

(No Model.)

2 Sheets—Sheet 1.

S. W. HOAG, Sr.
ELEVATOR.

No. 279,648.

Patented June 19, 1883.

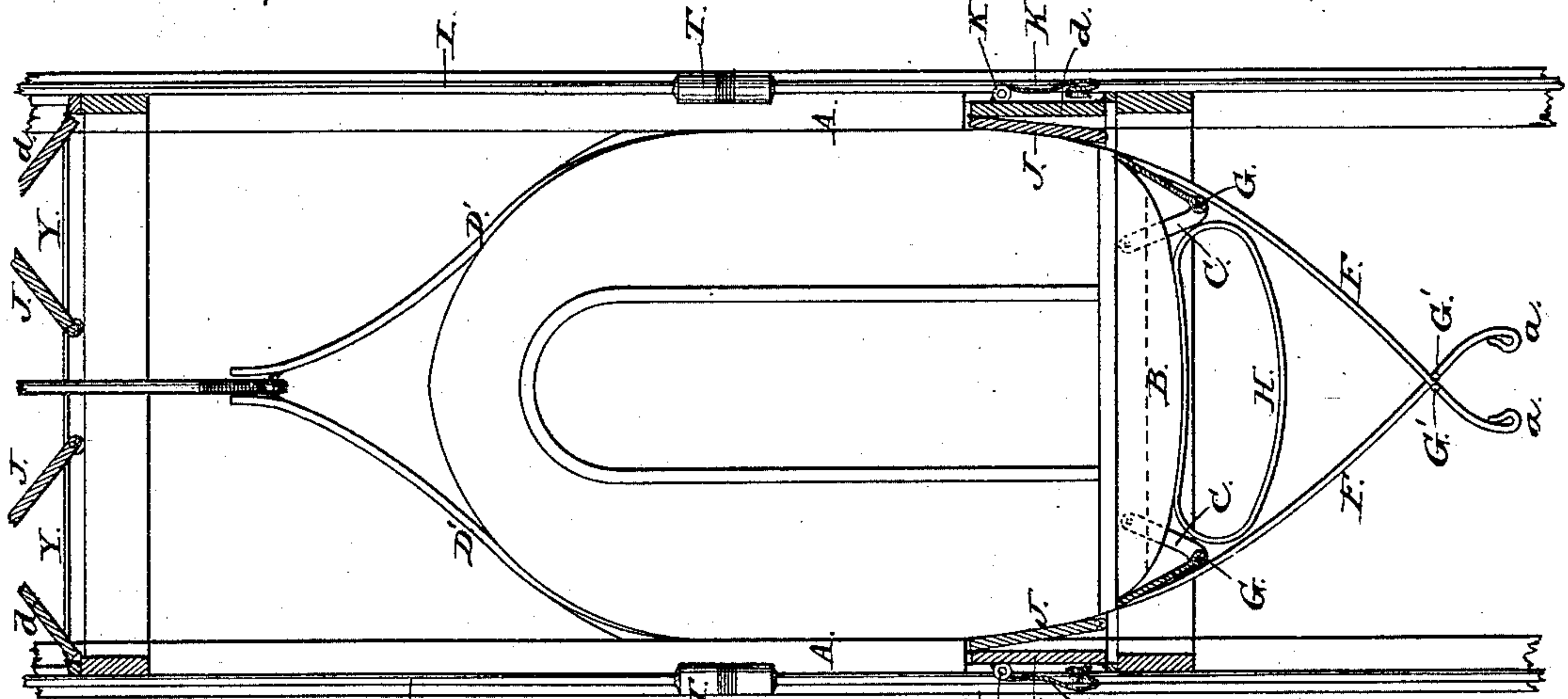


Fig. 3.

