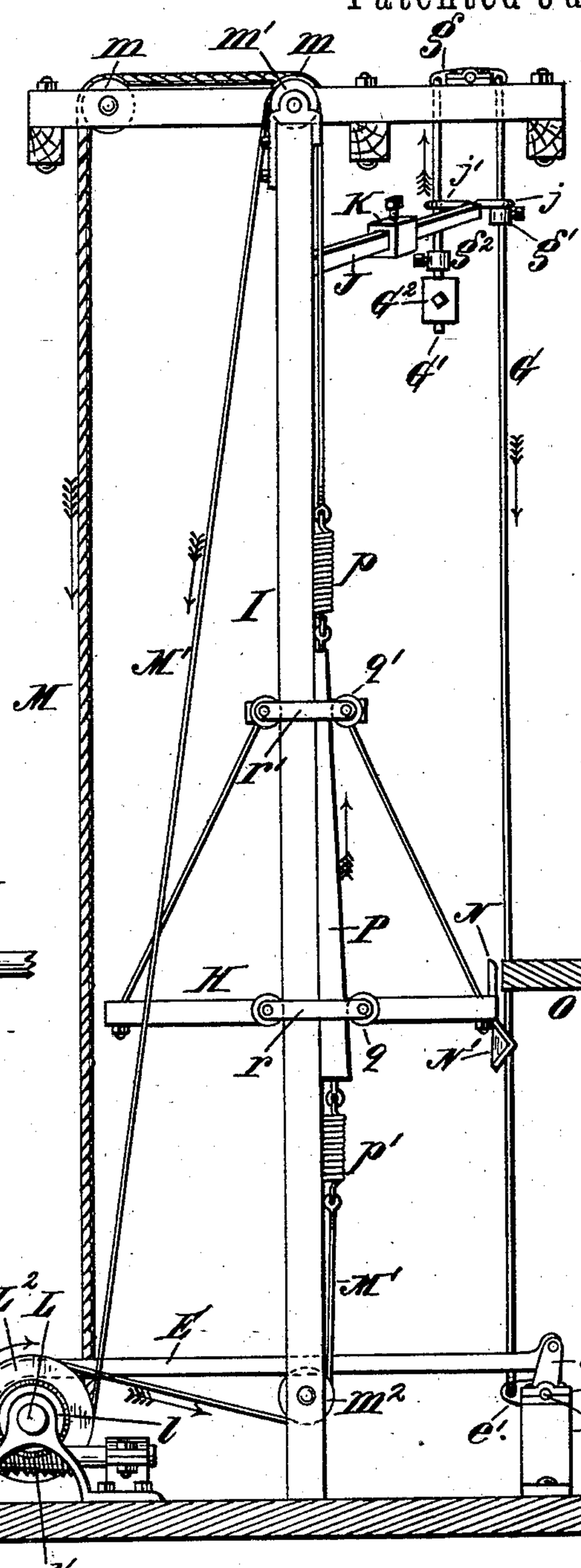
(No Model.) 3 Sheets—Sheet 1.

H. M. & R. F. DARLING.

ELEVATOR.

No. 302,325. Patented July 22, 1884.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

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ELEVATOR.

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Fig. 2.

