(Model.)

2 Sheets—Sheet 1.

G. T. FALLIS.

SAFETY GATE FOR ELEVATORS.

No. 324,544. Patented Aug. 18, 1885.

Fig. 1.

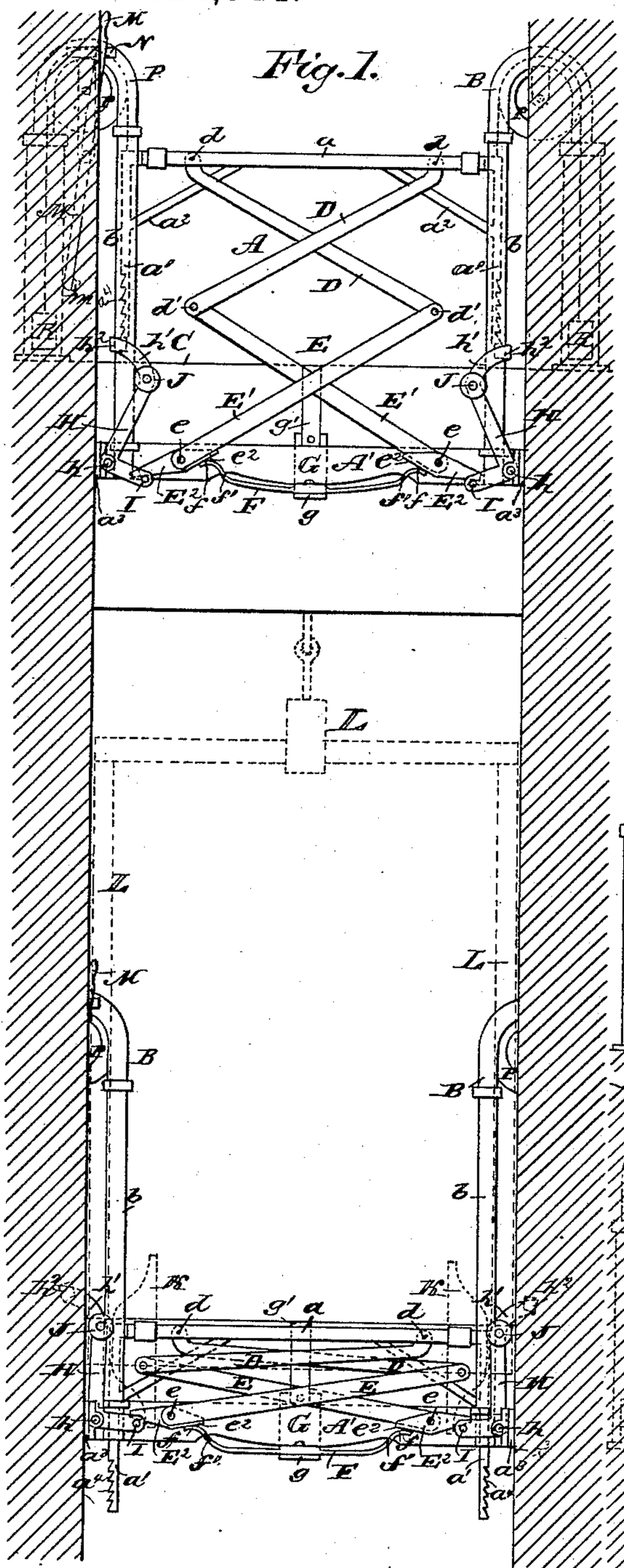


Fig. 2.