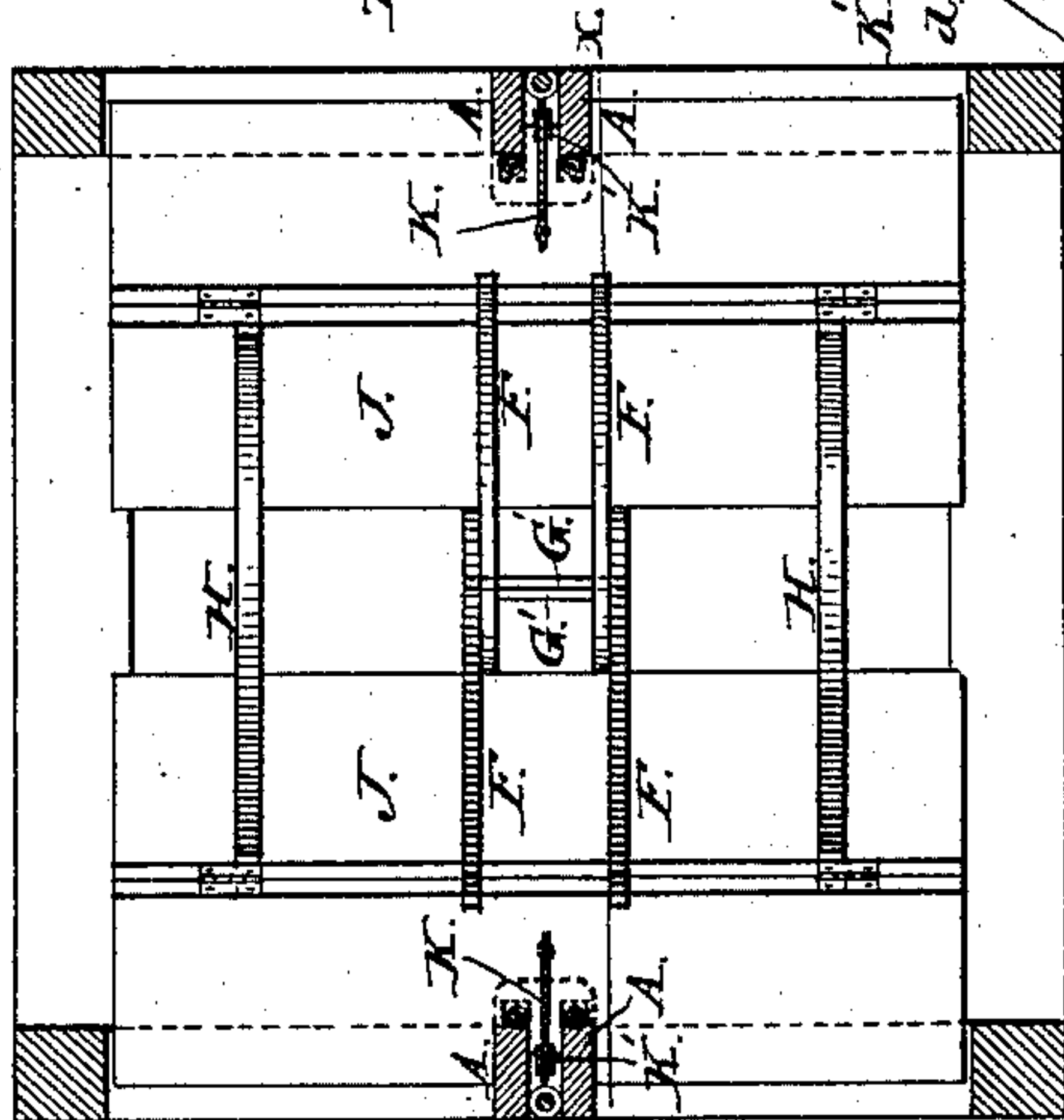


Fig. 2.

