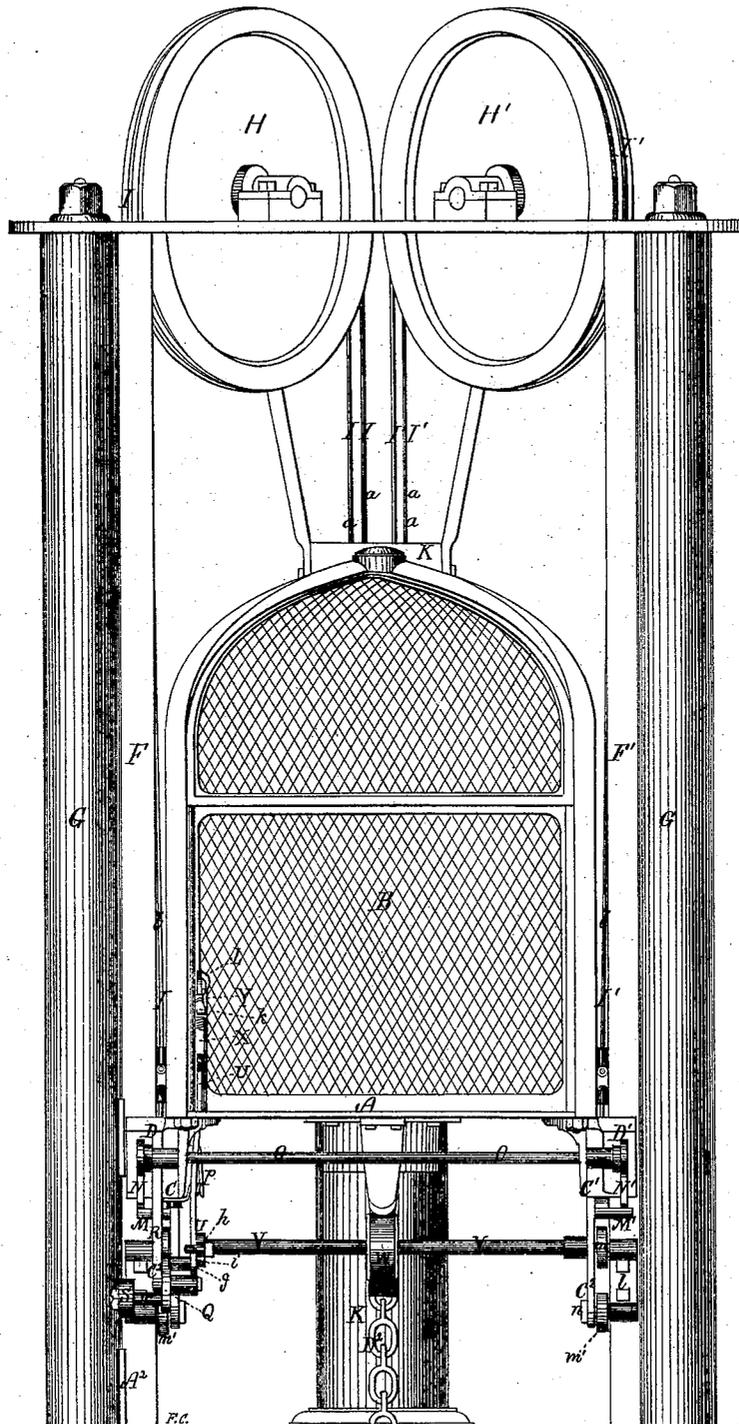


C. W. BALDWIN.
Improvement in Elevators.

No. 123,761.

Patented Feb. 20, 1872.

Fig. 1.



Witnesses.
H. A. Curtis
W. C. Boardman.

