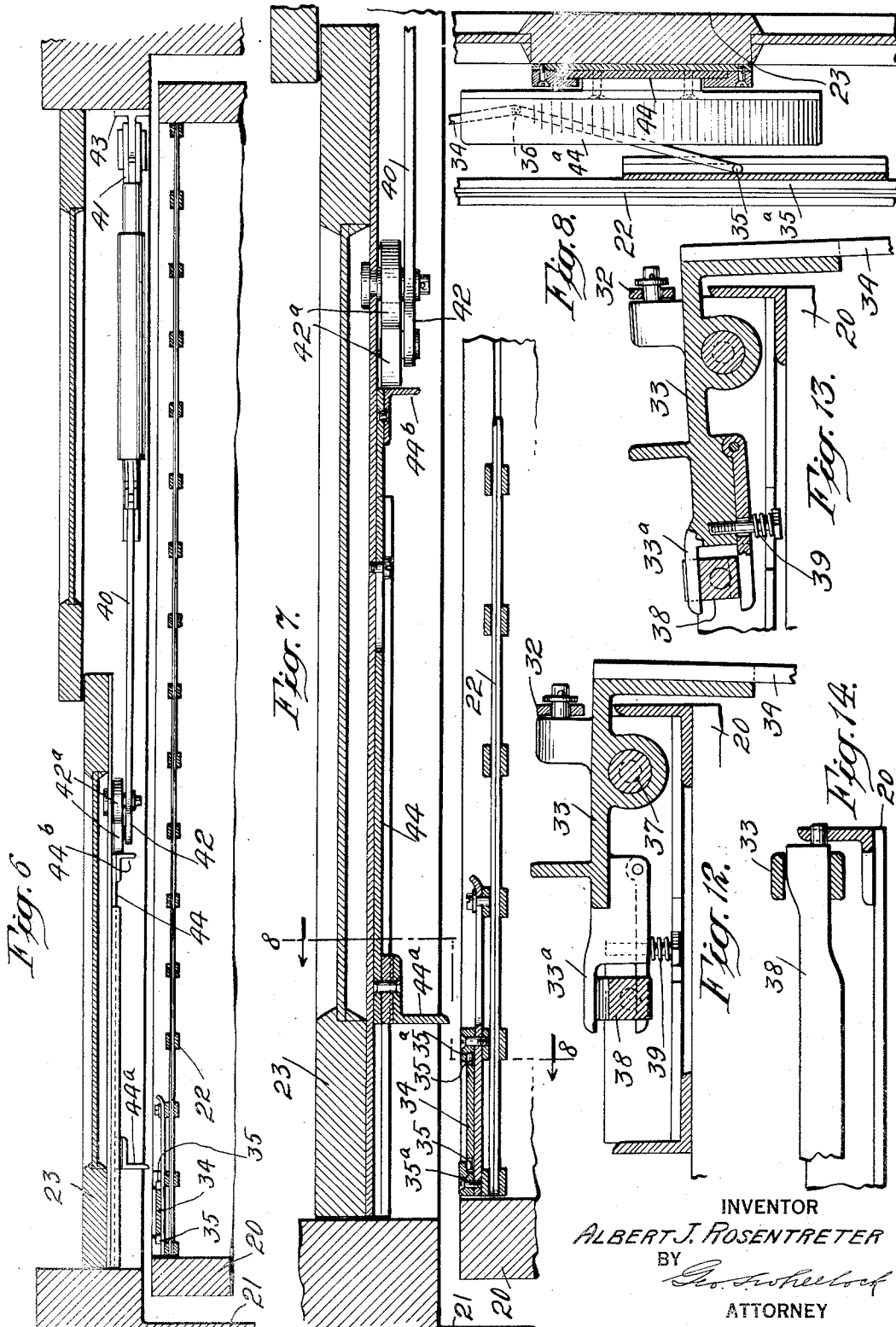
A. J. ROSENTRER

1,696,328

SAFETY MECHANISM FOR ELEVATOR SHAFT DOORS

Filed June 17, 1926

5 Sheets-Sheet 3



INVENTOR
ALBERT J. ROSENTRER
BY *Chas. F. Wheelock*
ATTORNEY

Dec. 25, 1928.