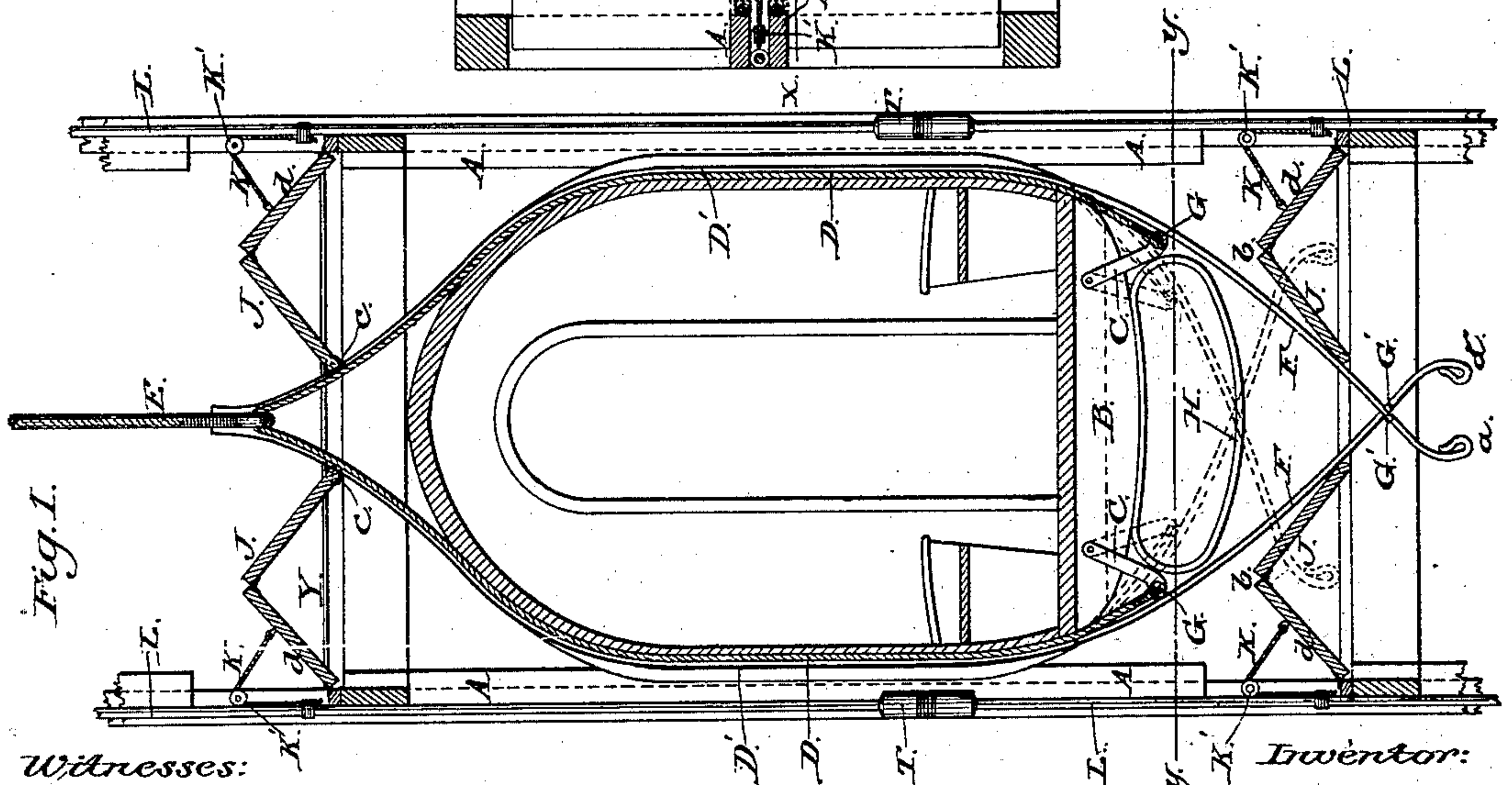


Fig. 1.