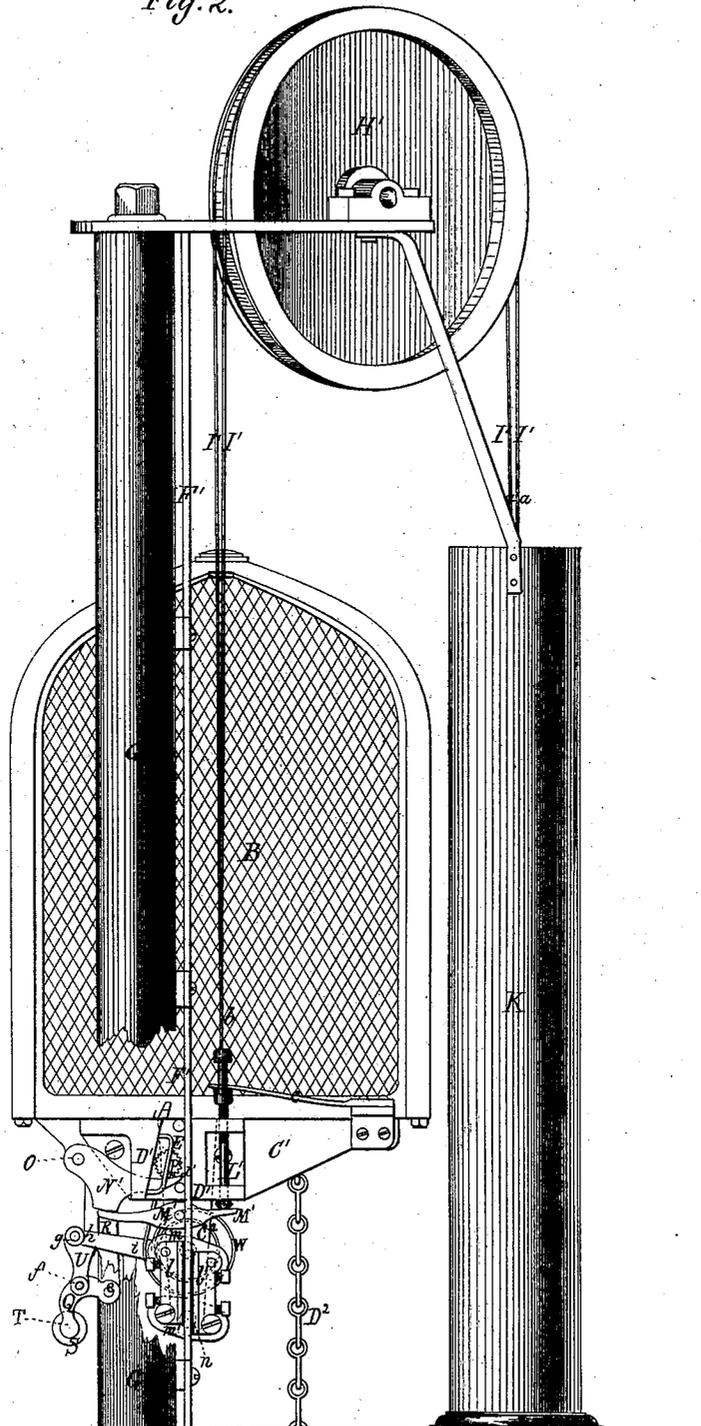
C. W. Baldwin.
by his Attorney,
Frederick Curtis.

C. W. BALDWIN.
Improvement in Elevators.

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Fig. 2.



