No. 762,612. PATENTED JUNE 14, 1904.

P. BENDING.

SAFETY DEVICE FOR ELEVATORS.

APPLICATION FILED NOV. 17, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

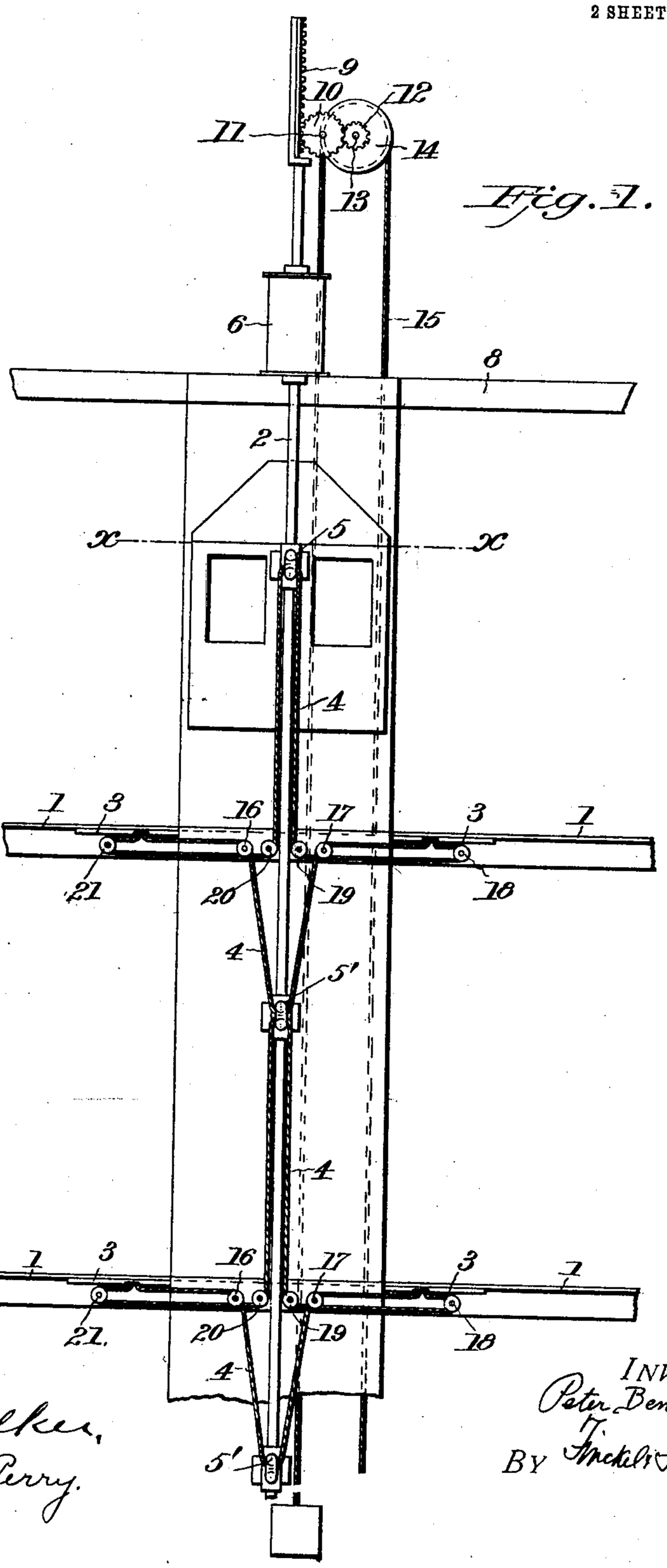

Fig. 1.

WITNESSES:

C. M. Walker.

Lillie M. Perry.