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J. Albert Kostrand

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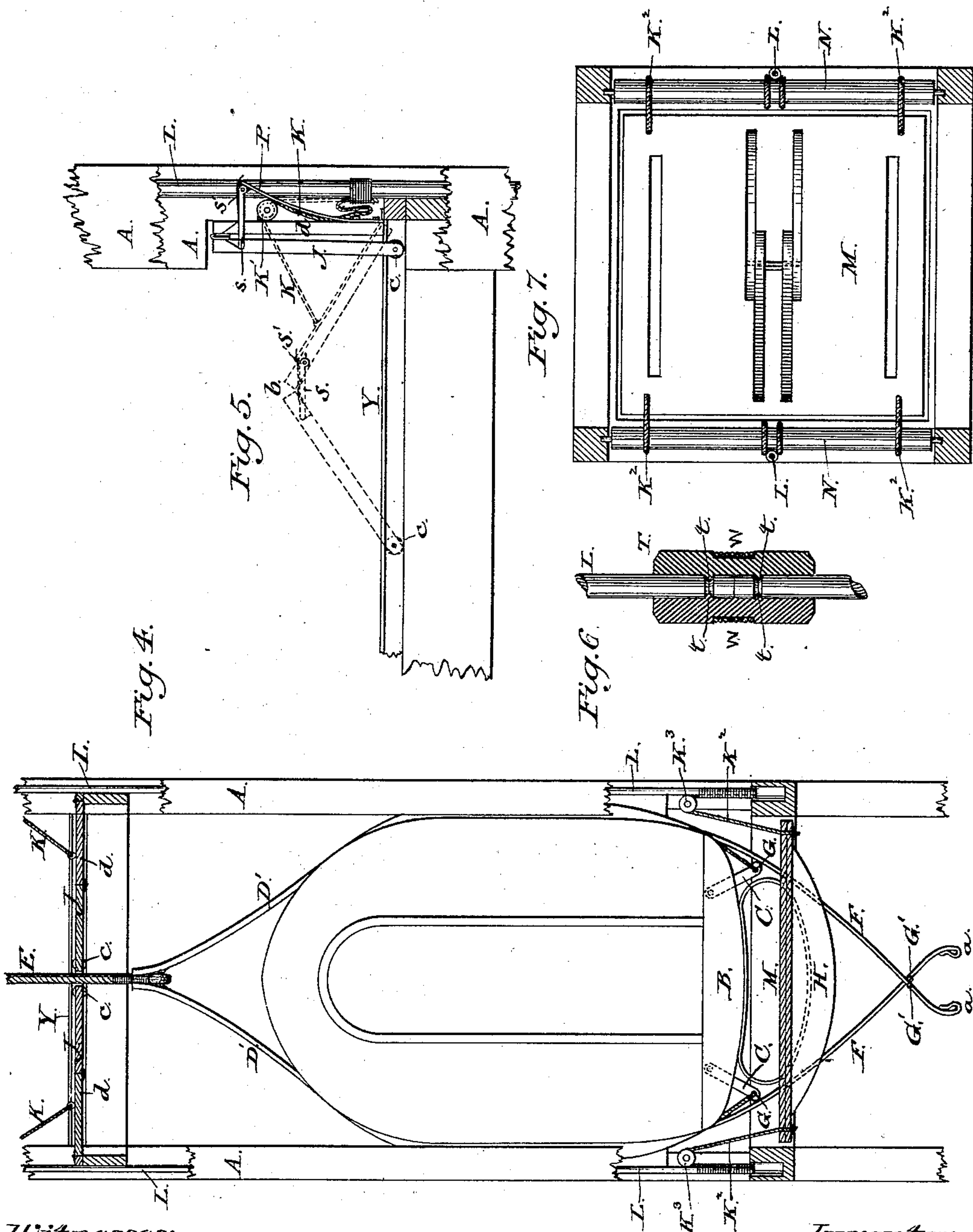
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2 Sheets—Sheet 2.

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Witnesses:

John A. Ellis.
F. Elbert Kostrand

Inventor:

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UNITED STATES PATENT OFFICE.

SIDNEY W. HOAG, SR., OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO
HENRY B. PIPER, OF SAME PLACE.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 279,648, dated June 19, 1883.

Application filed March 13, 1883. (No model.)