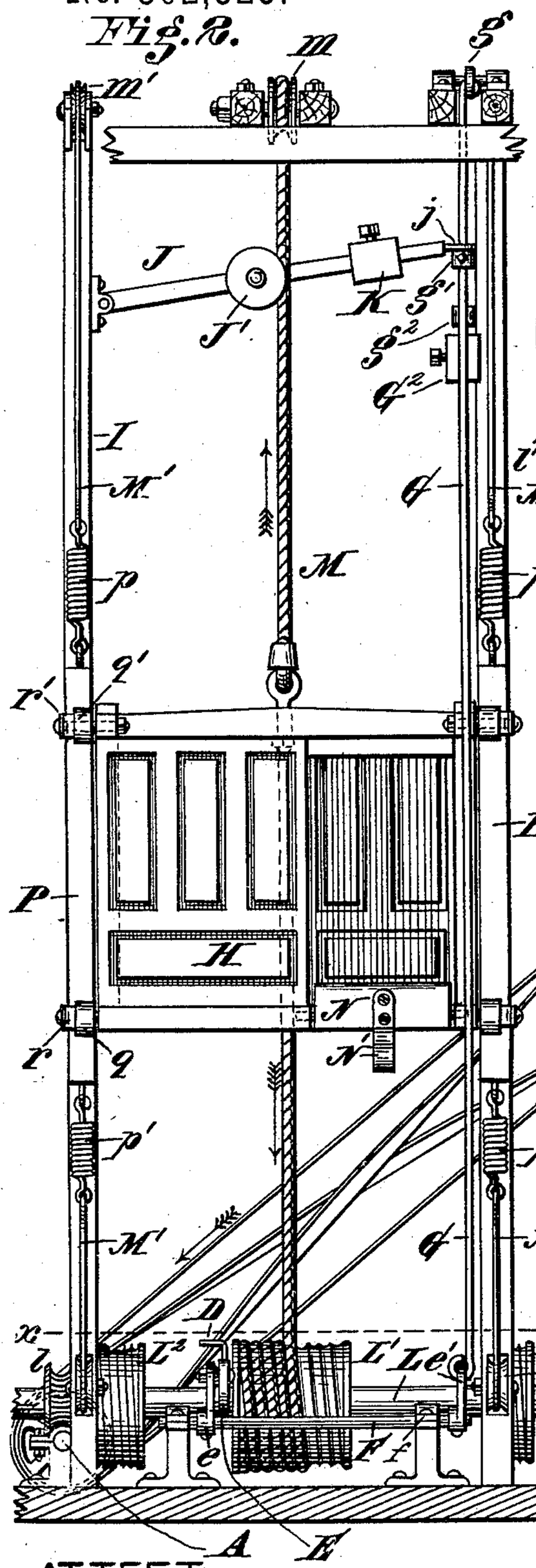


Fig. 3.