Witnesses.
H. A. Curtis
W. C. Boardman

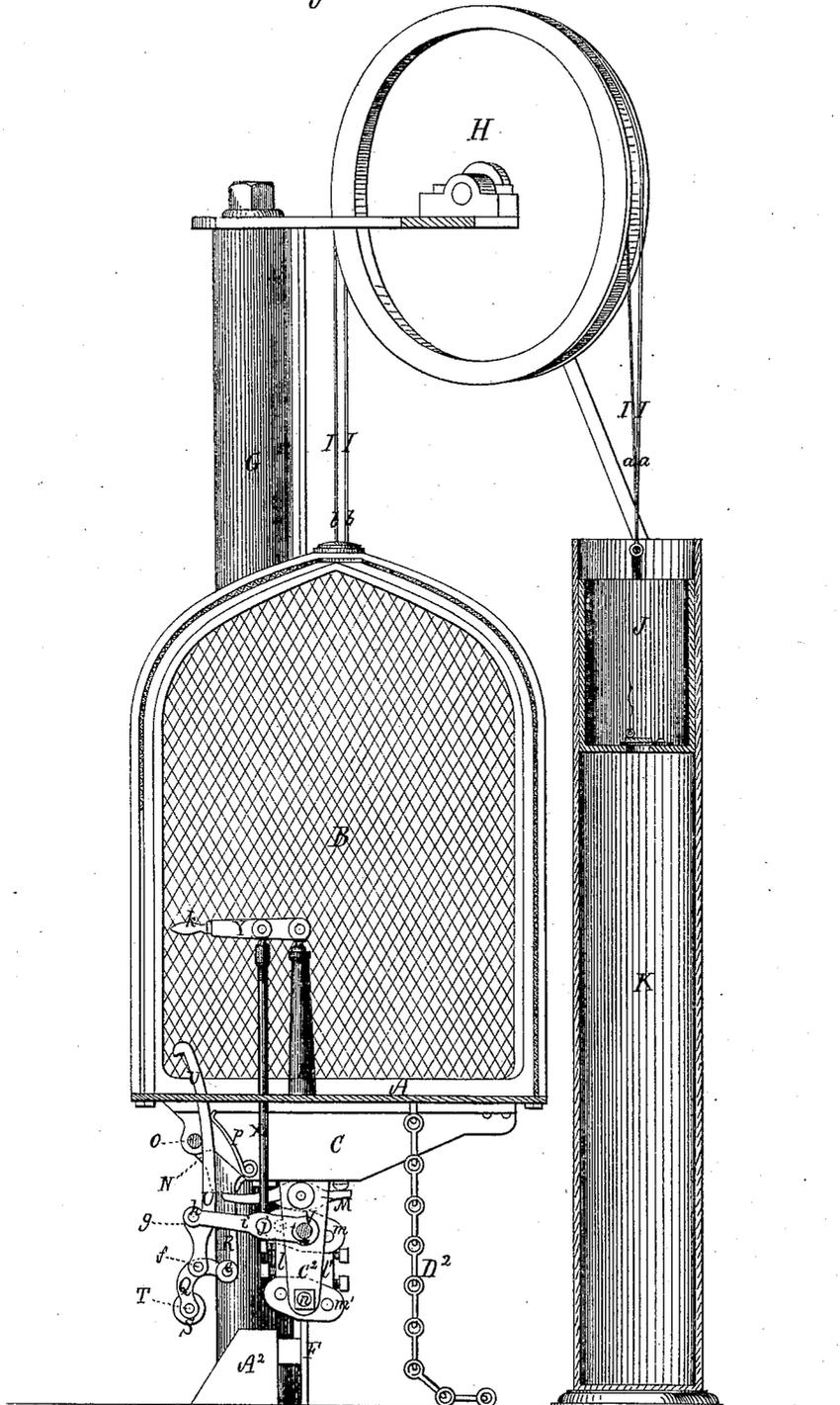
C. W. Baldwin.
By Fred. Curtis atty.

C. W. BALDWIN.
Improvement in Elevators.

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Patented Feb. 20, 1872.

Fig. 3.



Witnesses.
H. A. Curtis
W. E. Boardman

C. W. Baldwin
by Fred. Curtis, atty.

C. W. BALDWIN.
Improvement in Elevators.

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Fig. 5.