INVENTOR

Peter Bending

BY Fickel & Fickel

Attorneys

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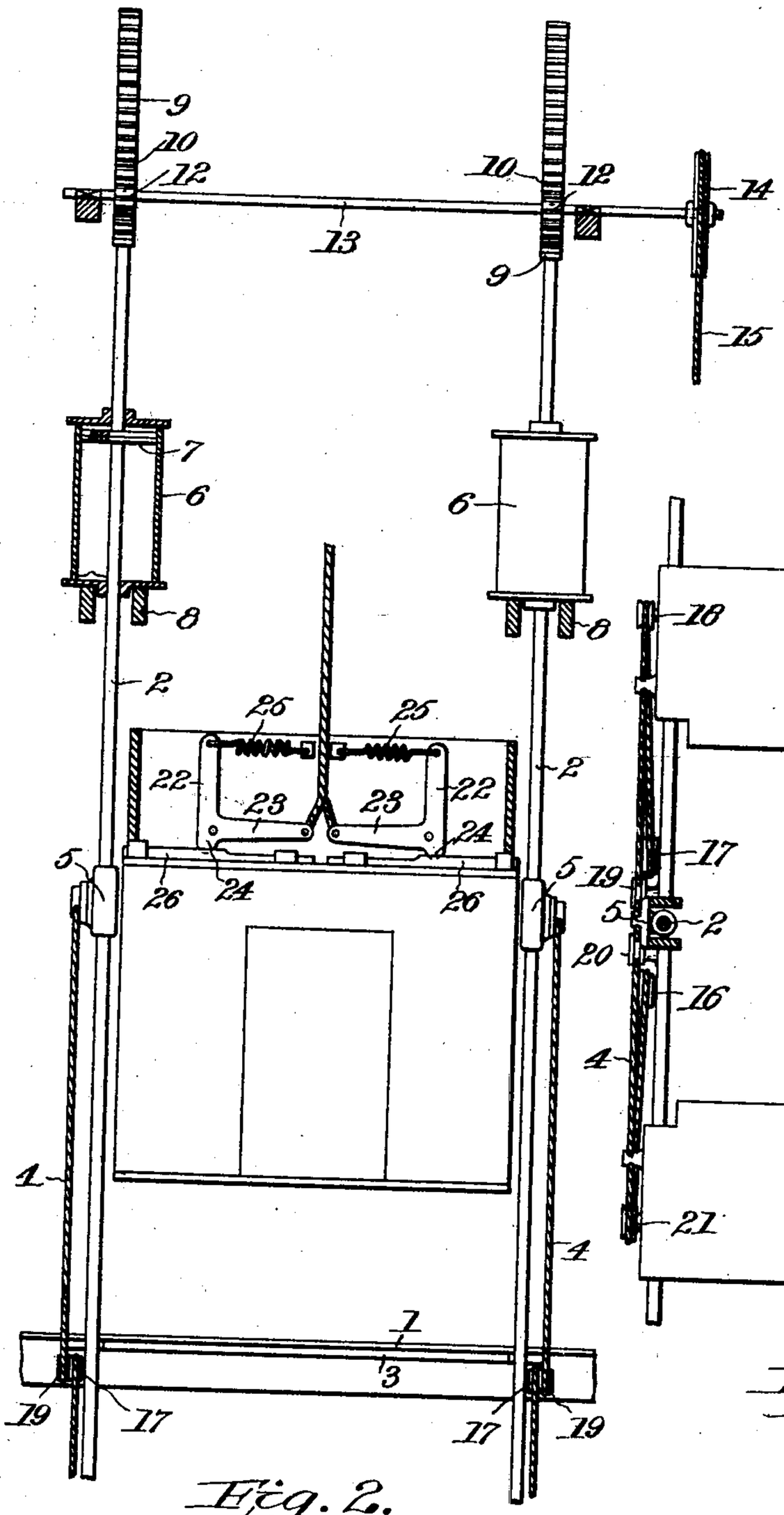

Fig. 2.