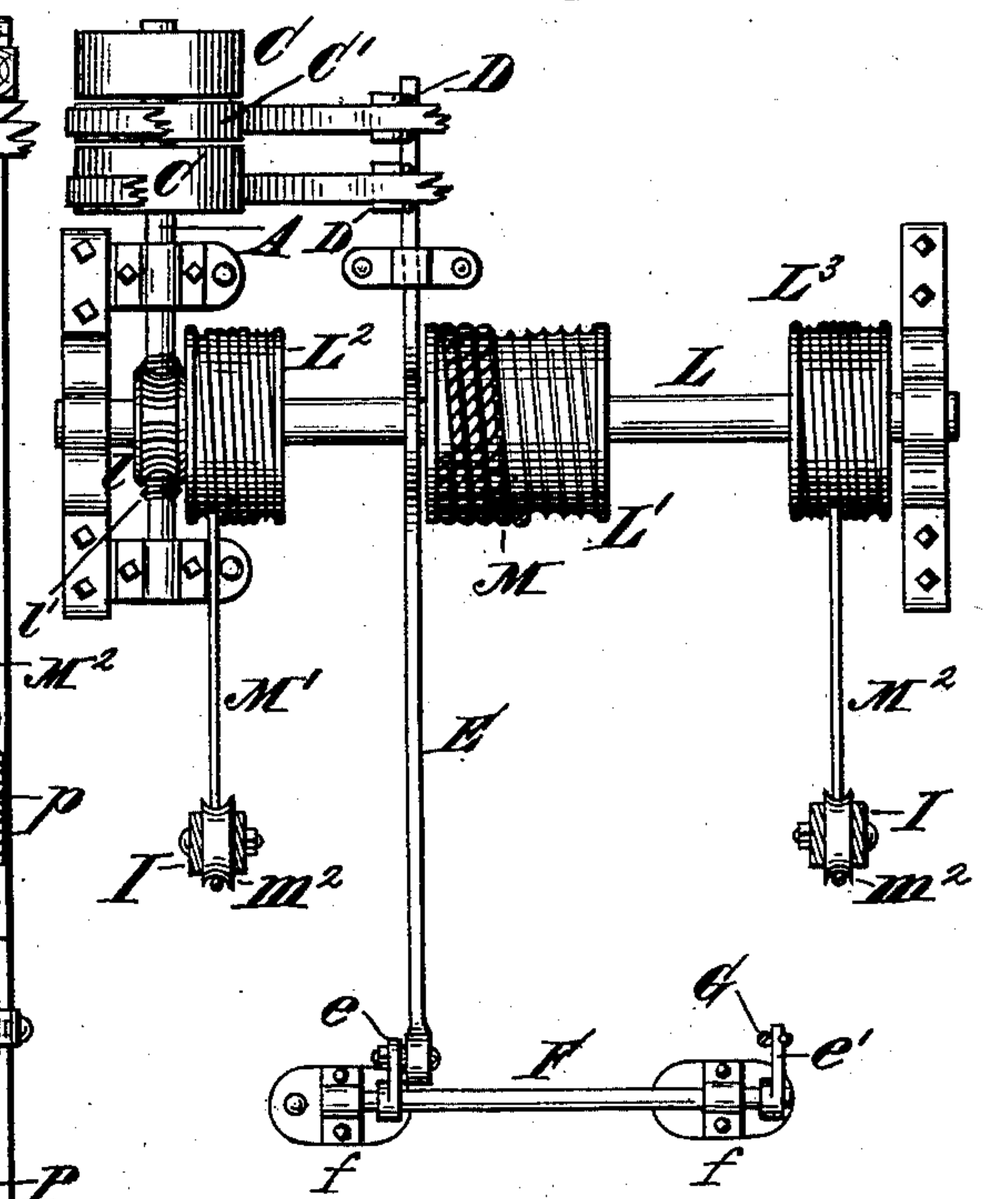
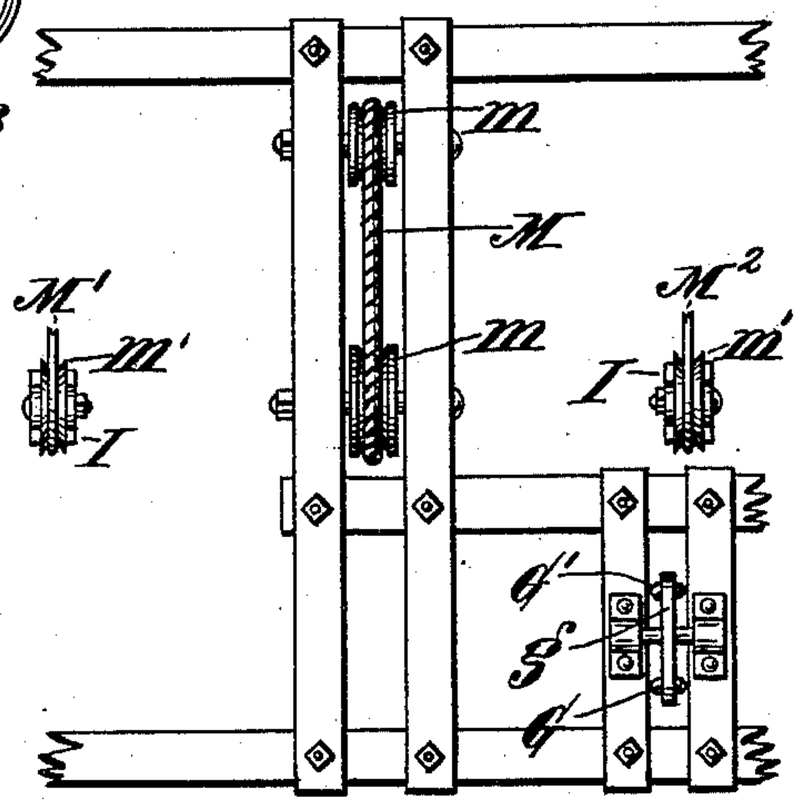


Fig. 4.