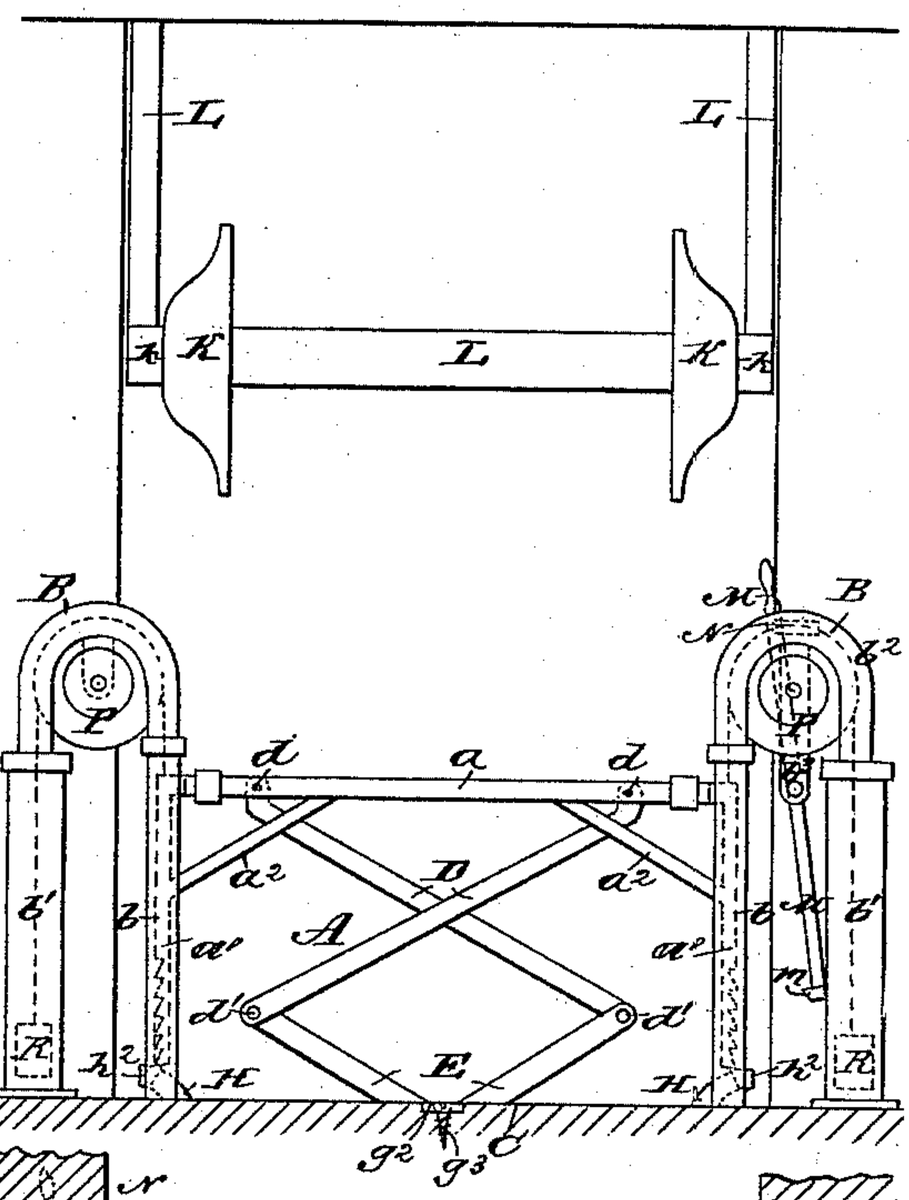
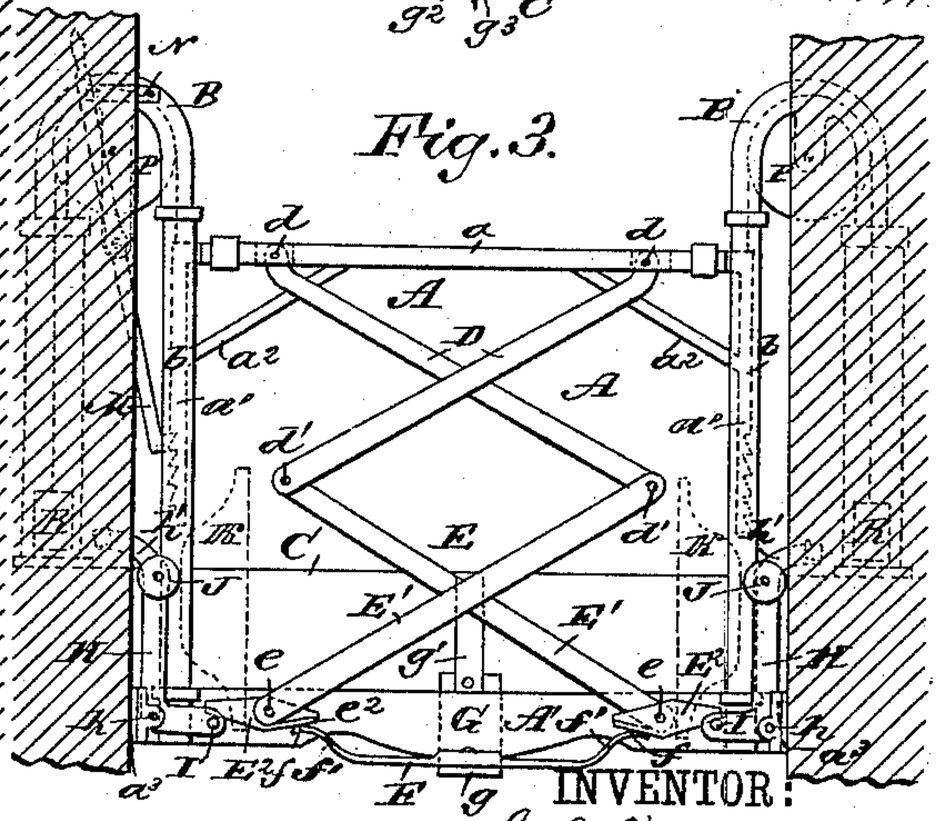


Fig. 3.