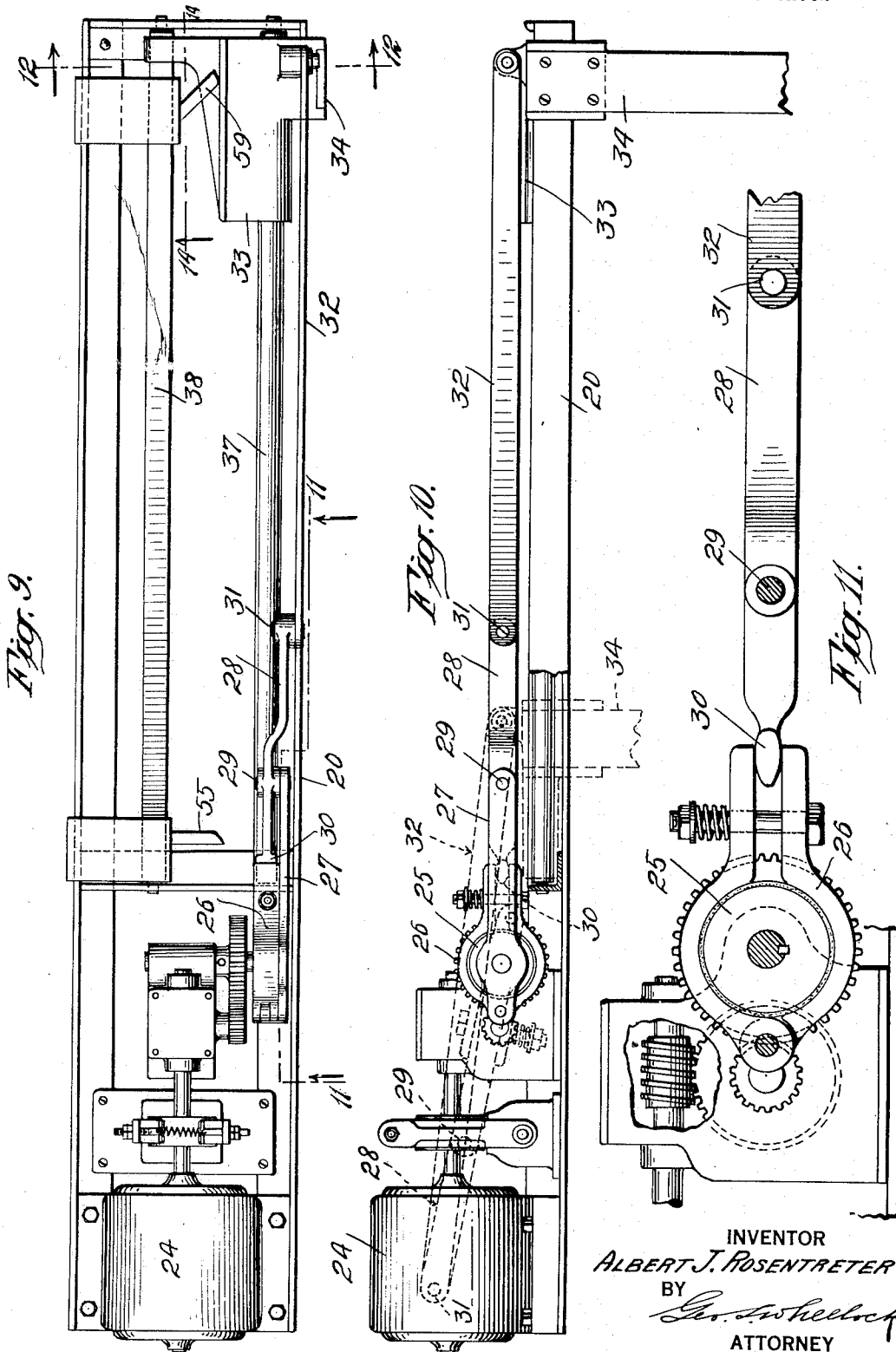
A. J. ROSENTERER

1,696,328

SAFETY MECHANISM FOR ELEVATOR SHAFT DOORS

Filed June 17, 1926

5 Sheets-Sheet 4



INVENTOR
ALBERT J. ROSENTERER
BY
Geo. S. Wheeler
ATTORNEY

Dec. 25, 1928.