To all whom it may concern:

Be it known that I, SIDNEY W. HOAG, Sr., of the city, county, and State of New York, have invented a new and useful Improvement in Elevators; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

10 The object of my invention is to provide an elevator-hoistway with doors level with each floor, to be folded back by the elevator in moving up and down through the hoistway, and which will close automatically to arrest the
15 fall of the cage in case of accident, and in case of fire shut off communication between each story; and I accomplish this result by devices wholly inclosed within the shaft, which may be fitted up in any hoistway without weaken-
20 ing or affecting the timbers of the building, and which operate noiselessly, without jar or concussion, and with a minimum expenditure of power, and the least possible wear and tear.

It consists in the combination, with the hoist-
25 way on each floor of the building, of double doors, each formed in two divisions hinged to fold together, one of the divisions being hinged to the hatchway on a level with the floor, and the free edge of the other supported by friction-rollers at either end working in horizontal grooves in the sides of the hatchway, said
30 doors being automatically separated, by means of devices hereinafter described, far enough to allow the entrance between them of a wedge-shaped suspension-frame above the car, and of centrally-converging spring-bars beneath it, which operate in the movement of the car to force open and fold back the doors against the
35 side of the hoistway, so as to permit the free
40 passage of the car between them.

It consists, furthermore, in the combination, with the folding doors, of spring-bars projecting beneath the car, from each side thereof, governed by levers actuated by the weight of
45 the car upon its suspension-rope, so that when thus suspended the lower ends of the spring-bars shall draw apart to meet centrally under the car and form a wedge to force open the doors, but so soon as, from any cause, the car is
50 no longer supported by the rope, and the levers are consequently left free, the ends of the

springs shall fly apart far enough to strike upon the doors on either side, and thus arrest the farther descent of the car, as herein-
after more fully described.

55 In the accompanying drawings, Figure 1 is a vertical section in line *x x* of Fig. 2, with one of the guide-rails removed, showing the elevator-cage entering the doors on one floor and passing from between the doors on the
60 floor above. Fig. 2 is a transverse section in line *y y* of Fig. 1, showing the position of the spring-bars and buffer-springs. Fig. 3 is a vertical section taken in same line *x x* of Fig. 2, but with the cage in elevation, illustrating it in
65 position midway through the hatch-doors of one floor; Fig. 4, a view of the cage at the bottom of the hoistway, the platform being cut in section. Fig. 5 is an enlarged end view, partly sectional, of one of the hatch-doors,
70 illustrating its actuating-spring and the connection of the door with the weight-rod; Fig. 6, an enlarged sectional detail of one of the couplings for the side rods; and Fig. 7 is a
75 plan view of the lower platform by which the weight-rods are actuated, showing a modification in the devices for suspending the rods.

A A are the vertical guide-rails for the elevator-cage, attached in the customary manner to the sides of the hoistway.

80 B B are the lower cross-beams of the elevator-cage, supporting in the customary manner the platform and frame of the cage. Swinging arms C C are pivoted at one end to the two central cross-beams B B, near to their outer ends. The
85 free lower ends of these arms, projecting below the beams, are connected in pairs on each side of the cage by cross-rods G G, and wire ropes D D are attached thereto, and, being carried thence up in grooves on each side of the cage,
90 are united centrally over the top thereof in an eye to which is secured the lower end of the rope E, by which the cage is suspended. These wire suspension-ropes are protected by
95 iron straps D' D', which, bolted to the sides of the cage, extend from the ends of the cross-beams B B upward to a point above the intersection of the ropes, so as to form a wedge which shall operate, as the cage moves upward, to force open the sliding doors of the
100 hatchway. The lower ends of the arms C C, swung outward by the tension thereon of the