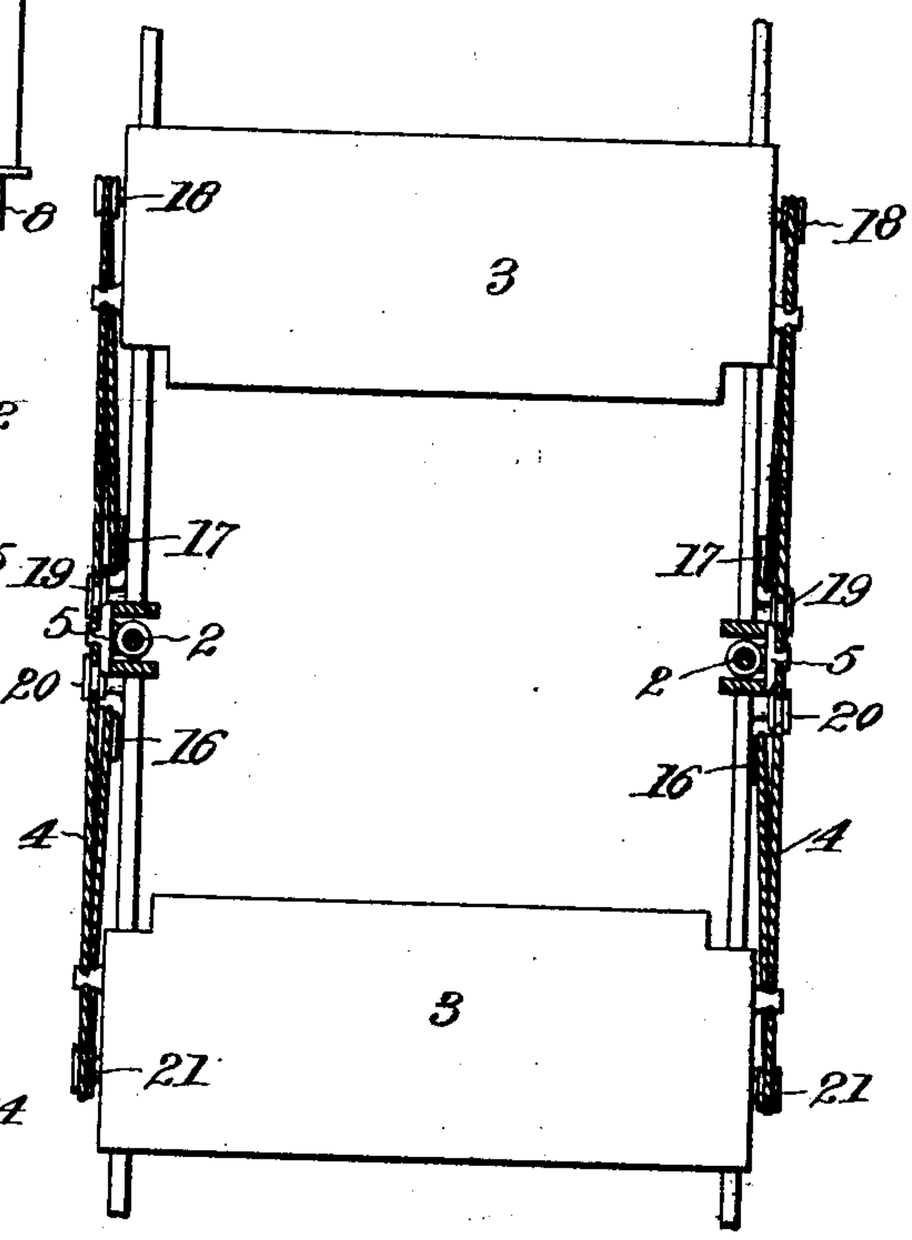

Fig. 3.

WITNESSES:

C. H. Walker.

Lillie M. Perry.

INVENTOR

Peter Bending

BY Fickel & Fickel

Attorneys

No. 762,612. Patented June 14, 1904.

UNITED STATES PATENT OFFICE.

PETER BENDING, OF COLUMBUS, OHIO.

SAFETY DEVICE FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 762,612, dated June 14, 1904.

Application filed November 17, 1903. Serial No. 181,477. (No model.)

To all whom it may concern:

Be it known that I, PETER BENDING, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Safety Devices for Elevators; 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.

The objects of the invention are, first, to provide means for checking the fall of the car in case the lifting-cable breaks, and, second, to provide means to prevent flames from rising through the elevator shaft or well in case of fire in the building.

The invention includes a door or doors adapted to be projected across the opening of the well to afford an obstruction to the descending car or to prevent flames from rising through the well, the door or doors lying normally in open position and out of the way of the moving car, but operative by means on the car to be closed upon the breaking of the lifting-cable or operative by means independently of the car in case of fire in the building.