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ELEVATOR.

No. 302,325. Patented July 22, 1884.

Fig. 5.

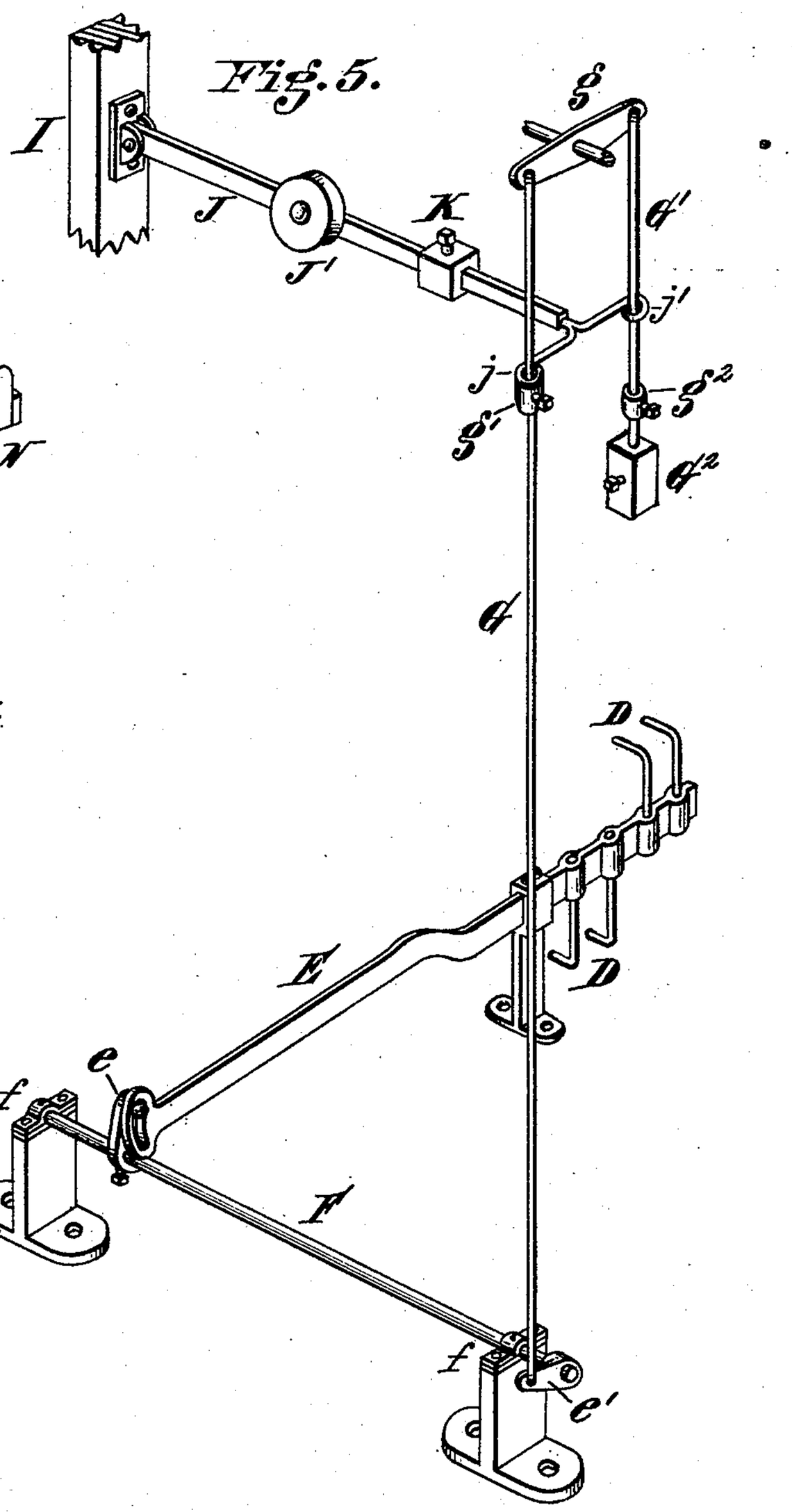


Fig. 6.

