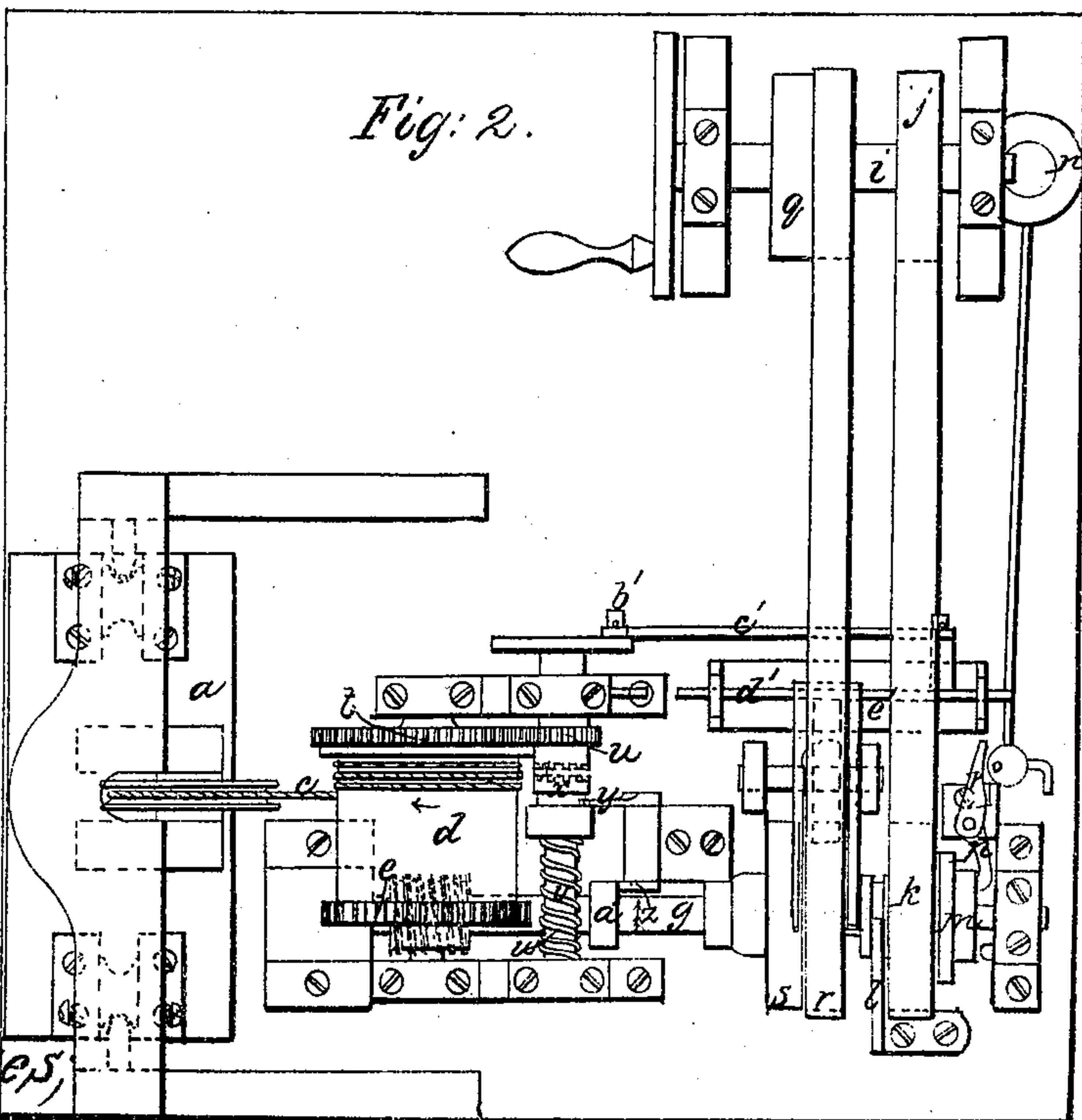