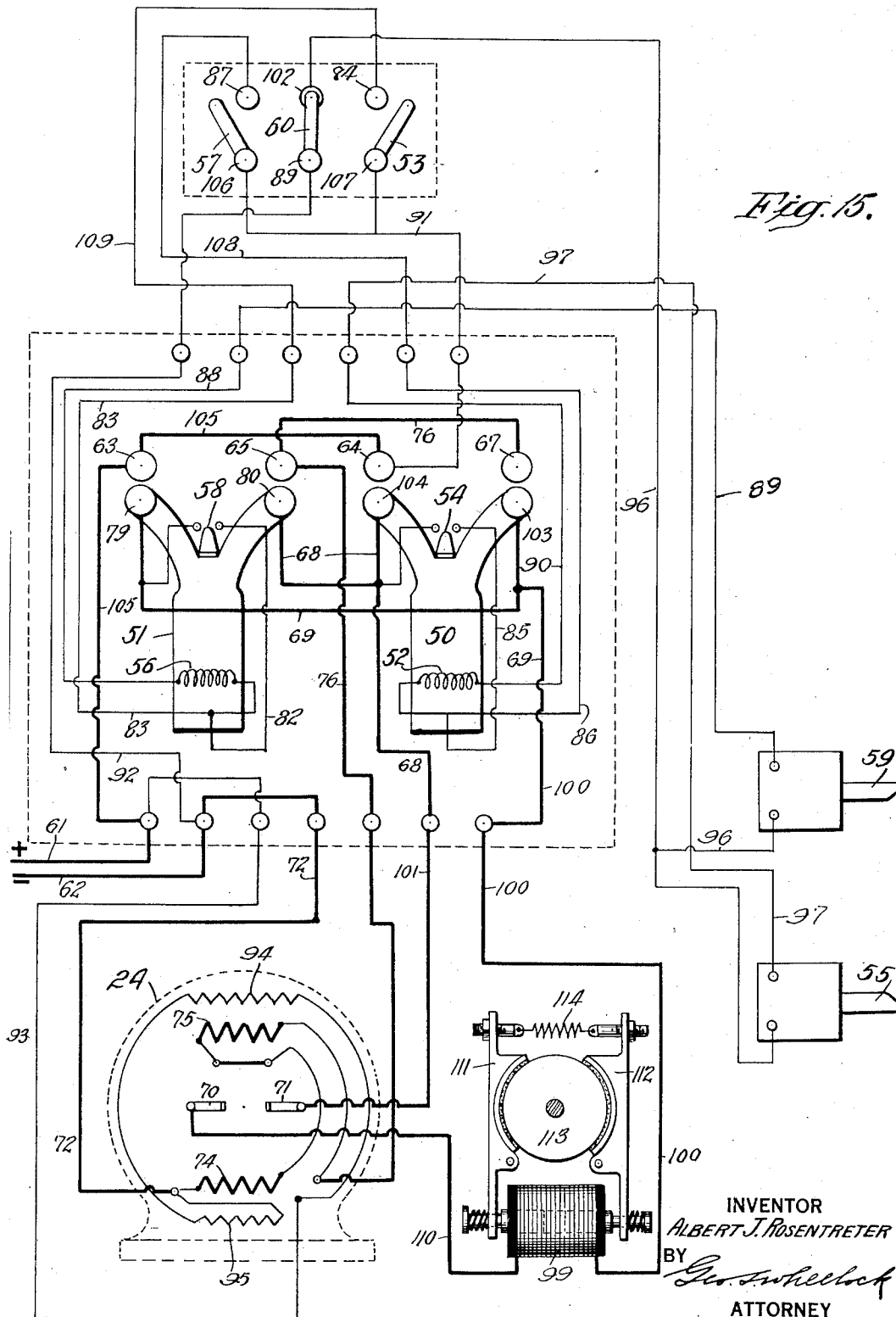
A. J. ROSENTERER

1,696,328

SAFETY MECHANISM FOR ELEVATOR SHAFT DOORS

Filed June 17, 1926

5 Sheets-Sheet 5



UNITED STATES PATENT OFFICE.

ALBERT J. ROSENTRER, OF BOONTON, NEW JERSEY, ASSIGNOR TO EDGAR ZABRISKIE, OF MAPLEWOOD, NEW JERSEY, AND FRANK E. HUTCHINS, OF NEW YORK, N. Y.

SAFETY MECHANISM FOR ELEVATOR-SHAFT DOORS.