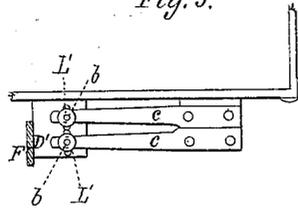
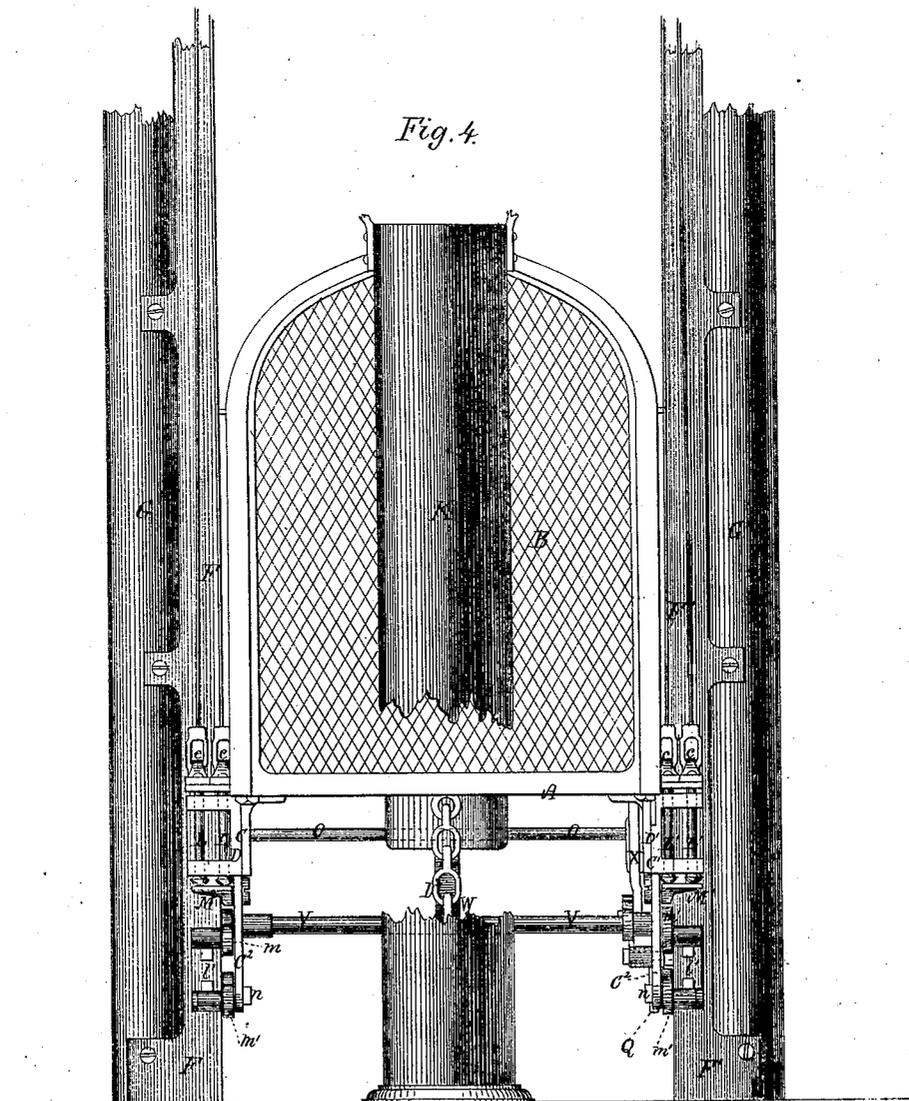


Fig. 4.



Witnesses
H. A. Curtis
W. S. Boardman.

C. W. Baldwin.
by Fred. Curtis,
att'y.

UNITED STATES PATENT OFFICE.

CYRUS W. BALDWIN, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO CHARLES WHITTIER AND HENRY H. McBURNEY, OF SAME PLACE.

IMPROVEMENT IN ELEVATORS.

Specification forming part of Letters Patent No. 123,761, dated February 20, 1872.

To all to whom these presents shall come:

Be it known that I, CYRUS W. BALDWIN, of Boston, in the county of Suffolk and Commonwealth of Massachusetts, have made an invention of certain new and useful Improvements in Elevators; and do hereby declare the following to be a full, clear, and exact description thereof, due reference being had to the accompanying drawing making part of this specification, and in which—

Figure 1 is a front elevation; Fig. 2, a side elevation; Fig. 3, a vertical central and longitudinal section; and Fig. 4, a rear elevation of an elevator in which my improvements are embodied. Fig. 5 is an elevation of one of the recessed brackets, or housings, and its accessories to be hereinafter explained.

(1.) First. My present invention consists, first, in suspending and operating an elevator-carriage from the bottom thereof, in lieu of the top as now universally practiced, my purpose in so doing being threefold; first, to reduce very greatly the present weight of an elevator-carriage, and by this means lessen the cost of operating it; secondly, to lessen, in a very marked degree, the sounds at present conveyed through a building by the conducting materials of necessity employed in elevator-carriages; this second effect, incident to my mode of suspending the carriage, being obtained by constituting its cover or roof of cloth or other non-conducting material; and thirdly, to obtain more nearly absolute means of safety against accidental fall of an elevator-carriage, since there are no connections between the platform and top, the sundering of which would precipitate the former to the bottom of the building.