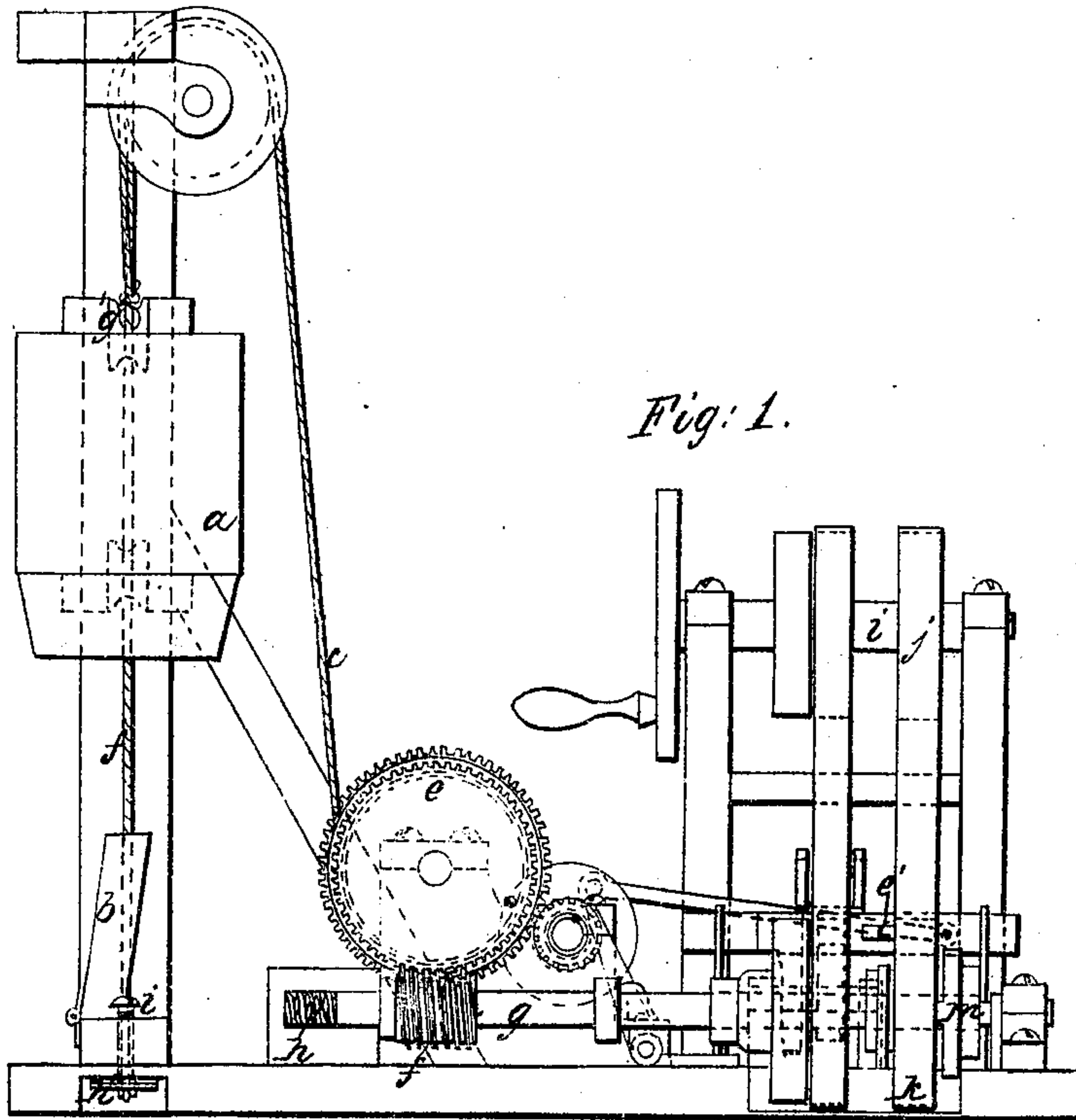