Application filed June 17, 1926. Serial No. 116,538.

An object of this invention is to provide power mechanism for concurrently opening or closing the car gate and the shaft door opposite to which the car may be stopped, by coupling means carried by the car and by which the car gate and shaft door are coupled.

A further object is to provide operating means by which the coupling means is pushed from the car into engagement with the shaft door and by which the coupling means will be retracted at other times.

A further object is to provide an electric motor which operates through a friction device for opening and closing the car gate and shaft door, and has means for relieving the friction when there is any undue strain exerted to move the gate and door.

A further object is to provide means, the operation of which, after it has been initiated, will continue automatically until the gate and door are fully opened or closed.

A further object is to provide a separate means for stopping the opening or closing of the gate and door at any point of the travel.

In the accompanying drawings which form a part of this description,

Fig. 1 is an elevation of an elevator car, together with the automatic car gate and shaft door opening and closing mechanism which embodies the invention;

Fig. 2 is a vertical section on the line 2—2 of Fig. 1, through the car gate, and showing a portion of the car and adjacent shaftway and shaft door;

Fig. 3 is an elevation of the shaft door in closed position, together with the toggle members and the sliding member through which it is opened and closed, viewed from the shaftway side;

Fig. 4 is a similar view showing the shaft door released for opening and slightly opened;

Fig. 5 is a similar view showing the shaft door fully opened;

Fig. 6 is a horizontal section through the shaftway at a shaft door, on the line 6—6 of Fig. 3, together with a section through the elevator car, broken away and drawn to a larger scale;

Fig. 7 is a horizontal section of a portion of the above drawn to a still larger scale;

Fig. 8 is a vertical section on the line 8—8 of Fig. 7 showing the connection from the

blade of the traversing member to the car gate and shaft door;

Fig. 9 is a plan of the top of the car, including the motor, traversing member and connecting mechanism;

Fig. 10 is an elevation of the same, showing the parts in dotted lines in the position they assume when the gate and door are opened;

Fig. 11 is an enlarged view of a portion of the preceding, on the line 11—11 of Fig. 9, showing the friction connection through which driving is effected;

Fig. 12 is a vertical section on the line 12—12 of Fig. 9, showing the traversing member and the manner of its engagement with the cam bar;

Fig. 13 is a similar section showing the traversing member displaced and rocked to bend the blade into engaging position with a flange carried by a shaft door;

Fig. 14 is an elevation of a portion of the camming bar for rocking the traversing member;

Fig. 15 is a diagram of the circuits.

An elevator car 20 traveling in a shaftway 21 has a collapsible sliding gate 22, and the shaftway has at each landing a sliding door 23. The operating mechanism comprises an electric motor 24 preferably mounted on the top of the car. The motor is suitably geared down so as to slowly turn a friction drum 25 which is gripped by shoes 26, 26 which carry a toggle link in two parts 27, 28 hinged together at 29, but normally kept in line and swung by the drum about its axis when the drum is turned, as shown in dotted lines in Fig. 10. Should there be an excessive strain because the toggle link is restrained from swinging, there will be a slight movement on the hinge connection, and a flattened wrist pin 30, carried at the end of the link part 28, is turned between the two shoes so as to spread them and thereby relieve the friction.

Through a pivot 31 the toggle link above mentioned is connected through a second toggle link 32 to a traversing member 33, which has a depending blade 34 connecting to the car gate at its lower end where it has a vertically sliding connection 35 guided in ways 35^a. Between the ends of blade 34 is a hinge 36 which permits of its being outwardly bent or displaced at this point. The traversing member is guided preferably by

a round horizontal rail or bar 37 and has a fork 33^a embracing a camming bar 38. The rail or bar 37 permits the traversing member 33 to have a transverse range of movement on the car corresponding with the full open position of each door 23. Both bars are supported at their ends from the top of the car. The camming bar 38 is rockable and is so shaped along its guide surfaces (see Fig. 12) that immediately upon starting to open the car gate the portion of the traversing member which engages the camming bar is depressed thereby, the traversing member is rocked, and the depending blade is outwardly displaced at the point where it is hinged, as shown in Figs. 8 and 13. This condition continues throughout the rest of the movement. The bifurcation of the fork under the camming bar is yieldingly held by a spring 39 so that the blade will not be rigidly held in its displaced position and can yield if the car should be run while it is displaced and any projection in the shaftway is encountered.

