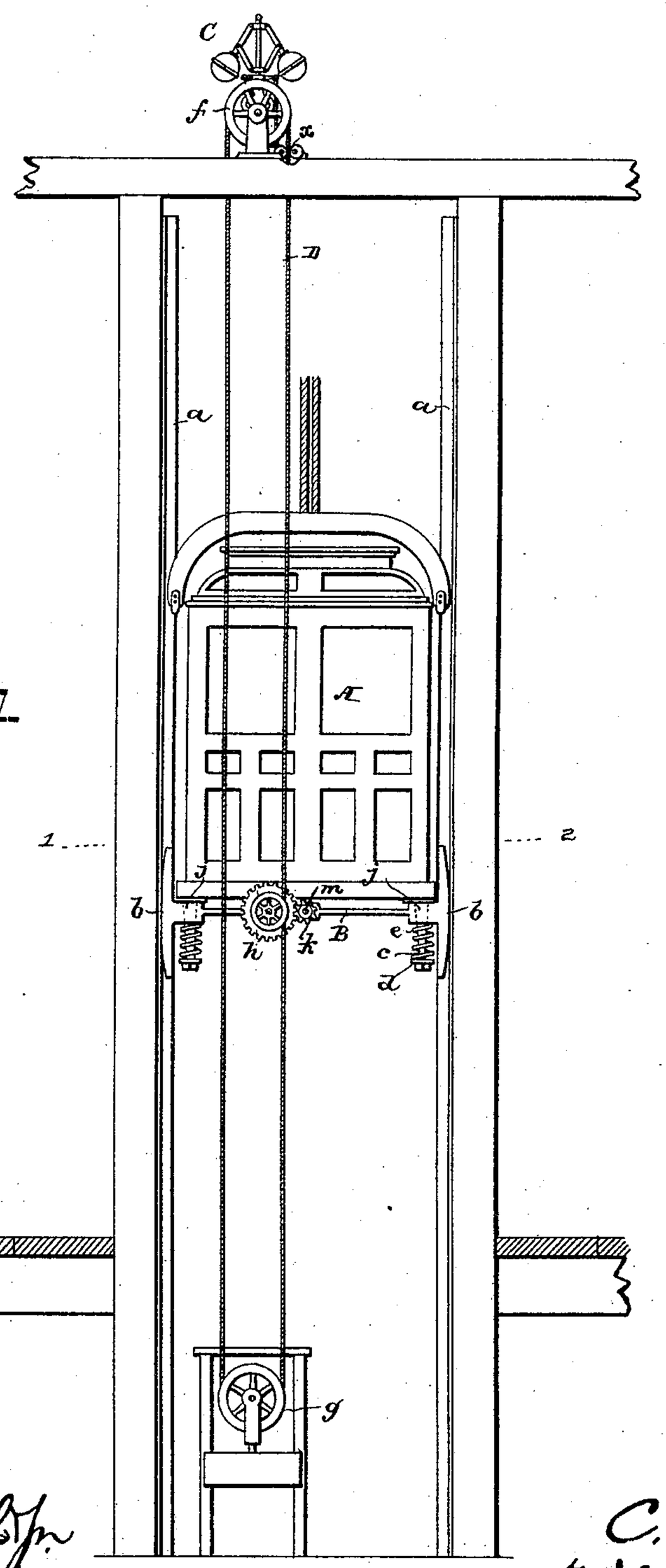
(No Model.) 2 Sheets—Sheet 1.

C. R. OTIS.

SAFETY DEVICE FOR ELEVATORS.

No. 390,032. Patented Sept. 25, 1888.