ropes D D, supporting the weight of the cage, bear against the inner or upper portion of spring-bars F F, which are firmly secured at their upper ends to the cross-beams B B, so as to project downwardly therefrom at an angle toward each other, which causes their lower ends to cross centrally under the beams, as shown in Figs. 1, 3, and 4. In their normal position, when left free, the spring-bars F F will cross each other about midway of their length, so that their lower ends shall spread widely apart, as illustrated in dotted lines, Fig. 1; but the pressure of the ends of the arms C C against the bars will operate, by forcing out the upper portion of the bars above their intersection, to draw their lower ends together until they are stopped by means of cross-rods G' G', which tie together each pair of bars on either side of the cage, as shown in Figs. 1, 3, and 4. When the lower ends of the spring-bars are thus brought together, the outer sides of the bars form a wedge whose apex is central under the cage, and whose sides incline thence to the outer ends of its cross-beams, and which, upon entering between the proximate edges of the two doors of the hoistway on each floor, will operate to force them apart and fold them back. The lower ends, *a a*, of the spring-bars are finished in a curved or rounded form to prevent them from engaging or resting upon the angle *b b*, Fig. 1, formed by the two leaves of the doors, in the event of their striking said angle in falling, as will be hereinafter more fully described.

Elliptic or semi-elliptic springs H H are fitted upon the under side of the two outer cross-beams B B, to prevent any severe shock or concussion in case of an accidental fall of the cage.

Doors J J are hinged on each floor to the frame of the hoistway, on each side, so as to close and meet in the center thereof, on the level of the floor, and to open and fold back within the hoistway against its sides. Each door is divided centrally and the divisions hinged together. The extreme outer edge of each door is rounded, and is fitted with lateral friction-rollers *c c* at each end, adapted to travel in grooves formed at the sides of the hatchway, on a level with the floor, by means of angle-irons Y Y, secured to the side of the hatchway. The inner hinged division, *d*, of each door is attached by a cord, K, led over a friction-pulley, K', to a vertical rod, L, which extends from the bottom of the hoistway to the upper floor of the building, between the vertical guide-rails A. The rods L L have free vertical play, and a frame or platform, M, is suspended thereon at the bottom of the hoistway on a level with the lower floor. The rods are so weighted as to counterbalance the combined weight of the platform and of all the doors and draw up the inner divisions of the doors from a level position to an angle of thirty-five degrees, as shown in Figs. 1 and 3 of the drawings, and thus hold them open to permit the wedges formed above

and below the cage, in manner as described, to freely enter between them.

The platform or frame M is suspended upon the rods by means of wire ropes K², led over friction-pulleys K³, as shown in Fig. 4; or, instead of suspending the platform directly upon the rods, as shown in said Fig. 4, rollers N N may be substituted for the pulleys K³, and the rods L L secured to cords wound upon the rollers, at the center thereof, and the platform be upheld by cords K², wound upon the ends of the rollers, as shown in Fig. 7. Openings are formed in the platform M (see Fig. 7) to allow the springs F and H to pass through it and permit the cross-beams under the cage to bear directly upon the platform. When the cage descends to the first floor it will, before reaching the level of the floor, carry down the platform M, and thus draw the rods L L up far enough by means of the cords K to allow the doors connected therewith to close completely by their own weight, as shown in Figs. 3 and 5. When the cage is, therefore, at rest on the first floor, all the doors in the hoistway are completely closed. By using cords K of cotton or other inflammable material for the suspension of the doors in their partly-open position, the cords will, in case of fire, burn and part, should the flames ascend the hoistway, and thus allow the doors to close automatically by their weight to cut off the progress of the flames. As the cage moves upward and its weight is removed from the platform, the weight of the rods L L will operate automatically to open the doors, in manner as described, far enough to allow the wedge on the top of the cage to enter. The divisions of each door, when they are thus partly opened, will stand at an angle, in readiness (see Fig. 1 and dotted lines, Fig. 5) to be folded together, so that the movement of the car will operate readily to force and fold or double the outer edge of the outer leaf inwardly against the inner leaf and carry the two back against the side of the hoistway, as shown in Fig. 5, the movement of the door in folding and opening back, and in thereafter closing the doors, being steadied by the friction-rollers *c c* at its outer end. The doors, after being thrown open and folded back, are automatically closed again so soon as the pressure of the cage against them is withdrawn by means of springs P P, Fig. 5. These springs consist of flat plates of spring-steel, which are secured at one end to the inner hinged end of the inner division or leaf of the door, and extend thence, upon its upper face, nearly to its outer end. An arm, S, is hinged to the outer free end of the spring P, to extend through a recess in the edge of the inner leaf and engage a recess in the opposite edge of the outer leaf of the door, as clearly illustrated in dotted lines, Fig. 5. As this outer leaf folds up, the spring P is forced out from the door by the movement of the arm S as it is pushed back, and so soon as the door is relieved from the pressure of the cage passing through the hatchway the resili-