At each floor landing of the shaftway the shaft door is provided with an operating toggle mechanism consisting of folding lever members 40 and 41 pivoted to each other, which are preferably operated and the door thereby automatically closed and held closed as set forth in my United States Patent No. 1,203,413, dated October 31, 1916. The first lever member 40 is pivoted to the door and has an oblique arm 42 with rollers 42^a. The other lever member is pivoted to a fixed bracket 43. The said toggle mechanism for locking and closing the door is independent of the motor.

A sliding member 44 carried by the door has a flange 44^a engaged by the depending blade 34 of the traversing member and another flange 44^b, contacting first with the oblique arm 42, releases the door from the locking action of the toggle mechanism and on further movement opens the door. (See Figs. 3, 4 and 5). On a reverse movement, the toggle levers 40 and 41 are caused to act on the flange 44^b so as to close the shaft door. The said flanges constitute abutments. When the door is closing, the toggle mechanism, the abutment flange 44^b and sliding member 44 will cause the abutment flange 44^a to follow up the displaceable traversing member 33 as the latter returns to the closed position of the door.

Referring briefly to the diagram, Fig. 15, the motor is controlled by a pair of relays 50, 51, one of which is closed by a magnet coil 52 on circuit closure at a normally open switch 53 on the car when the car gate and shaft door are to be opened. The relay also closes its own magnet circuit at a contact 54 and the circuit therefore remains closed, even if the car switch 53 is opened, until the car gate and shaft door have fully

opened, when the magnet circuit is opened by a limit switch 55, which is also shown in Fig. 9. The other relay makes a reversed circuit through the armature of the motor and is closed by a magnet coil 56 on circuit closure at a normally open switch 57 on the car when the car gate and shaft door are to be closed. The relay also closes its own magnet circuit at a contact 58 and the circuit therefore remains closed, even if the car switch 57 is opened, until the car gate and shaft door have fully closed, by a limit switch 59, which is likewise shown in Fig. 9. The two relays are interlocked so that both cannot be closed at the same time. A third normally closed car switch 60, under the control of the car operator, is in the circuit of both relay magnets and enables the operator to arrest the automatic closing or opening of the doors at any point, after which he can operate either the opening or the closing switches to complete the door movements either way.

Referring more specifically to Fig. 15 there is shown a complete control equipment in which positive wire 61 and negative wire 62 are the service supply leads. Wire 61 is connected to terminals 63 and 64 of the contactors 50, 51. Wire 62 is connected to wire 72 feeding series fields 74 and 75 and thence by wire 76 to contactor terminals 65 and 67. On the contactor 51 switch contact 79 is connected by wire 69 to switch contact 103 on contactor 50 and thence by wire 100, through coil 99 to armature brush 70. Switch contact 80 on contactor 51 is connected by wire 68 to switch contact 104 on contactor 50 and thence by wire 101 to armature brush 71. Negative wire 62 is also connected through wire 72 to shunt field windings 95 and 94 and thence by wire 93 to positive wire 61.

When contactor 51 is closed armature brush 70 is connected to positive line and armature brush 71 is connected through the series field to negative line 62.

This would cause the motor 24 to run in one direction while if contactor 50 is closed positive line 61 will be connected to armature brush 71 and negative line 62 will be connected through the series fields to armature brush 70. As the shunt fields are constantly across the line in one direction the motor will then run in the opposite direction.

Switches 57 and 60 and 53 located in the car are used to control the operation of contactors 51 and 50 as follows: Negative line 62 is connected through wire 92 to switch 60 at terminal 89 and when switch 60 is closed as shown, current is then led from terminal 102 through wire 96 to the two limit switches 59 and 55 one of which represents the limit of travel of the door in one direction and the other the limit of travel of the door in the other direction.

Assuming that switch 53 is to open the

door and switch 57 is to close the door, then limit switch 59 will be in series with the magnet 56 of contactor 51 and this switch will be closed when the doors are closed.

5 Upon closing switch 53 and establishing the circuit from positive line 61 through wire 105, wire 91, switch terminal 107, switch 53, switch terminal 84, wire 109, wire 83, coil 56, wire 88, wire 89, switch 59, wire 96, 10 to switch terminal 102, through switch 60, terminal 89, wire 92, to negative terminal 62, the contactor 51 closes and the motor moves in the direction to open the doors. Releasing the switch 53 does not cause contactor 15 51 to open as a holding circuit is made up on contacts 58 from positive switch contact 79 through wire 82 to wire 83, thence to coil 56.