(2.) Second. And, secondly, my present improvements will be found to consist in a novel mode of attaching the hoisting-ropes or suspensories to the carriage-floor or platform, and the combination therewith of a "safety" stop-motion or device, which, upon fracture of any one suspensory, sets free the said stop-motion and allows it to arrest the descent of the carriage and prevent accident; this second portion of these improvements consisting in connecting the suspensories to the upper ends of a series of upright rods, playing in suitable brackets or housings, applied to one or both

sides of the platform and provided with springs to depress them under certain conditions, the lower ends of said rods resting upon the inner extremity of a tilting or oscillating lever fulcrumed to the side of the platform and below the brackets or housings above named, the outer or front extremity of the said lever being situated below the inner and free end of an arm or tripper affixed to one end of a horizontal rock-shaft, which rocks in suitable bearings placed below the carriage-platform, the last element in this safety device being a fluted roller, which, in turn, rests upon the free end of the tripper above named and is deposited in a converging channel, contracted at the top, said channel being a groove or recess created in the housing or bracket above named and in which an upright rail or slide is situated, the arrangement of parts being such that upon fracture of one suspensory, the rod to which it is attached is suddenly lowered by the action of its spring, the descent of the rod, through the agency of the oscillating lever and tripper above named, having the effect of throwing the fluted roller with a quick movement upward into the contracted portion of its channel and between the front wall of the latter and the bar or slide above referred to, the roller being so firmly wedged between the two as to lock them together, and consequently arrest instantly the descent of the carriage.

(3.) Third. And, thirdly, these improvements embrace an automatic brake or stop mechanism, whereby, upon failure of the attendant through inattention or preoccupation to apply his hand-brake and stop the motion of the carriage as the top or bottom of the building (or, when desirable, a landing) is reached, the said brake is forced to act without the aid of the attendant; this portion of the invention consisting in the employment of a vibratory bar swiveled to a hanger depending from the front of the platform, and provided with an anti-friction roller upon its forward and free end, the said vibratory bar being fulcrumed at about its center to the lower end of a shipping or reversing lever or "cast-off," the handle whereof rises into the interior of the carriage or above the platform, a ledge or shelf being formed upon such shipping-lever upon which rests the outer end of a second vibratory le-

ver, the rear end of which, in turn, is affixed rigidly to the rock-shaft, upon which is mounted the brake mechanism which grasps the upright slides hereinbefore named, the said lever having pivoted to it a pitman which rises above the platform and is connected to a horizontal handle suitably supported, the depression of the last-named lever, by means of such handle, having the effect of releasing the brake, and vice versa, the arrangement of parts in this instance being such that when the top or bottom of the building, (or, if desirable, a landing) is reached, the roller of the vibratory bar before named impinges against a sloping fender or deflector placed in the path of movement of such bar, by which the latter is elevated and with it the vibratory lever which has been above referred to as attached rigidly to the brake-shaft, the elevation of this last-named lever bringing the brake into action and stopping the motion of the carriage. This automatic stop mechanism is so applied, and its reversing lever so adapted to it and to the brake mechanism, that said stop mechanism may be used or not at pleasure according to the position in which the lever is suffered to remain.

(4.) Fourth. And, fourthly, I have incorporated in these improvements a chain or series of weights whereby the equipoise of the suspensories of the carriage is effected at all points in its path of movement, the preponderance of the weight of the increasing length of suspensories upon one side of the supporting drum, as the carriage ascends, being equipoised by the equally increasing weight of the chain or weights upon the opposite side of such drum, and which are picked up or brought into requisition one after another, and vice versa, as the carriage descends, the weight of the carriage *per se* being counterbalanced in any one of several modes now adopted, according to the class of elevators which is to be supplied with my improvements.

I have adopted, in explaining these improvements, a class of elevators shown and described in Letters Patent of the United States numbered 99,049, and issued to me on the 25th day of January, 1870, for Hydro-Atmospheric Elevator, in which the carriage is balanced by a bucket, to which water is supplied or removed in varying quantities according to the weight of the carriage and the direction in which it is to travel.

The accompanying drawing represents at A a horizontal platform of suitable proportions and construction to constitute the bottom or flooring of an elevator-carriage or car, the superstructure B of the car being, in this case, a very light one, and composed of lattice-work or other reticulated or ornamental material, the top thereof being, by preference, composed of cloth or other material which shall be an ineffectual conductor of sound, in order that conversation or other sounds or noises within the car may not disturb the various occupants of a building. Upon each side of the platform