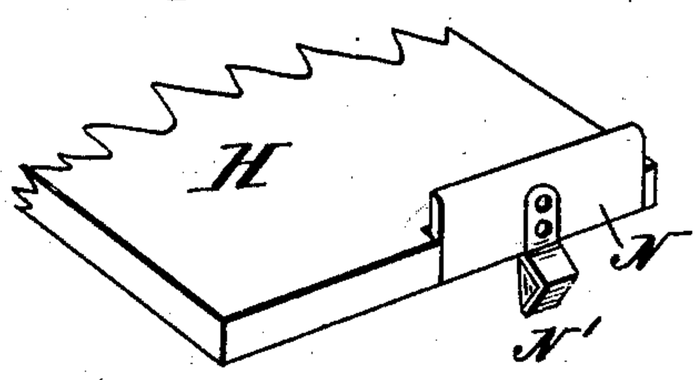
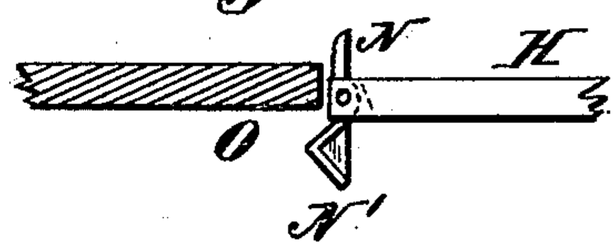


Fig. 7.



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UNITED STATES PATENT OFFICE.

HENRY M. DARLING AND ROBERT F. DARLING, OF LINWOOD, OHIO.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 302,325, dated July 22, 1884.

Application filed June 7, 1884. (No model.)

To all whom it may concern:

Be it known that we, HENRY M. DARLING and ROBERT F. DARLING, of Linwood, Hamilton county, Ohio, have invented certain new and useful Improvements in Elevators, of which the following is a specification.

Our invention consists in a safety device by which disastrous results from the falling of the elevator-car, on the parting of the suspending-cable, are rendered impossible; in a foot-guard, and in an automatic belt-shifter, by which, on the happening of an accident in raising or lowering the car, all further movement of the operative mechanism is prevented.

In the drawings, like letters on different figures indicate the same parts.

Figure 1 is a side elevation. Fig. 2 is a front elevation. Fig. 3 is a cross-section on line *x x* in Fig. 2. Fig. 4 is a top plan view. Fig. 5 is a detail of the mechanism for shifting the belts. Fig. 6 is a perspective view of the foot-guard, and Fig. 7 is a side sectional view of the same.

Between the main driving-shaft A and a counter-shaft, B, over a fixed pulley on the counter-shaft and two loose and one fixed pulley, C C′, on the main shaft, run two belts—one straight and the other crossed—to drive the main shaft in either direction. The fixed pulley C′ is half the width of each of the loose pulleys and a little wider than the belts. Embracing constantly each belt, and adapted to shift the belts when required, are pairs of fingers D. These fingers are attached to a belt-shifter, E, which may be link-connected at the end opposite the fingers to an adjustable crank, *e*, on a rock-shaft, F, or joined to it in any suitable manner. In the drawings this end of the rock-shaft is shown as broadened and slotted to allow play to a pin on the crank *e*, so that the belt-shifter may move only in a horizontal plane, and not have its end tilted up by any movement of the rock-shaft. The rock-shaft (which, with the belt-shifter, is supported on bearings *f f*) carries at its other end a crank, *e′*, (shown in the drawings at substantially right angles to the crank *e*.)

To crank *e′* is pivoted a rod or cable, G, which extends to the top of the elevator-well, where it is pivoted to a rock-arm, *g*, secured to the elevator-frame, and having pivoted to its other end a rod, G′, shorter than G, which supports a weight, G^2, sufficiently heavy to counterbalance the excess of weight of rod G over rod G′; or, instead of rods, we may have an endless cable running over pulleys at the top and bottom of the well, or two cables, each fast at top and bottom to rock-arms. The elevator-car H travels between uprights I I. Hinged to one of these uprights so that it may swing free is an arm, J, on the unsupported end of which are rings *j j′*, adapted to surround the rods G G′, on which, at short distances below the rings in their normal position, are buttons or sleeves *g′* g^2.