Fig 1.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

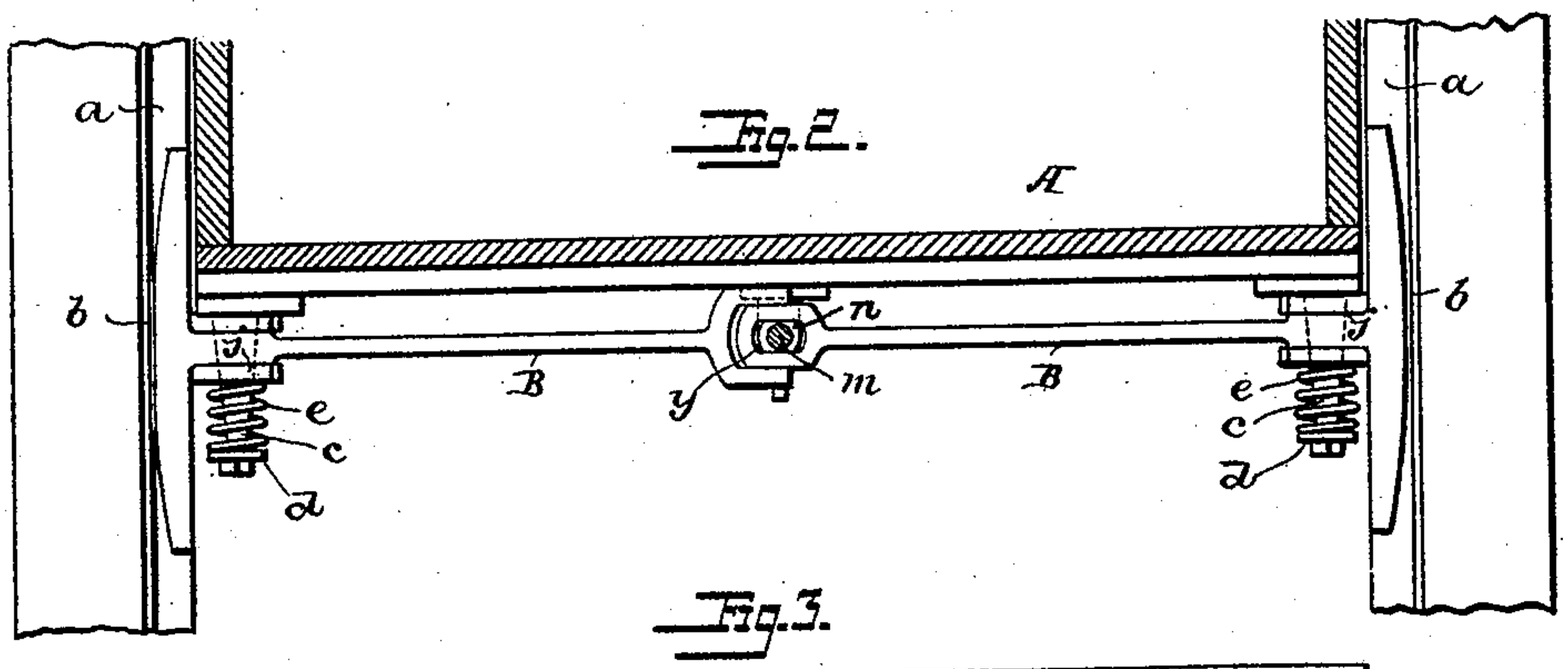


Fig. 3.