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ATTORNEYS.

(Model.) 2 Sheets—Sheet 2.

G. T. FALLIS.

SAFETY GATE FOR ELEVATORS.

No. 324,544. Patented Aug. 18, 1885.

Fig. 4.

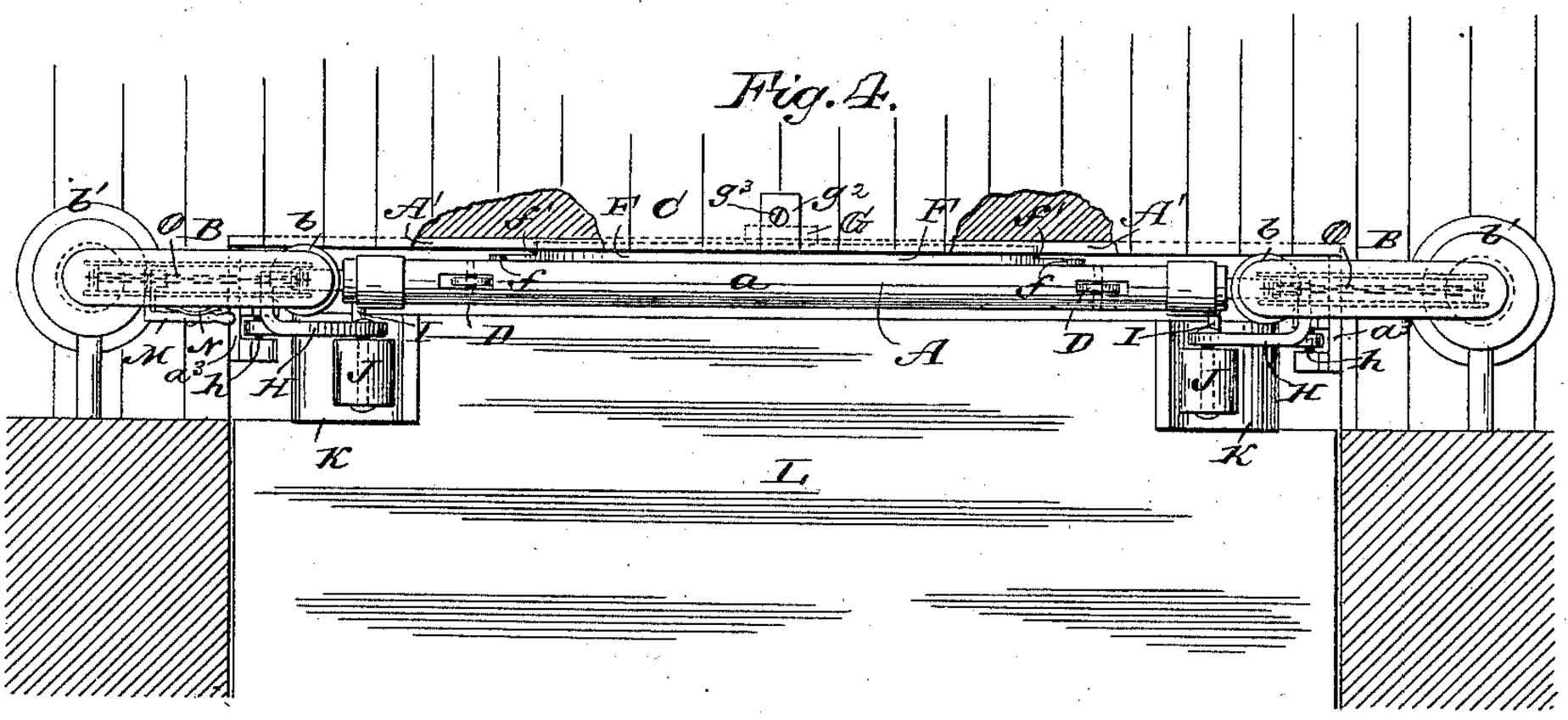


Fig. 5.