When the motor has opened the door the 20 amount required, switch 59 opens, breaking the magnet circuit 56 and allowing the contactor 51 to open the supply circuits from both negative and positive wires to the armature of the motor. At the time the 25 contactor 51 closes, current is supplied from negative line 62 to wire 72, series fields 74, 75, wire 76, terminals 65, 80, wires 68, 101, brushes 71, 70, wire 110, coil 99, wire 100, wire 69, terminals 79, 63, wire 105 to positive 30 line 61. This causes the magnet 99 to open the brake shoes 111 and 112 so that they will no longer be pressed against the brake pulley 113 by spring 114. When the contactor 51 opens, the circuit feeding the brake 35 is broken between contacts 79 and 63, thus de-energizing the magnet 99 and allowing the spring 114 to pull the brake shoes tightly against a pulley 113 mounted on the motor shaft.

40 To close the door the operator closes switch 57, feeding positive current from line 61 through wire 105, wire 91, switch terminal 106, switch 57, switch terminal 87, wire 108, wire 86, coil 52, wire 90, wire 97, to limit 45 switch 55, thence through wire 96, switch terminal 102, switch 60, switch terminal 89, wire 92 to negative line 62. This causes the magnet 52 to close the contactor 50, thus causing the armature of the motor 24 to receive current from line 61 to armature brush 71 and 50 negative current from line 62 through series fields and armature brush 70. At the same time the magnet 99 of brake is energized in the same manner as before.

55 The circuit, when the contactor 50 is closed, is through wire 61, wire 105 to terminals 64, 104, wire 68, wire 101 to brushes 71, 70, wire 110, coil 99, wire 100 to terminals 103, 67, wire 76, series fields 75, 74, wire 72 60 and wire 62.

What I claim as new is:

1. In combination with an elevator car having a gate and a shaftway with automatically closable sliding doors at the floor 65 landings, an operating mechanism for the

shaft doors which comprises a motor carried by the car, abutment members carried by the doors, by which they are released and opened, a traversing member carried by the car and connected with the car gate 70 for engagement with the abutments, means for guiding the traversing member transversely of the car, independently of the car gate, and for a distance corresponding with the full opening movement of the 75 shaft door, and means for outwardly displacing the traversing member into engagement with an abutment member.

2. In combination with an elevator car having a gate and a shaftway with automatically closable sliding doors at the floor landings, an operating mechanism for the shaft doors which comprises a motor carried by the car, abutment members carried by the doors, by which they are released 85 and opened, a traversing member carried by the car and connected with the car gate and having an outwardly displaceable blade for engagement with the abutments, means for guiding the traversing member transversely of the car, independently of 90 the car gate, and for a distance corresponding with the full opening movement of the shaft door, and a camming bar for rocking the traversing member for effecting engagement of the blade with an abutment 95 member, and means operated by the motor for operating the traversing member transversely for effecting the opening of a door when the car is at a floor landing. 100

3. In combination with an elevator car with a sliding car gate and a shaftway with sliding doors at the floor landings, abutment members carried by the shaft doors by which they are released and opened, a 105 traversing member with an outwardly displaceable blade depending from the top of the car and connected with the gate for engagement when flexed with an abutment member, means for displacing the blade 110 and means for operating the traversing member for effecting the simultaneous opening of the gate and a door when the car is at a floor landing.

4. In combination with an elevator car 115 with a sliding car gate and a shaftway with sliding shaft doors at the floor landings, abutments carried by the shaft doors by which they are released and opened, a traversing member at the top of the car with a depending outwardly displaceable blade 120 connected to it at its upper end and to the gate at the other end and having an intermediate hinge for engagement when bent at the hinge with a door abutment, means 125 for displacing the blade and means for operating the traversing member for effecting the simultaneous opening of the gate and a door when the car is at a floor landing. 130