The invention also contemplates the employment of air-cushions in connection with the door-operating mechanism to prevent a sudden impact between the car and the doors in case the car falls or to bring the car to a full stop independently of the door or doors, all as herein set forth and claimed.

In the accompanying drawings, Figure 1 is a view in elevation looking toward one side of the well. Fig. 2 is a similar view looking toward the front or entrance side of the car, and Fig. 3 is a horizontal plan and section view on line *x x* of Fig. 1.

In the views the numeral 1 designates the floors of the building.

2 2 are vertically-mounted slidable bars.

3 3 are horizontally-slidable doors lying normally in recesses in the floors and preferably mounted on antifriction-rollers and adapted to be projected across the well.

4 4 are cables connecting the vertically-slidable bars 2 2 with the slidable doors 3 3, and 5 5′ are lugs or blocks rigidly secured to the sliding bars 2 2 and forming part of the engaging means between the car and the sliding rods 2 2 when the door-operating mechanism is brought into play upon the breaking of the lifting-cable.

6 6 designate air-cylinders mounted on the slidable bars 2 2 at the top or bottom thereof.

7 is the piston-head of the cylinder and is rigidly secured to the sliding bar 2, which forms the piston-rod, and 8 8 are supporting-beams for the cylinders.

9 9 designate racks on the upper ends of the sliding bars 2 2. 10 10 are pinions engaging said racks, said pinions being mounted on a shaft 11, which is disposed transversely the well, near the top thereof.

12 12 are intermediate gears mounted on a second shaft 13 and adapted to engage pinions 10 10, the said shaft 13 being arranged parallel to shaft 11 and extending beyond the well. A pulley 14 is mounted upon the extension of the shaft 13 and carries an endless cable 15, which extends through the various floors of the building and preferably to the basement, where a weight is attached to counterbalance the sliding rods and maintain them normally in inactive position, with the sliding doors lying in the recesses in the floors. It will be seen that motion may be transmitted to the sliding bars 2 2 by means of the cable 15 and the train of gearing comprising the racks 9 9, the pinions 10 10, the shaft 11, the gears 12 12, the shaft 13, and the pulley 14.

The sliding doors 3 3 are connected to the sliding bars 2 2 by means of the cables 4 4, which are first securely fastened to the door—say on the left-hand side—then passed over pulley 16, thence to stop-block 5′, where it is again securely fastened, thence up and over pulley 17, thence to the sliding door on the right-hand side, where it is again securely fastened, thence around pulley 18, under pulley 19, thence to the stop-block 5, where it is secured, and thence passed down and under pulley 20, around pulley 21, and then again securely fastened to the sliding door on the left-hand side. This rigging for operating the sliding doors is duplicated at each floor of the building, and it will be seen that the doors at the various floors are operated simultane-

ously. In case a single door is employed at each floor the cable instead of passing to the other side would be carried directly from the stop-block 5′ to the stop-block 5 and secured to each, or the ends could be securely fastened one to each block.

The mechanism on the car for effecting an engagement between the car and the sliding bars 2 2 when the cable breaks comprises a pair of rock-levers having arms 22 and 23 and lugs or projections 24 24. The rock-levers are suitably pivoted to the upper part of the car-frame and are held normally under tension by means of coil-springs 25 25, which are secured to the extremities of the arms 22 and to the car-frame. The lifting-cable is attached to the extremities of the arms 23. On top of the car are also mounted in suitable guideways two sliding dogs 26 26, having recesses into which are seated the projections 24 24 of the rock-levers, and under normal conditions the strain of the lifting-cable against the tension of the springs 25 is sufficient to maintain the sliding dogs 26 at the limit of their inward movement and out of the way of the sliding bars 2 2 and the stop-blocks 5 5′; but upon the breaking of the lifting-cable the springs 25 are brought into play and the arms 22 of the rock-levers are drawn inward, thereby throwing the lugs 24 outward and carrying with them the sliding dogs 26, which are thus thrown into the path of the sliding bars 2 2 and the stop-blocks 5 5′, which latter they will engage as the car drops, thereby depressing the sliding bars 2 2 and operating the cable connections with the sliding-doors, whereby the latter are closed.