K is a weight on arm J.

The main driving-shaft A passes under a drum-shaft, L, on which are three drums, L′ L^2 L^3, and a worm-wheel, *l*, shaft A having upon it a worm or screw, *l′*, which meshes into and drives the worm-wheel, and thereby actuates the drum-shaft.

Coiled around the drum L′ is the main cable M, which passes up to the top of the elevator over pulleys *m m*, and down to the top of the car, to which it is secured in any suitable way, and around drums L^2 L^3, of equal size, are coiled smaller cables M′ M^2, one end of each of which runs over a pulley, *m′*, and down to a coiled spring, *p*, which is fastened to the upper end of a wedge, P, the thickest end of which is at the bottom, the other end of each smaller cable passing under a pulley, m^2, and up to a coiled spring, *p′*, secured to the bottom of the wedge P. It will be seen that while the cables M M′ M^2 run at equal speed on drums of equal size, the elevator-car is raised or lowered by a cable having no connection whatever with the smaller cables, which elevate and depress the wedges. The wedges constantly follow the car up and down, and are always at the same short distance below the car as long as the cables are unbroken. On the top and bottom of each side of the car are pairs of rollers *q q′*, running on studs which are strongly fastened together by yokes *r r′*, which embrace the uprights I, and also the wedges, so that while the wedges are in their normal position the car ascends or descends freely; but when the car drops suddenly, from whatever cause, the wedges are driven tightly in between the rollers and the uprights, and are pressed with such force by the unyielding

grip of the yokes that further movement of the car is prevented until the wedges are again set free; and it is also to be noticed that either the rollers q must be of less diameter than the rollers q', and accurately adjusted to the angle of deviation of the wedges, or else the length of the yoke r' must be correspondingly less than that of yoke r.

On the arm J, about midway its length, is a disk, J′, having a peripheral surface broad enough to allow the main cable M to press against it constantly when said main cable is taut, and thereby elevate it, the horizontal distance from the hinge of the arm to the cable being less than the length of the arm from said hinge to the point on the periphery of the disk farthest from the hinge, that being the only point which touches the cable.

The operation of the elevator is as follows: Supposing the car at the bottom of the well, as long as the belts run on the loose pulleys C C the car will remain motionless. To raise the car the rod G must be pulled up. This pulls the belt-shifter toward crank e, and the fingers on the belt-shifter draw the straight belt onto the fixed pulley, the loose pulley on which the crossed belt still moves being wide enough to let the crossed belt crawl to its edge and not slip off, and by the same movement raises the button g' above the button g^2, this position of the buttons being retained as long as the car is ascending. When the car reaches the top of the well, the direction of its motion may be changed by hand, in the usual manner, by pushing down the rod G far enough to ship the straight belt to the farther edge of the loose pulley C, and the crossed belt onto fixed pulley C′, this action throwing the button g' below the button g^2. All this time the tension of the main cable has held up the arm J. If, while the car is ascending, the main cable parts, (it being noted that the button g' is then above the button g^2,) the arm J falls instantly, and the ring j pushes down the button g' and the rod G, to which it is clamped, until ring j' meets button g^2, when further depression of the rod is thus checked. The position of the buttons on the rods is carefully adjusted, so that at the instant the two buttons are side by side, and the motion of the rod G and of the belt-shifter is stopped, the straight belt has crawled entirely off the fixed pulley, and the main shaft ceases to move. On the other hand, if the car is descending when the cable breaks, (the button g^2 being above the button g',) the arm J falls as before; but the ring j' first encounters its button g^2, and the rod G is pulled up until button g' meets ring j, at which moment the crossed belt will have just crawled off the fixed onto its loose pulley. The weight of rod G′, with the counter-balance which it carries, being just equal to the weight of rod G, the full power of weight K goes directly to push or pull the belt-shifter, and is preferably but slightly in excess of the inertia of said belt-shifter. It will be seen that the instant the main cable breaks the car falls through the short distance that intervenes between the rollers and the outer surface of the wedges, and is held fast, while the actuating-belt is not unshipped from the fixed pulley until arm J has fallen through one-half of the space between the ring j and the button g', (seen most clearly in Fig. 5,) the belt being not instantly unshipped, but having to crawl off the fixed pulley.