Otis Tufts, Jr.

Elevators.

No 87,083.

Patented Feb. 16. 1869.



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UNITED STATES PATENT OFFICE.

OTIS TUFTS, JR., OF BOSTON, MASSACHUSETTS.

IMPROVED ELEVATOR.

Specification forming part of Letters Patent No. 87,083, dated February 16, 1869.

To all whom it may concern:

Be it known that I, OTIS TUFTS, Jr., of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Elevators; and I do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of my invention sufficient to enable those skilled in the art to practice it.

This invention consists in certain new and useful improvements in elevators, by which, if the car is checked or stopped by an obstruction during its descent, the rotations of the drum which unwind the elevator-rope or chain are also stopped, preventing such slackness of the suspensory as might cause its entanglement in the mechanism, or might cause its injury by kinking. If the unwinding operation of the drum continued long enough, the rope or chain would wind up again on the drum in the opposite direction, which might cause several kinds of accidents, which it is not necessary herein to describe in detail; but by causing the rotations of the drum to cease automatically upon any slacking of the suspensory, liability to accidents from the obstruction of the car in its descent is avoided; and my invention further consists in the employment of tightly-strained wire ropes for guides or ways in steadying the movement of the elevator car or platform in its ascent and descent, the ropes being located within the hatchways cut through the floors of buildings, and being stayed at the floors from deflection, such guides being cheaper than, and in many respects preferable to, the timber ways or guides now used.

Figure 1 represents in side view, Fig. 2 in plan, and Fig. 3, in end view, an elevator apparatus embodying my invention, in which—

a represents the car or platform, and *b* an obstruction, which, when present, will check the descent of the car and take off the strain of its weight from the rope *c* and the drum *d*. Said drum has at one end a worm-gear, *e*, which meshes into the worm *f* on the shaft *g*. Rotation of said shaft in the direction of the arrow thereon marked will turn the drum *d* as indicated thereupon, which will wind up the rope and elevate the car, the strain of the car on the rope acting, through the drum on

the worm, to keep the worm-shaft *g* pressed against a spring, *h*, which will react to move the shaft *g* endwise when the stress is taken off of the worm by reason of the slackening of rope *c*, caused by lodgment or obstruction of the car in its descent. It is this endwise movement of the shaft *g*, made by the spring *h*, consequent upon the slackening of the suspensory *c*, that I utilize as a means for automatically stopping the unwinding rotations of the rope-drum by causing said endwise movement to actuate other devices, which I now proceed to describe.

The shaft *i* may represent a main shaft in buildings, revolving constantly in one direction; or it may represent the shaft of a steam-engine, which may have its rotation reversed, so as to turn in either direction.

When shaft *i* is an engine-shaft, the pulley *j* is belted directly to the pulley *k*, which turns freely on shaft *g*, and is kept from endwise movement thereon by the fork *l*, which engages in a groove formed on a neck making part of said pulley.

On shaft *g* is fixed a coupling, *m*, which turns and slides with shaft *g*, so that when the strain of the car is on the worm, keeping the worm up toward and compressing spring *h*, the clutch is coupled with the pulley, so that rotations of the pulley must turn shaft *g*, and will lift or lower the car, according as the engine may turn shaft *i* in one or the other direction. But if the car, in descending, is stopped so as to slacken the rope, then the spring *h* reacts, and in moving endwise shaft *g* throws out of gear with pulley *k* clutch *m*, so that pulley *k* revolves loosely on shaft *g*, which, in consequence, stops, being no longer driven by the engine, which merely keeps on turning the loose pulley *k*, and the unwinding of the rope is stopped.

The engine may be stopped or may have its direction of motion changed by manipulation of connections from the car, which are not shown herein, as such connections are now well known. But if it is desired to have the movement of the engine stopped automatically, consequent upon the slackening of the rope, it may be done as follows:

In the pipe which supplied steam to the engine-cylinder *n* is located a check-valve, *o*, which is kept open by a weight or projection

on the valve-stem resting on one end of a pivoted arm, *p*, which remains under the projection from the valve-stem, upholding the valve till the arm is moved away from such projection, consequent upon motion of shaft *g* produced by spring *h*, the other end of arm *p* abutting against cam *m* or other projection from shaft *g*, which moves endwise with it.

This device for stopping the supply of steam to the engine may be used alone for stopping the unwinding rotations of drum *d*, or it may be used in combination with the uncoupling arrangement shown.

While the valve represented is of the ordinary puppet kind, operating by merely falling upon its seat, other kinds of valves which operate by turning or sliding could be employed, the movement of lever *p* operating in such case to cause a weight or a spring to move the valve to shut off steam.