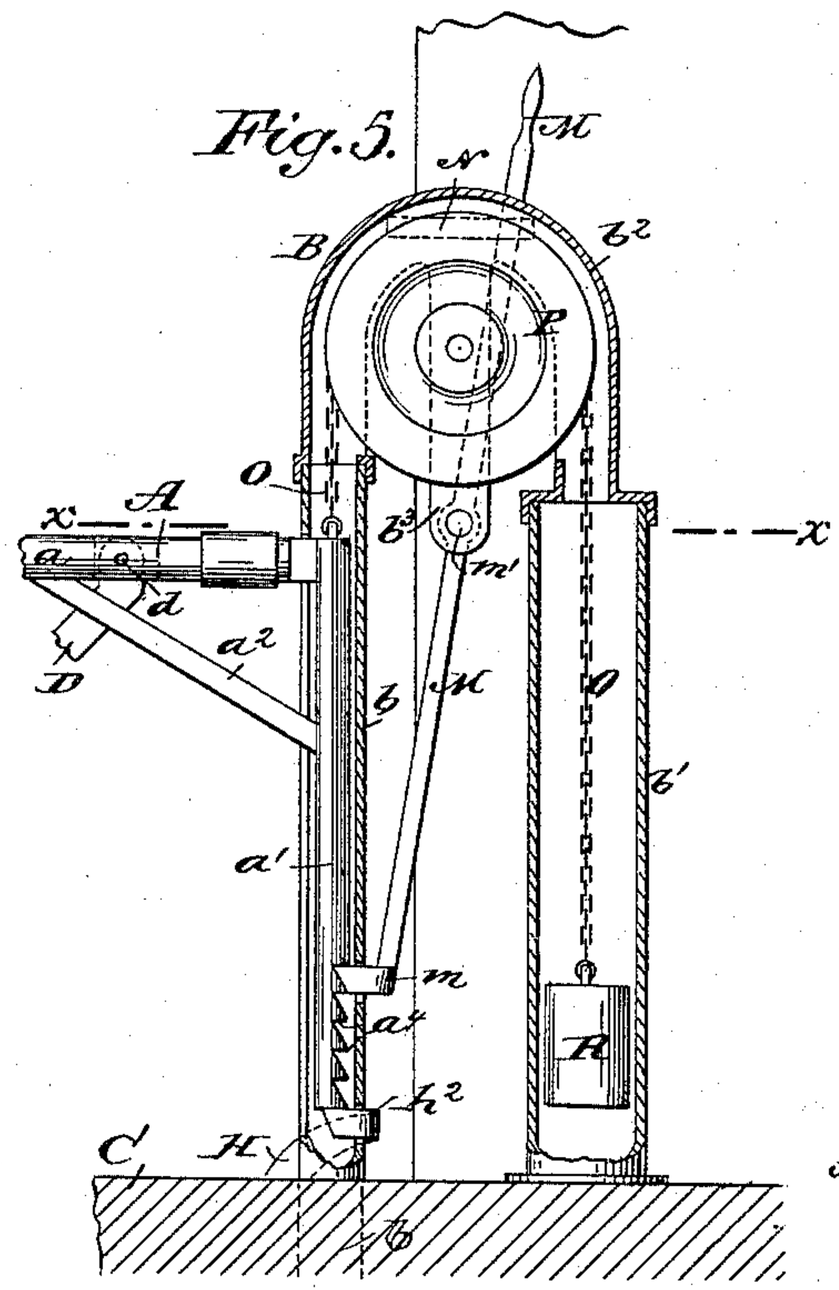


Fig. 10.

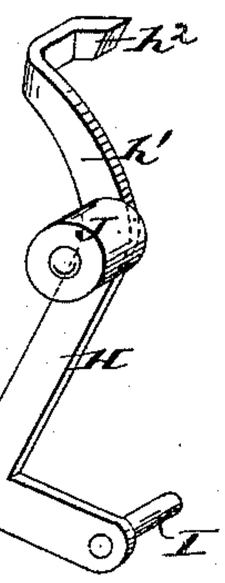


Fig. 7.

Fig. 8.

Fig. 9.

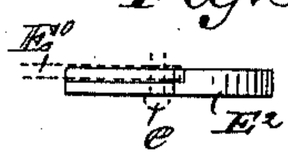


Fig. 11.