A and depending below it, I affix a thin side plate or cheek, C or C', while outstanding upon these plates, and centrally thereof and of the platform, I affix to each a recessed or channeled bracket or housing, D or D', of which a side elevation is shown in Fig. 2, as well as several details connected therewith, the contour of the upright channel or recess E of such housing being as shown—that is to say, with its rear wall a vertical plane and its front wall an inclined or sloping plane, the two converging at top. Furthermore, upon each side of the platform A I erect, upon the lower floor of the structure in which the elevator is placed, or upon the foundation of the elevator whatever it may be, an upright beam or bar, F or F', these bars being disposed within the roller recesses E of the housings and immediately against the rear wall thereof, and extending from basement to attic of the structure, these bars or slides being stayed or supported each by an upright column, G or G', which is placed outside and alongside thereof, as represented, these columns serving in addition to support the drums H or H', about the peripheries of which pass the suspensories I I' of the platform A, these drums being situated at the extreme upper part of the structure containing the elevator. The suspensories I I' are connected at their rear extremities *a a*, &c., or that portion in rear of the drums H H', to a balancing or equipoising bucket, J, contained within and traversing a well or stand-pipe K; the nature of the well and bucket and their action upon the platform or carriage, being as described in my Letters Patent number 99,049, before named, and requiring, in this connection, no extended notice.

The drums or pulleys H H' are disposed obliquely to each other and to the sides of the platform A or carriage B, this triangulate enabling me to employ large drums and apply the suspensories of both directly to a bucket of comparatively small diameter.

(1.) First, this above-described elementary construction of an elevator is such as has been or may be used (with the exception, perhaps, of the triangular arrangement of the carriage and drums) without direct connection with my present improvements, in carrying out which, in regular succession as hereinbefore premised, I proceed as follows: and first, to suspend and operate an elevator carriage or platform from the bottom thereof, I dispose, within vertical bearings formed in each housing D or D', one or more releasing-rods, L L or L' L', (see Fig. 4 of the drawing) equal in aggregate number and coincident in position with the suspensories L L', and depressed by plate springs *c c*, &c., suitably applied, and I connect to the upper end of each rod or bolt the end *b* of the next adjacent suspensory, the opposite ends *a a*, &c., of such suspensories being connected, as before stated, to the bucket J. I thus carry out the first portion of these improvements, and obtain, in so doing, results and advantages hereinbefore enumerated.

(2.) Second, to carry out the second portion of these improvements—that is, to instantly arrest the descent of the platform or car should fracture or failure of a suspensory occur—I dispose below each housing D or D' an oscillating or tilting lever, M or M', the fulcrum of which is a pin projecting laterally from the side of the cheek C or C', and placed below the roller recess E, the rear extremity of such lever being disposed immediately below the series of rods L, and being of sufficient width to overlap the lower ends or heads of each, while the forward extremity of such lever abuts against the under side of a swinging arm or tripper, N or N', affixed to the end of a horizontal rock-shaft, O, which is mounted in suitable bearings in the front part of the cheeks C C'. The inner and free end *d'* of each tripper extends into and nearly spans the lower part of the recess or channel E, and so as to intercept and support at certain times a fluted, roughened, or other roller, P, which is deposited in such recess, the diameter of this roller being less than the greatest width of the recess and greater than the smallest width thereof, the shaft O serving to connect the trippers upon opposite sides of the platform and compel them to act in unison.

This second portion of my invention last described is the "safety" apparatus, as it is now generally termed, and its operation is as follows: Upon fracture of any one of the suspensories I or I' its connection with the corresponding rod L or L' is severed, and the latter is driven by its spring *c* forcibly and instantaneously in contact with the rear end of the lever M or M', which effects a like sudden elevation of the free end of the tripper N or N', the elevation of the tripper throwing the fluted roller P upward into the throat of the recess E in such manner that it is wedged fast between the front boundary of the recess and the adjoining face of the adjacent slide or bar F or F', and locks the latter to the housing, by this means instantly arresting the descent of the latter, the weight of which aids in retaining the roller in place. As the two trippers are rigidly united by the shaft O a fracture of one suspensory sets free the safety apparatus upon both sides of the platform. By means of this second portion of my invention instant and unavoidable notice is given to the occupant of the car when one suspensory fails or parts, and enables the proper remedy to be availed of.

As it is morally certain that no two suspensories would fail at the same time, this feature in my present improvements becomes an absolute means of safety against accidental fall of an elevator-carriage, as the connections of the suspensories are not weakened by time and service, and nothing exists in the construction of the car above its platform to give way.

I do not herein claim broadly the arrangement of the "safety device," as above explained, as I have shown and laid claim to this in a former patent, the novelty in this connection

consisting in a system of so attaching the suspensories to this safety device that fracture of any one suspensory shall set the device free to act.