To prevent a sudden impact between the car and the closed doors when the car drops, I employ air-cushions in connection with the sliding rods in the following manner: The cushions are placed at any desirable position on the sliding bars, either near the top of the well or in the basement. The piston-heads are rigidly connected with the sliding bars and have a small vent for the passage of air when they are drawn down, and the cylinder is also provided at the bottom with a valve to admit air when the piston-head is forced up in restoring the sliding bars to normal position. The length of the air-cylinders is made to conform to the extent of movement of the sliding bars, so that the piston-head will rest on the lower cylinder-head at the same time that the bottom of the descending car reaches the closed sliding doors, making a positive stop of the car at the proper place independently of the safety-doors.

In case of fire in the building the sliding doors may be operated independently of the car by means of the endless cable 15, the said cable being so mounted as to be accessible to persons on any floor of the building. By pulling the cable on the right-hand side, as seen in Fig. 1, the pulley 14 and its supporting-shaft 13 are caused to revolve and through the train of gearing heretofore described the sliding bars 2 2 are depressed, whereby the cable connections between the sliding doors and said bars are operated to close the sliding doors.

What I claim is—

1. In an elevator, a horizontally-slidable door lying normally in open position and adapted to be projected across the well, vertically-mounted slidable bars and means for counterbalancing the same, cable connections between said door and slidable bars, and means, operable upon the breaking of the lifting-cable, for effecting an engagement between the car and sliding bars, whereby said bars are depressed and the cable connections operated to close the sliding door.

2. In an elevator, a pair of horizontally-slidable doors oppositely mounted in recesses in the floor and adapted to be projected across the well, vertically-mounted slidable bars and means for counterbalancing the same, cable connections between said doors and slidable bars, and means, operable upon the breaking of the lifting-cable, for effecting an engagement between the car and sliding bars, whereby said bars are depressed and the cable connections operated to close the sliding doors.

3. In an elevator, a vertical series of horizontally-slidable doors lying normally in open position and adapted to be projected across the well, vertically-mounted slidable bars and means for counterbalancing the same, cable connections between said doors and slidable bars, and means operable upon the breaking of the lifting-cable, for effecting an engagement between the car and sliding bars, whereby said bars are depressed and the cable connections operated to close the sliding doors.

4. In an elevator, a horizontally-slidable door lying normally in open position and adapted to be projected across the well, vertically-mounted slidable bars and means for counterbalancing the same, cable connections between said door and slidable bars, and means, automatically operable upon the breaking of the lifting-cable, for effecting an engagement between the car and sliding bars, whereby said bars are depressed and the cable connections operated to close the sliding door.

5. In an elevator, a vertically-mounted slidable bar and means for counterbalancing the same, means, operable upon the breaking of the lifting-cable, for effecting an engagement between said bar and the car, and an air-cylinder on said bar adapted to arrest the movement of the car and bring the same to a stop at any floor.

6. In an elevator, a vertically-mounted slidable bar and means for counterbalancing the same, means, automatically operable upon the breaking of the lifting-cable, for effecting an engagement between the said bar and the car,

and an air-cylinder on said bar adapted to arrest the movement of the car and bring the same to a stop at any floor.

7. In an elevator, a horizontally-slidable door lying normally in open position and adapted to be projected across the well, vertically-mounted slidable bars and means for counterbalancing the same, cable connections between said door and slidable bars, air-cylinders mounted on said bars and having their piston-heads connected thereto, and means, automatically operable upon the breaking of the lifting-cable, for effecting an engagement between said bars and the car, whereby the said slidable bars are depressed to close the sliding door and the air-cylinders operated to arrest the descent of the car.

8. In an elevator, a horizontally-slidable door lying normally in open position and adapted to be projected across the well, vertically-mounted slidable bars and counterbalancing means therefor, cable connections between said bars and sliding door, racks on said bars, a shaft and pinions thereon engaging said racks, a second shaft and intermediate gears thereon engaging said pinions, a pulley on said second shaft, and a cable engaging said pulley and accessible at any floor for operating said shafts, pinions and gears, whereby the elevating-bars may be depressed or elevated to close or open the sliding door.

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

PETER BENDING.

Witnesses:

NELSON ROLLER,

ORA SERIMGER.