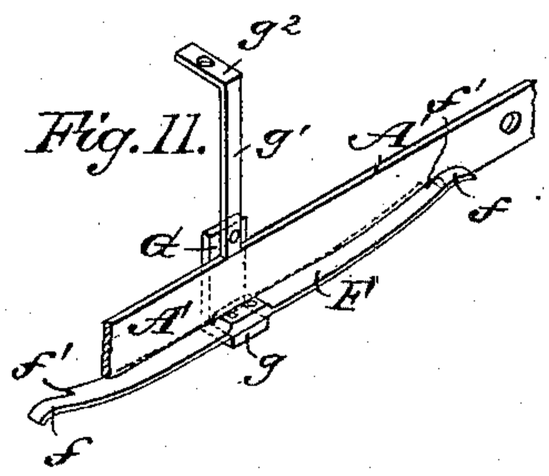
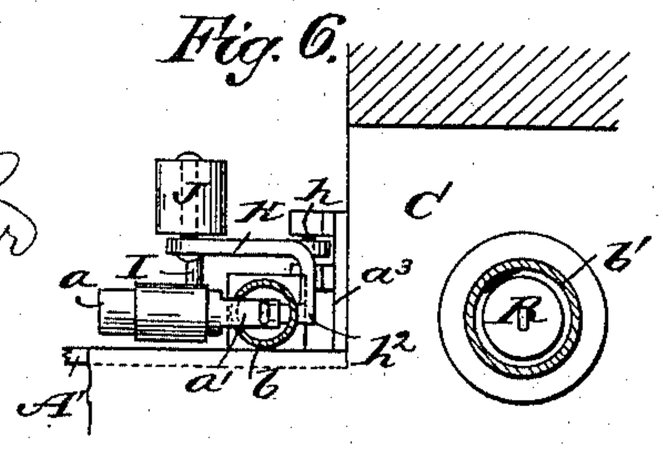


Fig. 6.



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UNITED STATES PATENT OFFICE.

GEORGE T. FALLIS, OF ST. JOSEPH, MISSOURI.

SAFETY-GATE FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 324,544, dated August 18, 1885.

Application filed June 5, 1885. (Model.)

To all whom it may concern:

Be it known that I, GEORGE T. FALLIS, of St. Joseph, in the county of Buchanan and State of Missouri, have invented a new and Improved Safety-Gate for Elevators, of which the following is a full, clear, and exact description.

My invention relates to gates for closing the open sides of elevator-shafts at the several floors of a building to prevent the fall of persons or goods through the shaft, and has for its object to improve the construction and facilitate the operation of gates of this character.

The invention consists in particular constructions and combinations of parts of the gate and connections to the elevator shaft and carriage, whereby the gate may automatically be opened and closed, and locked when closed and as the carriage passes the gate in either direction, and whereby, also, the gate may at will be prevented from opening, all as hereinafter fully described and claimed.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a vertical sectional elevation of an elevator-shaft along two floors of a building, and with my improved safety-gates fitted at each floor, one gate being closed and the other opened, the view being taken from the inside of the elevator-shaft. Fig. 2 is a front elevation of one of the gates and part of the carriage. Fig. 3 is a rear or inside view of one of the gates as arranged to remain closed when the trip-levers are operated by the passing carriage. Fig. 4 is an enlarged plan view of the safety-gate and portions of the floor, elevator-shaft, and carriage. Fig. 5 is a front vertical sectional elevation of one end of the gate and the adjacent counterbalance devices. Fig. 6 is a plan view in section on line *x x*, Fig. 5. Figs. 7, 8, and 9 are detail views of the shoe which forms the lower ends of the gate-operating toggle-levers. Fig. 10 is a perspective view of one of the trip-levers; and Fig. 11 is a perspective view of the gate-closing spring and an adjacent part of the base-plate, which supports the gate-operating mechanism.

The letter A indicates the safety-gate, which I make, preferably, with a round tubular top bar, *a*—a piece of metal pipe, for instance—and with round tubular or solid side bars, a' a', to the upper ends of which the flattened ends or necks of bar *a* are connected, the side bars being braced to the top bar by flat diagonal bars a^2 a^2. The side bars, a', are fitted to slide in the inner tubular legs or uprights, *b*, which form parts of ∩-shaped standards B, placed one at each side of the opening to the elevator-shaft. The legs or uprights *b* have side slots, through which the ends or necks of the gate-bar *a* move.

In the elevator-shaft and to its wall, just below and next the opening to the floor C of the building, is fastened by screws, bolts, or otherwise, a metal plate, A′, which extends across the whole width of the shaft and has outturned ends of flanges a^3 a^3, so that said plate A′, which I call a "base-plate," may give support to most of the mechanism and fixtures of the gate, as hereinafter more fully explained. The uprights *b* of standards B pass downward into the shaft and are fixed to the base-plate A′, and the opposite posts or uprights, *b*′, of the standards are secured to the floor C, as clearly shown in the drawings.

It is evident that by using the base plate A′ the gate-guides *b*, and the toggle levers, spring, and trip-levers, hereinafter described, may all be adjusted to each other in exact relative position on the base-plate prior to fastening the plate in the elevator-shaft.