(3.) Third, in carrying out the third feature of these improvements, as enumerated in order in this context—that is, to insure the stoppage of the platform or carriage at the proper place should the attendant fail to do so—I combine with the hand-brake of the said platform a suitable mechanism which shall operate automatically to effect this object, and to carry out this end in one mode by which it may be simply and effectually accomplished, I proceed as follows, this device being applied in the present to the left side of the platform, although it may be placed at either side, as may be preferred.

Q in the drawing represents a curved vibratory or swinging bar, swiveled at its inner end, as shown at *e*, to the lower part of a hanger, R, depending from the front part of the cheek C, the lower extremity of the said bar carrying an anti-friction roll, S, which is mounted upon a horizontal stud, T, projecting outwardly and laterally from the bar, as represented in Fig. 1 of the drawing. To the center or thereabout of the bar Q I pivot the lower end of a "cast-off" or hand lever, U, such lever rising upward through a slot in the floor or platform A. Toward the lower end or pivot *f* of the hand-lever U I form, upon such lever, an outwardly-projecting offset or shelf, *g*, while immediately over this shelf I dispose the free end *h* of a horizontal vibratory arm or lever, *i*, the rear or inner end of this latter lever being affixed rigidly to a rock-shaft, V, which spans the area between the cheeks C C' and rocks in suitable bearings therein, this rock-shaft being inclined to rotate in the direction of its arrow by the action of a volute spring, W, which is coiled about it and secured as shown in Fig. 4 of the accompanying drawing. A pitman, X, has its lower end pivoted, as shown at *j*, to the arm *i*, and thence rises above the platform A, where it is pivoted to a horizontal rod, Y, this rod in turn being fulcrumed at rear to a post, Z, erected upon the said platform A, the forward extremity of the rod Y terminating in a handle, *k*, which is at such a height as to be readily grasped by the attendant of the carriage.

The brake mechanism herein shown is repeated in duplicate upon opposite sides of the elevator, therefore the explanation of one side will suffice; and it consists of two rectangular twin-shaped and dually-arranged blocks, *l l'*, embracing opposite sides of the slide F or F', and pivoted at each end to one of two oscillating bars, *m* or *m'*, the uppermost one (*m*) of which is affixed to the extremity of the shaft V as a center, and the lowermost (*m'*) fulcrumed to a pin or stud, *n*, extending laterally from the lower extremity of the cheek C or a hanger, C², making part thereof. The space intervening between the two blocks *l l'* when the supports or bars *m m'* are horizontal is

somewhat greater than the thickness of the slides F, and the depression of the hand-lever or rod Y has the effect of forcing these blocks to such a position as to clamp the slide, a suitable stop being combined with the apparatus to prevent the bars *m m'* from being forced beyond a given point. The pressure upon the hand-lever Y leaves the spring W free to act, which it does by partially rotating the shaft in the direction of its arrow, which forces the arms *m m'* into a sloping position, and compels a convergence of the clamps or blocks *l U*, which, by the action of the spring, clamp the slide so firmly as to retain the car at any given altitude while a load is being added or removed, it being presupposed that the attendant, coincident with the act of lowering the handle *k* and releasing the brake, also sets in action the agent which raises or lowers the platform.

The operation of the automatic-stop mechanism above-described, and which constitutes, primarily, thus the third portion of these improvements, is as follows: The depression of the handle *k* by the attendant, in the act of starting the carriage, depresses simultaneously the outer and free end of the arm *i*, and, consequently, partially rotates the shaft V until the brake loses its hold upon the slides, at which time the end of the arm *i* has reached and abuts against the shelf *g* of the hand-lever U, and the platform or carriage begins its journey, either ascending or descending. The carriage continues to travel until the roller S of the bar Q reaches a sloping deflector or inclined plane, A², which is affixed to the column G and in vertical alignment with the roller or its path, this deflector being situated at the extreme top and bottom of the building, or near one of the landings or stopping places of the elevator. Should the attendant, as the carriage reaches a landing or the end of its journey, and the roller S arrives in contact with the deflector A², neglect to lessen or remove the pressure exerted by him upon the handle *k*, the bar Q will be partially rotated by impact with the deflector, and, by elevating the hand-lever U, also elevate the free end of the lever *i*, and permit the shaft V to be partially rotated by the action of the spring W, which compels the brake to seize hold of the slide G and estop the movement of the carriage, as before stated.