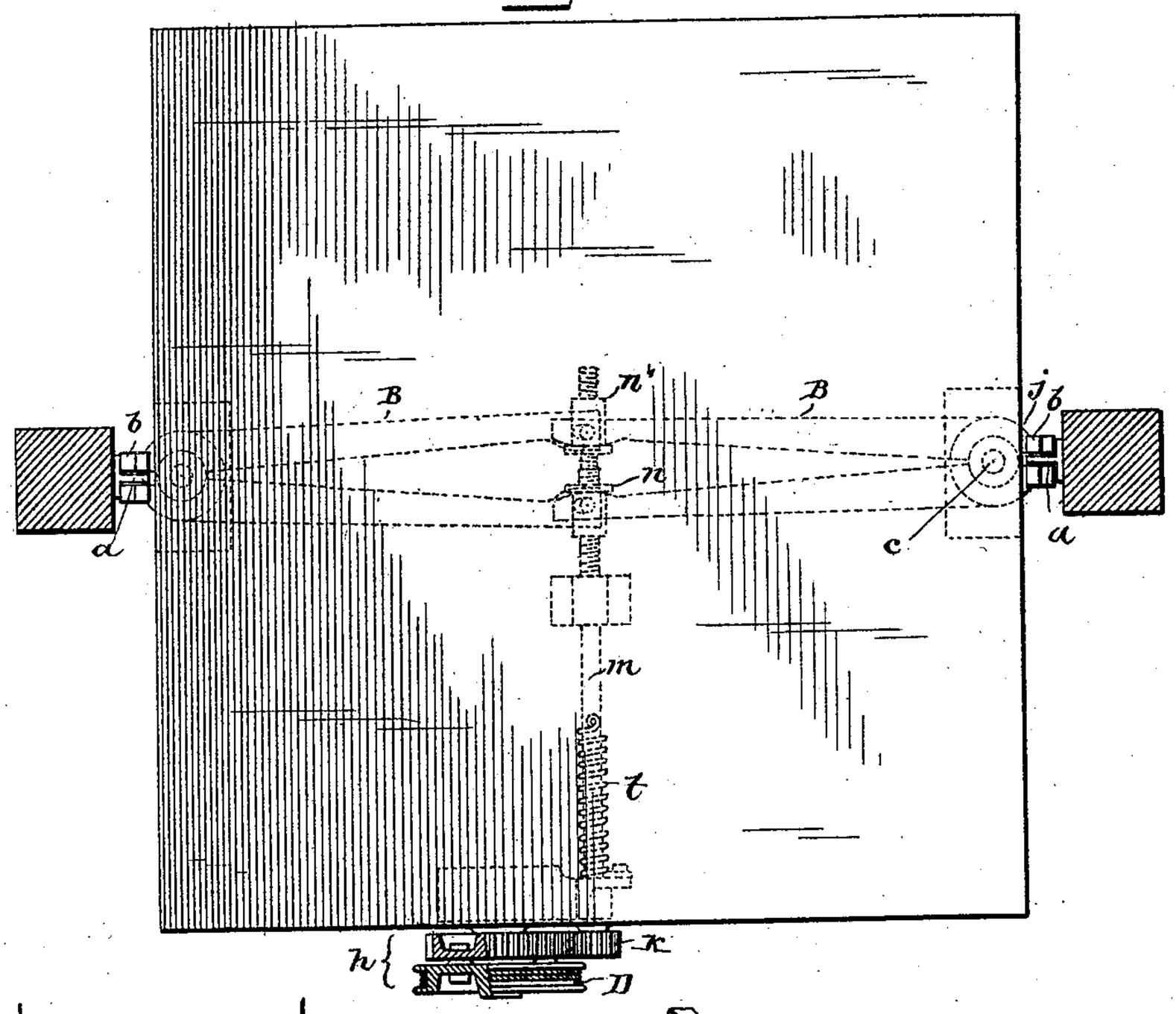


Fig. 5.

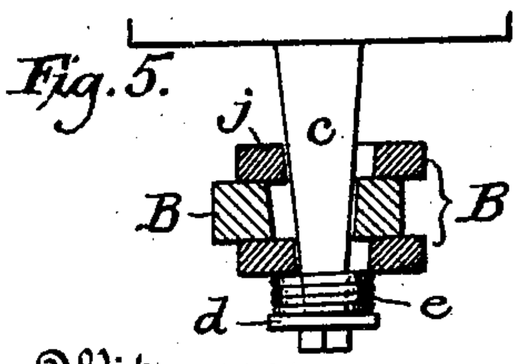
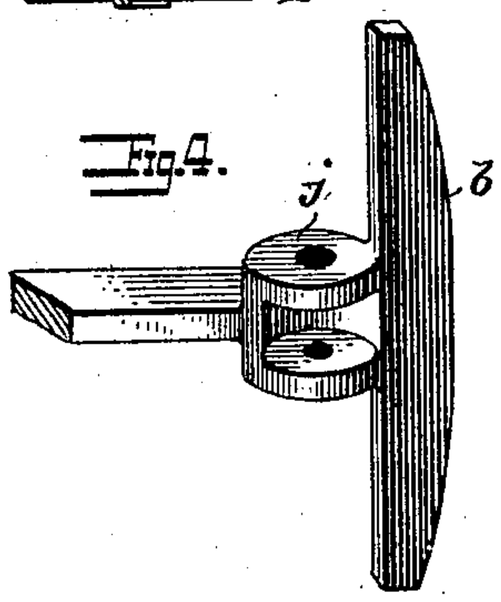


Fig. 4.



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UNITED STATES PATENT OFFICE.

CHARLES R. OTIS, OF YONKERS, NEW YORK.

SAFETY DEVICE FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 390,032, dated September 25, 1888.

Application filed January 10, 1888. Serial No. 260,332. (No model.)

To all whom it may concern:

Be it known that I, CHARLES R. OTIS, a citizen of the United States, and a resident of Yonkers, Westchester county, New York, have invented certain new and useful Improvements in Safety Devices for Elevators, of which the following is a specification.

My invention has for its object to automatically arrest the descent of the cage or platform of an elevator should the speed of descent become excessive from any cause; and my invention consists of certain means, fully set forth hereinafter, for effecting this purpose.

In the accompanying drawings, Figure 1 is an elevation of sufficient of a passenger-elevator to illustrate one character of mechanism embodying my invention. Fig. 2 is an enlarged transverse section of the cage and contiguous parts. Fig. 3 is an enlarged plan on the line 1 2, Fig. 1, the suspensories omitted. Fig. 4 is a perspective view of the jaw end of one of the clamp-levers. Fig. 5 is a cross-sectional view indicating the positions and bearings of the levers on one of the fulcrum-pins when the cage has been lifted while the clamps are applied to the rails.