Assuming shaft *i* to be a constantly rotating shaft in a building in which the elevator is located, I will now trace the mechanism and its mode of operation, by which slackness of the suspensory automatically stops the drum *d* from unwinding.

On shaft *i* is a drum, *q*, from which is driven a belt over either the tight pulley *r* or the loose pulley *s*.

When shaft *i* revolves in but one direction, as is most commonly the case, the drum *q* should carry a cross-belt as well as the open belt shown, and there should be another loose pulley located on shaft *g* on the other side of tight pulley *r*, in the manner well known to machinists, for producing rotation of the driven shaft from a driving-shaft turning in one direction.

On the drum *d* is fixed a gear, *t*, meshing into a pinion, *u*, loose on shaft *v*. On said shaft is splined a coupling, *x*, so as to turn with the shaft and slide thereon, the coupling being constantly pressed by spring *w* toward its counterpart made on the pinion.

There is a groove made in the coupling *x*, into which one end of an arm, *y*, on a rocker-shaft projects, another arm, *z*, on the same rocker-shaft abutting against a collar, *a'*, on shaft *g*.

On one end of shaft *v* is a crank-pin, *b'*, which, by link *c'*, is connected to a belt-shipper bar, *d'*, provided with suitable projections therefrom to ship the belt from the tight to the loose pulley, or vice versa, or to ship both the open and cross belts, when both are used, as is most commonly the case.

It will be seen that while the arm *y* is engaged in the groove of the coupling, rotation of drum *d* will simply rotate the loose pinion *u* on shaft *v*; and it will also be seen that if, by obstruction of the car in its descent, the suspensory slackens so as to allow spring *h* to move shaft *g* endwise, the collar *a'* will throw rocker-arm *y* out of the groove in the coupling, so that spring *w* will move coupling *x* endwise on shaft *v* into gear with pinion *u*, thereby causing rotative movement of crank-

pin *b'*, which will ship the belt from the tight to the loose pulley *s*, thereby causing the rotations of shaft *g* and drum *d* to cease. To cause such rotations to cease quickly a brake may be applied to the tight pulley *r*, such brake being applied in the form of a pivoted bent lever, one arm of which is fitted to the curvature of the pulley, the other arm being actuated by contact therewith of an incline or wedge, *e'*, on the shipper-bar.

When the obstruction to the descent of the car has been removed the clutch *x* is drawn back out of gear with pinion *u*, and is locked by placing arm *y* in the groove in the coupling. Then the shipper-bar may be operated to throw either the open or the cross belt upon the tight pulley *r*, to cause the movement of the car up or down, as may be required.

For guiding the car I make use of wire ropes *f'*, stretched taut from the top to the bottom of space through which the car moves, the car or platform being provided with grooved friction-wheels *g'*, which turn by contact with the ropes. At one end of each rope I make provision for taking up stretch by wear and to keep the ropes taut at all times. I prefer to do this by connecting the ropes to stout springs, the strain of which can be adjusted by screws or equivalent means. The spring shown in the drawings is located at the bottom of the ropes, and is marked *h'*, the adjusting-screws being denoted by *i'*.

At intervals along the length of the guiding-ropes—say at the floors of the building, or oftener, if desired—the ropes are stayed from deflection by struts *j'*.

While I have described the screw or worm and its shaft as the means for rotating the drum which winds and unwinds the suspensory, it will be evident that in elevators in which the drum is rotated by other means the worm and its shaft, with the spring or its equivalent, might be so applied as to rotate with the drum, though not intended to drive the drum, in which case, as well as in the application of the worm and its shaft, as shown in the drawings, slackening of the suspensory would allow the spring to move the worm-shaft endwise and produce the result of stopping rotation of the drum, as set forth.

I claim—

1. In an elevator, such a combination of a spring or its equivalent with a shaft having a screw or worm thereon meshing into gearing connected with the winding-drum as will, on the slackening of the suspensory, operate to move the screw and its shaft endwise and cause a cessation of the rotation of the drum.
2. Also, for guiding an elevator car or platform in its movement, the combination therewith of wire ropes with mechanism for keeping the ropes taut, substantially as described.

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Witnesses:

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