To the gate-bar *a* are pivoted at *d* the upper ends of upper toggle-bars, D D, which are crossed, and their lower ends are pivoted at *d*′ to the upper ends of the lower part of crossed toggle bars or levers E E, which in turn are pivoted at *e e* to the base-plate A′. These toggle-bars D E form, practically, parts of the gate A. I make the lower toggle-bars, E E, in two parts—the main upper parts, E′, which are pivoted to bars D at *d*′, and also are pivoted at their lower ends on the pins *e*, and the lower parts or shoes, E^2, which are shown detached in Figs. 7, 8, and 9, and which also are pivoted about at their centers on the pins *e*, and have sockets or face-recesses at one side to receive the lower ends of parts E′ of the bars E. The shoes each have an edge flange, e^2, which underlaps the edge of the part E′ inside of the pivot-pin *e*.

A spring, F, is secured in the elevator-shaft,

and preferably to a lug, *g*, of a stirrup-plate, G, which is fixed to the center of the base-plate A′, and the spring lies partly under the base-plate, so that its opposite extremities, *f f*, will act at the face of plate A′ and under the flanged edges e^2 of the shoes E^2 and inside of the pivots *e*, to lift the toggle-levers and close the gate, and the spring-shoulders *f′ f′*, formed by cutting away the ends of the spring at its inner edge, will strike the lower edge of the base-plate A′, to limit the upward movement of the ends *f* of the spring, and consequently prevent the rise of the gate beyond a desired point.

To suitable lugs or bearings fixed to the end parts, a^3 a^3, of the base-plate A′ are pivoted at *h h* the trip-levers H H, one at each side of the shaft. Each trip-lever has a long and a short arm projecting at right angles to each other from their pivots *h*, and each trip-lever has a fixed pin, I, in its short arm, which pin projects below the outer end of the adjacent toggle-bar E, or, rather, its shoe E^2, and the long arm of each trip-lever which extends upward carries a roller, J, or it may be a fixed pin, which is thrown toward the center of the front part or line of the elevator-shaft by the action of the spring F, which forces the outer ends of the shoes E^2 downward against the pin I, and which throws the rollers or pins J J of the opposite trip-levers, H H, into the path of the trip-blocks K K, fixed to the opposite sides of the elevator-carriage L.

The upwardly-extending arms *h′* of the trip-levers H H carry at their ends the dogs or pawls h^2, which pass through slots in the hollow uprights *b* of the standards B, and project beneath the ends of the side bars, *a′*, of the gate A, or it may be into one of a series of notches, a^4, formed in the side bars, to hold the gate raised or open, the dogs being held in this position by the pressure of the spring F on the shoes E^2, and through the shoes on the pins I of the trip-levers H.

The acting faces of the trip-blocks K K have a straight section in the middle, and are beveled backward toward both ends, so that as the elevator-carriage L passes the gate A of each floor of a building the trip-blocks will strike the rollers J J and force the long arms of the levers H H back, which first will carry the dogs h^2 away from the bars *a′* of the gate, thus unlocking the gate, and at the same time the short arms of the levers will carry the outer ends of the shoes E^2 of opposite toggle-bars, E, upward against the tension of the spring F. The straight parts *k k* of the trip-blocks K K hold the gate open until the carriage has raised or lowered beyond ordinary stride or step of a person entering or leaving the carriage.

The stirrup-plate G has an upwardly-extending metal bar or plate, *g′*, which rises to the top of the floor C, and has a bent upper end part or flange, g^2, which is held to and flush with the floor by a screw or bolt, g^3, said plate *g′* serving to help support the gate mechanism and to prevent contact of the toggle-bars D E with the wall of the elevator-shaft as the bars fold and open in opening and closing the gate A, and thus avoid friction, which would result from such contact.

The foregoing is a description of the parts of the gate in its ordinary and simplest practical form; but when it is desirable, and for reasons hereinafter set forth, the following attachments or parts may also be used in connection therewith.

To a lug, b^3, pendent from arched head b^2 of one of the standards B—say the right-hand one, facing the elevator—is pivoted at *m′* a lever, M, which carries at its lower end a catch or dog, *m*, adapted to pass through the upright *b* of standard B and to enter one of the series of notches a^4 in the side bar, *a′*, of the gate A, as in Figs. 3 and 5, so as to prevent lowering or opening of the gate.

To the standard B is attached a spring, N, or other suitable catch device which will lock the lever into engagement with the gate, as above described, and also will hold the lever-catch *m* away from the gate, as represented in Figs. 1, 2, and 4.

To the upper ends of the opposite side bars, *a′*, of the gate are connected the chains or cords O, which run over pulleys P, journaled in the lugs b^3 of the heads b^2 of standards B, said pulleys running in the heads b^2, and the chains O, after passing from the gate over the pulleys, run down into the standard-uprights *b′*, and have weights R attached at their ends, said weights moving up and down in the uprights *b′* as the gate A opens and closes.