The main features of my improved device are, first, two pairs of levers carried by the cage; second, clamps carried by the said levers and adapted to grip vertical rails or guides within the well, one rail extending between each pair of clamps; third, an automatic clamp-controller, by the action of which the clamps are thrown into engagement with the rails if the cage exceeds a stated rate of speed; fourth, a releaser whereby the grip of the clamps upon the rails may be automatically released, and, fifth, a restorer consisting of means for resetting the parts in their original position to operate again automatically should circumstances again so require.

The cage A is shown as connected to flexible suspensories to move between rails or guides *a a*, arranged vertically within the well. As shown, each rail is a T rail or bar, the web or central flange of which extends toward the cage. To the cage-platform are suitably pivoted two pairs of levers, B B, constituting the clamp-carriers, each pair terminating in two short jaws, which constitute or carry the clamps *b b*, and between each pair of clamps extends one of the rails *a*.

As shown in the drawings, the clamps *b* constitute parts of the levers, and are curved at the outer edges to prevent contact of said edges with the flanges of the guide-rails if the levers are tilted on their bearings or fulcra, when constructed as hereinafter described.

Clamp-controllers of different constructions known in the art may be employed to insure the gripping of the rails by the clamps should the speed become excessive. In the construction illustrated the controller consists of a screw-shaft, *m*, for actuating the levers, a governor, C, and an endless rope, D, normally traveling with the cage, connected with a driving-wheel, and arrested by the action of the governor when the speed becomes excessive.

The rope passes around the driver-wheel *h*, and also travels under a weighted guide-pulley, *g*, at the bottom of the well and over and drives the governor-pulley *f*, traveling between eccentrics *x x*, which are thrown in by the action of the governor when the speed becomes excessive, so as to grasp the rope and arrest its travel, as is fully set forth in Letters Patent of the United States granted to C. R. Otis, May 25, 1880, No. 228,107.

Different means, obvious to any mechanic, may be employed for moving the levers to apply the clamps by the rotation of the drum or driver-wheel *h*. In the construction shown the wheel *h* gears with a pinion, *k*, on a screw-shaft, *m*, and the ends of the opposite pairs of levers B B are coupled together, as shown, and the screw-shaft passes through nuts *n n'*, carried by the opposite levers, and is provided with two reverse threads adapted to the threads in the said nuts, so that the rotation of the shaft, when the cage descends after the rope is clamped, separates the nuts, and with them the inner ends of each pair of levers, and applies the clamps to the rails, while the reverse motion of the shaft carries the nuts toward each other, brings together the inner ends of the levers, and moves the clamps away from the rails.

The two reverse threads are preferably upon two parts of the shaft *m*, of different diameters, so that one nut, *n*, can be slipped over the reduced part of the shaft onto the thicker part, and the other nut, *n'*, can be applied to the reduced portion, and each nut extends into a slot, *y*, in one of the levers and has a shoulder

which rests against a curved bearing of the lever, the ends of the levers overlapping or forked and one being slotted to receive a coupling-pin projecting from the other, as best shown in Fig. 2.

The application of the clamps to the rail will arrest the cage; but to resume the operation of the latter it is necessary to release the grip of the clamps, and it is most desirable to do this quickly and automatically without the aid of workmen, especially in cases where the clamps have been applied as the result of excessive speed without any fracture or disarrangement of the parts of the apparatus.

As the cage could not descend while the rails are gripped, neither can it be raised during the gripping of the rails if the clamps are immovably connected with the cage. I therefore support the clamps so that the cage can rise slightly independently of the clamps and employ the restorer before referred to for resetting the clamps and their connected parts on the upward motion of the cage; but as the gripping of the clamps upon the rails places a great strain upon the connected devices, and the friction will prevent the restorer from acting, I provide means whereby, when the cage is lifted slightly and while the clamps still grip the rails, such lifting of the cage will loosen the connections between the clamps and the restorer, thereby relieving the parts of the strain and friction and enabling the restorer to act. Thus the loosening of the connections may be effected by a change in the fulcra of the clamp-carrying levers, causing their slight separation sufficient to relieve the strain upon the parts. As shown in the drawings, this is effected by the use of conical pivots or bearings for the levers B B, each of said pivots consisting of a conical pin, *c*, connected at the upper end to the cage, passing through an opening in the lever, and carrying at the lower end a nut or bearing, *d*, between which and the under side of the lever is interposed a spring, *e*, which tends to maintain the lever in position upon that part of the pin having the greatest diameter. When the levers are at the limit of their upward movement on the fulcrum-pins, their bearing-points on the opposite sides thereon are farther apart than when the pins are drawn upward through the levers when the latter are stationary, as results when the cage rises slightly while the clamps are gripped to the rails, the lifting of the cage and consequent separation of the fulcra loosening the strain upon the levers, slightly relieving the bite of the clamps upon the rails, and permitting the restorer to act.