5. In combination with an elevator car with a sliding car gate and a shaftway with sliding doors, abutments carried by the shaft doors by which they are released and opened, an operating mechanism for the car gate and shaft doors which comprises a motor carried by the car, a traversing member carried by the top of the car with a depending outwardly displaceable blade connected with the gate, means for flexing the blade and means for operating the traversing member for effecting the simultaneous opening of the gate and a door when the car is at a floor landing.
6. An operating mechanism for a sliding gate which connects the gate to a source of power through a friction connection, such mechanism comprising linkage, and means in the linkage, comprising a yielding joint for relieving the friction connection when there is an excess strain.
7. An operating mechanism for a sliding gate consisting of toggle links pivoted to each other, one of which is connected to the gate and the other of which is connected to a source of power through a friction connection and means for relieving the friction connection when there is an excess strain.
8. An operating mechanism for a sliding gate consisting of toggle links pivoted to each other, one of which is connected to the gate and the other of which is connected to a source of power through shoes bearing on a friction drum, and means for relieving the pressure of the shoes on the drum when there is an excess strain.
9. In combination with an elevator car and shaftway with doors at the floor landings, an operating mechanism for a shaft door which comprises an electric motor, a connection between the motor and the door, a hand switch for closing a circuit which initiates the operation of the motor, an automatically operated switch which holds the circuit closed after it has been closed by the hand switch, and a limit switch which is automatically opened when the door has been fully opened.
10. In combination with an elevator car and shaftway with doors at the floor landings, an operating mechanism for a shaft door which comprises an electric motor, a connection between the motor and the door, a hand switch for closing a circuit which initiates the operation of the motor, an automatically operated switch which holds the circuit closed after it has been closed by the hand switch, a limit switch which is automatically opened when the door has been fully opened, and a separate hand switch for opening the circuit and arresting the operation of the door when at an intermediate point of its movement.
11. In combination with an elevator car and a shaftway with a movable door at a floor landing, an operating mechanism for the shaft door comprising a motor carried by the car, means for locking and closing the door, and which means are independent of the motor, an abutment member carried by the door, by which the locking means are released and the door opened, a traversing member carried by the car for engagement with the abutment member, means for displacing the traversing member into engagement with the abutment member, means operated by the motor for operating the traversing member for effecting the opening of the door when the car is at the floor landing, and means actuated by the door closing means for causing the abutment member to follow up the displaceable traversing member when it returns to closed position of the door.
12. In combination with an elevator car and a shaftway with a movable door at a floor landing, an operating mechanism for the shaft door comprising a motor carried by the car, means for locking and closing the door, and which means are independent of the motor, an abutment member mounted for movement on the door, and by which the locking means are released and the door opened, a traversing member carried by the car for engagement with the abutment member, means for displacing the traversing member into engagement with the abutment member, means operated by the motor for operating the traversing member for effecting the opening of the door when the car is at the floor landing, and a second abutment member actuated by the door closing means for causing the first abutment member to follow up the displaceable traversing member when it returns to closed position of the door.
13. In combination with an elevator car and a shaftway with a movable door at a floor landing, an operating mechanism for the shaft door comprising a motor carried by the car, automatic means for locking and closing the door, an abutment member carried by the door, by which the locking means are released and the door opened, a traversing member carried by the car for engagement with the abutment member and having a transverse range of movement on the car corresponding with the full open position of the door, means for displacing the traversing member into engagement with the abutment member, and means operated by the motor for causing the travel of the traversing member along its said range of motion, for effecting the opening of the door when the car is at the floor landing.
14. In combination with an elevator car and a shaftway with a movable door at a floor landing, an operating mechanism for the shaft door comprising a motor carried by the car, an abutment member carried by

the door, by which the door is opened, a traversing member carried by the car and depending in a substantially upright position from the top thereof, for engagement
5 with the abutment member, and having a transverse range of movement corresponding with the full open position of the door, means for outwardly displacing the traversing member into engagement with the
10 abutment member, and means operated by the motor for causing the travel of the traversing member along its said range of motion, for effecting the opening of the door when the car is at the floor landing.
15 15. In combination with an elevator car and a shaftway with a movable door at a floor landing, an operating mechanism for the shaft door comprising a motor carried by the car, an abutment member carried by the door, by which the door is opened, 20 a traversing member depending from the top of the car for engagement with the abutment member, means for outwardly swinging the traversing member from the top of the car into engagement with the 25 abutment member, and means operated by the motor for operating the traversing member for effecting the opening of the door when the car is at the floor landing.

ALBERT J. ROSENTRÉTER.