The combined weight of the opposite weights, R R, is a little less than the weight of the gate A, so that when the gate is not held open by the catch-lever M, and when the trip-levers H are thrown back by the carriage-blocks K, which will swing the shoes E^2 on the pivots *e* and relieve the parts E′ of the pressure of the spring F, the gate will fall or open by its own gravity and easily or gradually as the counterbalancing-weights R are lifted by it.

The operation of the gate when the counterbalancing weights and pulleys R P are employed is as follows: When the gate A at any particular floor of the building is not to be opened by the passage of the elevator-carriage, the lever M will be engaged by its catch *m* with the gate, and when the passing carriage blocks K throw the trip-levers H back the shoes E^2 will alone be swung on the pivots *e* against the tension of the spring F, as in Fig. 3, and the gate cannot fall or open, as it is retained in closed position by the lever M, and when the blocks K escape from the trip-levers H the spring F will throw the shoes E^2 back to their first positions, or with their flanges e^2 in contact with the edges of the main parts E′ of the toggle-bars E, and the trip-lever rollers J will again be thrown into the

paths of the trip-blocks K, as at the top of Fig. 1, ready for the next action of the trip-blocks.

When the gate is to be opened by the passage of the carriage, the lever M will be operated to withdraw its catch *m* from the gate, which then will be locked in raised or closed position by the dogs h^2 of the trip-levers H, and when these levers are thrown back by contact of the trip-blocks K with their rollers J the first effect will be to throw the dogs h^2 back clear of the gate, leaving it free to fold down by its own weight when the flanges e^2 are swung down against the tension of the spring F and away from the parts E′ of the toggle-bars E—in other words, the parts E′ are no longer supported by the flanges e^2 of the shoes and the tension of the spring F on the shoes; hence the parts E′ of the toggle-bars E are free to turn on the pivots *e* as the bars E D fold down together as the gate opens, and as shown at the lower part of Fig. 1, in which position the gate will be held while the straight faces *k* of the carriage-blocks K hold the levers H back while the carriage is stopped at the floor-level to discharge or receive its load. As the carriage is started again either up or down, and as the trip-blocks K leave the levers H, the spring F immediately will act on the shoes E^2 of the toggle-bars E, to raise these bars and the toggle-bars D and lift or close the gate, the spring being aided in this action by the fall of the counterbalancing-weights R, which draw on the gate and relieve the spring from most of the weight of the gate, the weights thus promoting the long-continued serviceable elasticity of the spring. As the gate is fully raised the dogs h^2 again engage its side bars, *a′*, to hold the gate open, and the trip-lever rollers J again are thrown into the paths of the trip-blocks K, ready for the next action of the blocks on them.

It is obvious that as the lowered or open gate is being closed the spring F lifts or swings the parts E′ E^2 of the toggle-bars E as one piece, and said parts E′ E^2 move practically as one piece as the gate opens, as the parts E′ will scarely leave the shoe-flange e^2, as the shoes E^2 are swung against the tension of the spring F by the trip-levers.

It will be understood that the toggle-lever bars E may be made each in one piece, pivoted at *e* in the elevator-shaft and at *d′* to the toggle-bars D; but in this case the gate A at every floor would be opened every time the carriage passed by, either up or down, and it is to avoid this action and to open the gates only when and where necessary, and also that any accidental entanglement of or hinderance to the action of the gate may cause no damage, that I have made the toggle-lever bars E in two parts, and have provided the catch-lever M to support the gate closed, as above described.

It is evident that the counterbalancing-weight R may be dispensed with, as the spring F may be made to alone lift and support the gate; but the use of the weights is preferred, especially with wide heavy gates, because of the relief they afford the spring, which otherwise would have to be made overheavy, and would then be likely to raise or close the gate violently.

Any desired number of toggle-lever bars may be employed, depending on the height of the gate and the extent of movement it has in opening and closing.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A safety-gate for elevators, comprising a gate, A, fitted for movement to close and open a side of the elevator-shaft, and connected to toggle-bars which are pivoted in said shaft, a spring or springs acting to close the gate, trip-levers H, provided with arms or pins adapted to engage the toggle-bars to fold them or allow them to fold to open the gate, and provided also with rollers or pins, as at J, lying in the path of trip-blocks fixed to the elevator-carriage, substantially as herein set forth.

2. A safety-gate for elevators, comprising a gate, A, fitted for movement to open and close a side of the elevator-shaft, and connected to toggle bars which are pivoted in said shaft, a spring or springs acting to close the gate, trip-levers H, provided with arms or pins adapted to engage the toggle-bars E to fold them or allow them to fold to open the gate, and provided also with rollers or pins, as at J, lying in the path of trip-blocks fixed to the elevator-carriage, and said trip levers having pawls or dogs h^2, normally engaging the gate to lock it closed, substantially as herein set forth.