ency of the spring will operate to close the door, the outer leaf of the door being thrown forward simultaneously into the position shown by dotted lines in Fig. 5 by the movement of the arm S. The arm S is supported and kept from dropping too far by means of an auxiliary flat spring, S', secured upon its upper face to project over the end of the spring P.

Should the suspension-rope E break or any of the devices supporting the cage at any time give way, the springs F F, released from the tension thereon produced by the weight of the cage on the suspension-ropes, will fly apart, so that their lower ends will strike upon the partly-opened hatch-doors next below the cage, inside of the angle b, formed by the upward projection of the hinged joint of the two leaves thereof, and the cage will thus be caught and stopped by the doors. (See dotted lines, Fig. 1.) Hence it will be impossible for the cage to fall at any time to a greater distance than from the level of one floor to the level of the floor below, while, in so falling, no great jar or shock will result, as the weight will be caught upon the springs F and H.

In the ordinary operation of the elevator the doors will be forced open by the cage and be automatically closed by the springs smoothly and noiselessly. When the cage reaches the lower floor, its weight bearing upon the frame or platform M will, by raising the weighted rods L, relieve the doors from the tension of the cords K, which keep them partly open, so that they will all shut down perfectly flat and thus completely close the hoistway at each floor. If, in case of fire, the cage is caught above the lower floor with the hatch-doors in their partly-opened position, and the flames find their way into the elevator-shaft, the burning of the ropes of any one set of doors will allow them to close automatically.

The joints of the rods L L are united by a coupling consisting of a longitudinally-divided sleeve, T, Fig. 6, adapted to embrace the rods closely, and each division of which is formed with internal offsets, t t, adapted to fit into annular grooves near the end of each of the two sections of rod to be united. The two divisions of the sleeve, after being fitted upon the rods, are secured by wrapping them ex-

teriorly with wire W. I contemplate making this form of coupling the subject-matter of a separate application for Letters Patent.

I claim as my invention—

1. The combination, with an elevator-hoistway and elevator moving therein, and horizontal folding doors closing the hoistway, of intersecting spring-bars F F, projecting below the elevator, arms C C, pivoted to its cross-beams to bear against the upper portion of the springs, and ropes D D, connecting the free ends of the arms with the rope E, from which the cage is suspended, all substantially in the manner and for the purpose herein set forth.

2. The combination; with an elevator-hoistway and with the divisions or leaves of a folding door adapted to close the same, of a spring controlling the joint of the leaves, and adapted to be retracted or compressed by the folding back of the leaves in opening, and operating by its resiliency to automatically separate the leaves when the pressure against them is removed, substantially in the manner and for the purpose herein set forth.

3. The combination, with the leaves in the folding door J of an elevator-hoistway, of the counterpoise-weight rod L, suspended from the inner leaf by the cord K, passing over a pulley, K', and operating automatically to partly fold the door and hold it thus partly opened, substantially in the manner and for the purpose herein set forth.

4. The combination, with an elevator-hoistway, an elevator moving therein, horizontal folding doors closing the hoistway, and vertical rods L L, suspended by means of cords K and friction-pulleys K' to the inner division of each door, to counterbalance the same, of a frame or platform, M, at the bottom of the hoistway, suspended upon the rods L L by means of cords led over revolving shafts or pulleys, substantially in the manner and for the purpose herein set forth.

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

SIDNEY W. HOAG, SR.

Witnesses:

A. W. STEIGER,
A. B. MOORE.