The position in which the carriage and its adjuncts stop when arrested by the action of the bar Q and its accessories leaves the said bar and the hand-lever or "cast-off" U in such a situation that the arm *i*, which releases the hold of the brake upon the slide, cannot be depressed, owing to the presence of the shelf *g* of the said hand-lever, which is immediately below the free end of said arm *i*. Therefore, in order to lower this arm the lever or "cast-off" must be thrown backward by the foot of the attendant, and it is proper that a spring, such as is shown at P in the drawing, should be combined with the lever in order to throw the latter forward. Suitable provision also may

be made for throwing the automatic-stop arrangement entirely out of action.

This third part of my invention or automatic-stop motion is not intended to include, as a necessary part thereof, a brake mechanism of any given kind, since various brakes may be employed in connection with such automatic device. Nor do I herein limit myself to the details of mechanism constituting the automatic device herein shown, as I believe myself entitled to any mechanical elements which shall effect a like result, in this instance.

(4.) Fourth. Fourthly, and briefly, I carry out the remaining division of these improvements by attaching to the under side of the platform A a chain, D², the weight of which is such as to counterbalance the weight of that portion of the aggregate suspensories which is disposed upon the side of the drums opposite the platform or its carriage or car. As this last-named portion of the suspensories increases in length and weight with the ascent of the platform, the chain or its substitute increases likewise in length and weight, and by this means I establish, in a simple and inexpensive manner, an equipoise of the platform, or the same and its carriage or permanent load, the result being the same at any point in the journey of the platform.

The first portion of my invention, as hereinbefore explained, is seen to better advantage when employed upon such elevators as have no equipoising agent.

After fracture of a suspensory, the roller P remains wedged fast between the wall of the recess E and the slide F, and requires considerable power to dislodge it; but as a suspensory, if of good material, seldom or never breaks, this liability is of little consequence, as the cylinder or stand-pipe K below the equipoising bucket may contain a greater or less amount of air, or an entire or partial vacuum may exist therein. I propose, if circumstances render desirable, to employ this entire or partial vacuum as a means of arresting the motion of the elevator-carriage should a suspensory break, or should the attendant fail, as hereinbefore stated, to stop such motion on reaching the top or bottom of the building.

In order to secure this latter result a suitable valve may be combined with the stand-pipe, whereby a greater or less amount of air may be admitted to its interior, and this valve may be operated by a mechanism which shall be controlled by the attendant, or by an automatic stop-motion; or the valve may be actuated by a suitable agent placed at the top and bottom of the building, by which the air may be partially or entirely shut out of the stand-pipe and thus stop the motion of the carriage should the attendant fail to do so.

Claims.

1. I claim suspending and operating an elevator-carriage from the bottom or platform thereof, for purposes stated.
2. I claim attaching the several ropes or sus-

pensories of an elevator to the carriage or platform, or the "safety" device thereof, in such manner that a fracture or failure of any one suspensory shall set free the said "safety" device or stop, for purposes stated.

3. I claim the mode herein shown of attaching the suspensories of an elevator-carriage to the said carriage, the same consisting in connecting them to the series of rods, L or L', playing in suitable brackets or housings, and provided with the springs *c c*, or their equivalents, the rods being connected with the "safety" device, and operating as before explained.

4. I claim the combination of the rods L L', supported as explained, and provided with suitable depressing springs, the oscillating levers M M', trippers N N', and rollers P, operating in connection with the recess E and slide F or F', as herein explained.

5. I claim, in combination with the hand-brake of an elevator, a mechanism which shall actuate or put such brake into action to stop the carriage upon arriving at the top or bottom of the building, or a landing or stopping place, for purposes stated.

6. I claim, as a device for effecting the estoppel of the elevator-carriage at a given point, the bar Q, provided or not with its roller S, and pivoted as explained; the hand-lever U, pivoted to it as explained, and provided with the shelf *g* or its equivalent, and operating in connection with a lever which controls the hand-brake; and, finally, the sloping incline A² or its equivalent, the whole operating as explained.

7. In combination with the elevator-carriage or platform and means for raising and lowering the same, I claim the chain D² or its equivalent, connected with the carriage, and arranged so that its length above the platform or support on which its lower end rests shall increase or decrease proportionately with the increase or decrease in the length of the suspensories, substantially as shown and described, in order to counterbalance the weight of the latter during the various movements of the carriage.

Witnesses:

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W. E. BOARDMAN.