3. A safety-gate for elevators, comprising a gate, A, fitted for movement to open and close a side of the elevator-shaft, and connected to toggle-bars which are pivoted in said shaft, a spring or springs acting to close the gate, trip-levers H, provided with arms or pins adapted to engage the toggle-bars E to fold them or allow them to fold to open the gate, and provided also with rollers or pins, as at J, lying in the path of the trip-blocks fixed to the elevator-carriage, and said toggle-bars E made in two parts or with shoes made movable independently of the main parts of the bars, substantially as described, whereby the operation of the trip-levers by the carriage trip-blocks will not necessarily cause the gate to open, substantially as herein set forth.

4. In safety-gates for elevators, the combination, with the gate A and guides therefor, of toggle-bars E, connected to the gate and consisting of two parts, E′ E^2, pivoted in the elevator-shaft, and said part or shoe E^2 having flanges e^2 acting on the parts E′, to unfold the toggle-bars to lift or close the gate, substantially as herein set forth.

5. In safety-gates for elevators, the combination, with the gate A, its operating toggle-bars, a spring or springs acting on the toggle-

bars, to close the gate, trip-levers H, provided with pins I, acting to fold the toggle-bars or allow them to fold to open the gate, and provided also with rollers or pins J, lying in the path of the trip-blocks K on the elevator-carriage, of a base-plate, A′, fixed in the elevator-shaft, and provided with end flanges or parts, a^3 a^3, and to which base-plate the toggle-bars D E, spring F, and trip-levers H are adjusted in proper relative position, substantially as herein set forth.

6. In safety-gates for elevators, the combination, with the gate A and base-plate A′, of opposite side standards, B, consisting of slotted tubular posts *b*, forming guides to the gate side bars, and extended beneath the floor next the gate and fastened to base-plate A′, and the tubular posts *b′*, adapted to receive movable weights, the connecting head-bar b^2, and a pulley, P, adapted to receive a chain or cord, substantially as herein set forth.

7. In safety-gates for elevators, the combination, with the gate A and its toggle bars D E, of the wall plate or strip *g′*, substantially as described, whereby the toggle-bars will be held from contact with the wall of the elevator-shaft, as herein set forth.

8. In safety-gates for elevators, the combination, with the gate A and the toggle-bars D E, pivoted in the elevator-shaft and connected to the gate, substantially as described, of a spring or springs having end parts, *f*, acting on the toggle-bars, and shoulders *f′*, adapted to a plate or stop in the shaft to limit the rise of the gate, substantially as herein set forth.

9. In safety-gates for elevators, the combination, with the gate A, its toggle-bars D E, the spring F, and the trip-levers H, of trip-blocks K, secured to the elevator-carriage, and provided with oppositely-beveled ends to operate the trip-levers, and with straight central portions, *k*, holding the gate A open until the elevator passes beyond ordinary stride, substantially as herein set forth,

10. In safety-gates for elevators, the combination, with the gate A, guides therefor, and toggle-bars E, connected to the gate and pivoted in the elevator-shaft, and consisting of two independently-movable parts, E′ E^2, of the catch-lever M, substantially as herein set forth.

11. In safety-gates for elevators, the combination, with the gate A, guides therefor, and toggle-bars E, connected to the gate and pivoted in the elevator-shaft, of the chains or cords O and counterbalancing-weights R, substantially as herein shown and described.

12. In safety-gates for elevators, the combination, with the gate A, guides therefor, and toggle bars E, connected to the gate and pivoted in the elevator-shaft, and a spring or springs bearing on the toggle-bars to close the gate, of chains or cords O and weights R, substantially as herein set forth.

13. In safety-gates for elevators, the combination, with the gate A, counterbalancing-weights R, and chains O, of side standards, B, consisting of slotted tubular uprights *b*, forming guides to the gate side bars and extending beneath the floor next the gate, the tubular uprights *b′*, receiving the weights, and a pulley, P, for the chain O, substantially as herein set forth.

14. In safety-gates for elevators, the trip-lever H, constructed with an arm carrying a roller or pin, J, adapted to be struck by a trip-block on the elevator-carriage, an arm carrying a pin or projection, I, adapted to act on the short arm of the gate-operating toggle-bar, and a dog, h^2, adapted to retain the gate in closed position, and said trip-lever pivoted in a bearing fixed to the elevator-shaft, substantially as herein set forth.

GEORGE T. FALLIS.

Witnesses:
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GEORGE RIX.