In order to avoid the danger resulting from the above of breaking the smaller wedge-supporting cables the coiled springs p p' are introduced, as hereinbefore mentioned.

Another feature of our invention is the automatic foot-guard, which is most clearly shown in Figs. 6 and 7. This consists in a hinged platform, N, carrying a weight, N′, which has a bulging or angular face turned away from the car. In its normal position this platform will be held vertical and prevent a careless or inadvertent passenger thrusting his foot beyond the edge of the car-floor, where it might be caught and crushed between the car-floor and a landing. As the car reaches a landing, O, the outer edge of the landing, or a suitable stop thereupon, comes into contact with the upper face of N′ and slides up the same, forcing the platform, which extends across the entire doorway, down over the space intervening between the car-floor and the landing, affording unimpeded ingress and egress. When the edge of N′ passes the landing, the platform regains its normal upright position. On the descent of the car the operation of the foot-guard is the same, except that the lower inclined face of N′ first meets the landing.

We claim—

1. As an improvement in elevators, an automatic device for stopping the main lifting-shaft, consisting of a belt-shifter coupled to an actuating rod or rods, and a weighted arm engaging with stops on said rods, and thereby operating said rod or rods, substantially as described.

2. The combination, with the supporting-cable of an elevator, of a weighted arm pivoted to play in a vertical path, and normally upheld against said cable by engaging therewith at a point between the weight and the pivot, substantially as described.

3. In combination with the actuating-rods of an elevator, a pivoted weighted arm playing on said rods and engaging with stops thereon, said arm being upheld by the main cable, and allowed to fall by the breaking of said cable, substantially as described.

4. The combination, with an elevator-car and its supporting-uprights, of a drum-shaft driven directly from the main shaft and carrying drums which actuate the main cable and the cables which support the safety devices, said safety devices moving constantly under the car, but not attached thereto.

5. The combination, with locking devices

carried with the elevator-car and thrown into action by the severing of the supporting-cable, of a pressure-arm released by the severing of said cable, and thereupon operating shifting mechanism, whereby the cable carrying the locking device is released, substantially as described.

6. In combination with the main supporting-cable and a weighted arm upheld thereby, actuating-rods fitted with stops to engage with said weighted arm, a rock-shaft, and a belt-shifter adapted to shift the belts operating the cables from fast to loose pulleys when the main supporting-cable breaks, substantially as described.

7. The combination, with the main supporting-cable and a weighted arm upheld thereby, of wedges driven by cables independent of the main supporting-cable and constantly following the elevator-car, and of actuating-rods fitted with stops to engage with said weighted arm, a rock-shaft, and a belt-shifter fitted with fingers and adapted to shift the belts operating the cables from fast to loose pulleys when the main supporting-cable breaks, substantially as described.

8. The combination, with the wedge-supporting cables, of springs adapted to prevent the breaking of said cables when the main supporting-cable breaks, substantially as described.

9. The combination of the wedges, the rollers and yokes, and the springs, substantially as described.

10. The foot-guard consisting of a pivoted platform balanced to an upright position, which it assumes when the car is passing between the floors, and thrown to a substantially horizontal position at the landings, substantially as described.

11. The combination, with the floor of an elevator-car, of a hinged platform and a depending weight having inclined faces engaging with suitable stops at the landings, and thereby leveling said platform, substantially as described.

12. The combination, with an elevator-car, of a pivoted platform balanced to an upright position, and having depending therefrom a cam, which, by its contact with stops at the landings, levels said platform to bridge the space between the elevator-floor and the landing-floor, substantially as described.

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