The restorer is shown in the form of a spring, *t*, secured at one end to the shaft *m*, Fig. 3, and at the other to the shaft-bearing or to the platform, so that the spring is put under tension by the turning of the shaft to apply the clamps, and when the rope D is released on the moving of the eccentrics *x x* therefrom, or the frictional stress is removed from the threads of the shaft *m* by the automatic releasing of the clamps from the rails, the spring *t* uncoils and restores the shaft and levers to the first positions in respect to the rails, while the springs *e* lift the levers to their upper position as soon as the bite upon the rails is released.

It will be seen that as each pair of clamps is frictionally applied to bite the rail between them with a gradually-increasing friction, which yet permits a movement of the clamps upon the rails until the cage is arrested, and as this friction is at once released on the upward movement of the cage, I am enabled to get a gradual stop and an automatic release—an effect which is not secured when friction-clamps are used without any restoring device or where serrated eccentrics and like stop devices are used, with the effect of stopping the cage with a sudden jolt that strains the parts and injures the face of the guides.

I claim—

1. The combination, with the rails *a* and cage of an elevator, of clamp-levers carrying clamps arranged to receive the rails between them and constructed and connected with the cage to permit a limited upward movement of the cage independently of the clamps, a clamp-controller whereby the clamps are applied to the rails when the speed of the cage becomes excessive, and a clamp-restorer whereby the clamps are reset to their first position after the strain on the clamps is released, substantially as described.

2. The combination, with the rails *a* and cage of an elevator, of levers and clamps, conical pins secured to the cage and constituting pivots for the levers, a controller for applying the clamps to the rail automatically, and a restorer for resetting the clamps when the grip is released, substantially as described.

3. The combination, with an elevator-cage, of rails *a*, clamps *b*, and levers B, connected with the cage to permit a limited upward movement of the latter independent of the clamps to loosen the grip, an automatic clamp-controller to apply the clamps when the speed of the cage becomes excessive, and a clamp-restorer to reset the levers when the cage is moved upward after applying the clamps, substantially as described.

4. The combination of the rails *a*, an elevator-cage, clamps, clamp-levers and clamp-controllers, and conical fulcrum-pins for the levers, and springs supporting the levers on the thicker portions of the pins, substantially as set forth.

5. The combination of the cage, conical fulcrum-pins secured thereto, clamps, clamp-levers on said pins, and springs supporting the levers on the thickest parts of said pins, and the clamp-controller, substantially as described.

6. The combination, with the cage and clamps, of a threaded shaft carrying nuts connected with the clamps, a driving-wheel con-

nected with said shaft, a traveling rope, and a governor provided with rope-clamps, substantially as described, whereby said wheel is put into operation to turn the shaft when the speed becomes excessive, substantially as described.

7. The combination, with the rails, cage, and clamps, of levers carrying the clamps and supported movably on conical pivots carried by the cage, and a clamp-controller connected with the clamps to apply the same when the speed of the cage becomes excessive, substantially as set forth.

8. The combination, with the cage, clamps, clamp-carrying levers, and clamp-controller, of conical pivots for the levers, supporting-springs, and a restoring-motor, substantially as set forth.

9. The combination, with the cage, clamps, clamp-levers, and driving-wheel thereof, of a traveling rope passing round said wheel, a governor driven by said rope, rope-clamp connected with said governor, and a restoring-spring for resetting the clamps to their normal position, substantially as set forth.

10. The combination, with the clamps and clamp-carrying levers B B, pivoted below the cage, of the nuts, threaded shaft, driving-wheel, traveling rope and governor, and a spring connected with the shaft and with a stationary support, substantially as set forth.

11. The combination, with the cage, clamps, conical fulcrum-pins, and springs, of a driving-wheel connected with said clamps, a restoring-spring, a governor, a traveling rope passing round the driving-wheel and governor-wheel, and rope-clamps connected with the governor, substantially as set forth.

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

CHAS. R. OTIS.

Witnesses:
SIDNEY J. COWEN,
W. D. BALDWIN.