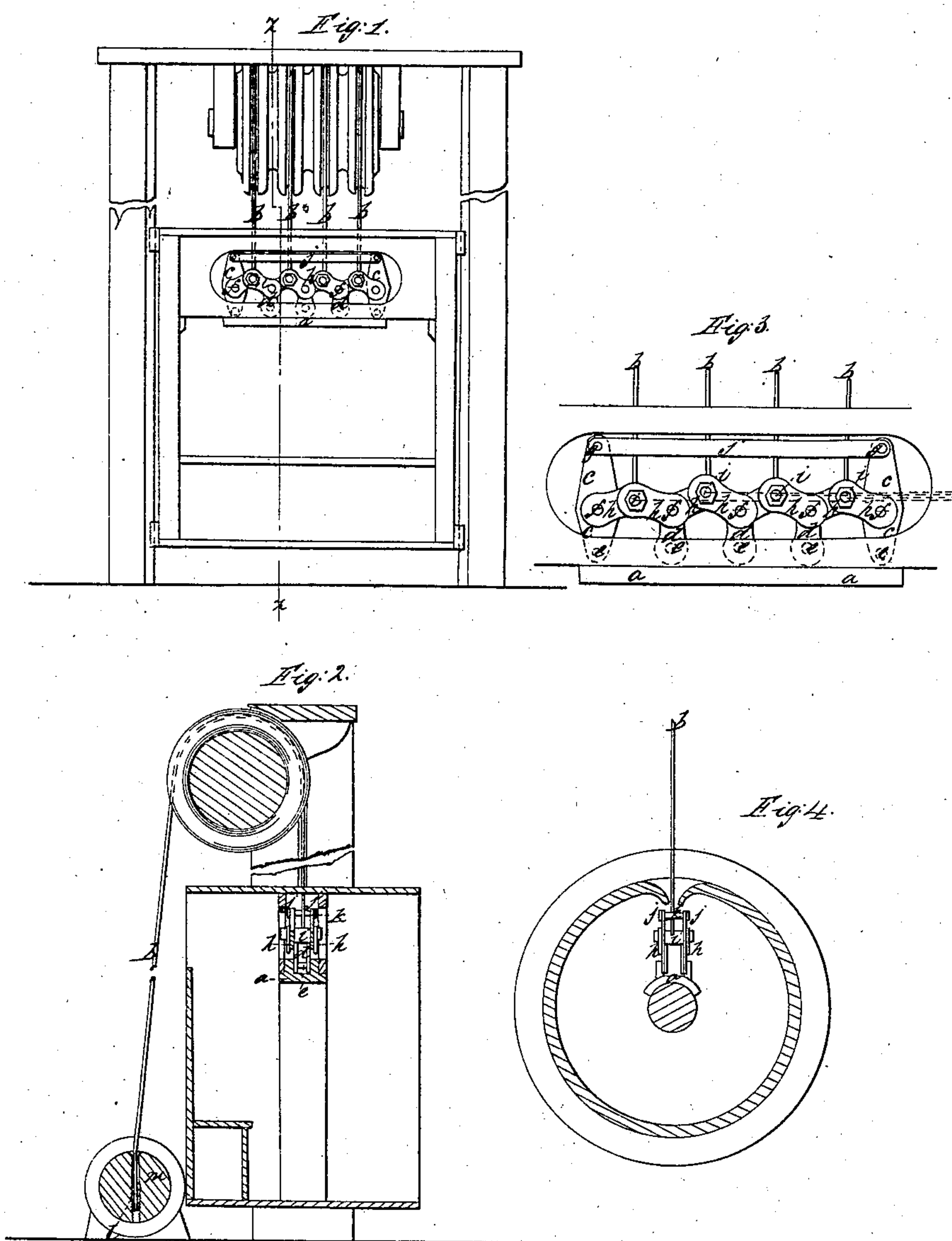


No. 60,442.

PATENTED DEC. 11, 1866.

O. TUFTS.
ELEVATOR.



Witnesses:

W. B. Gleason
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IMPROVEMENT IN ELEVATORS.

OTIS TUFTS, OF BOSTON, MASSACHUSETTS.

Letters Patent No. 60,442, dated December 11, 1866.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, OTIS TUFTS, of Boston, in the county of Suffolk, and State of Massachusetts, have invented an Improvement 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 practise it.

This invention relates to improvements upon my invention patented May 28th, 1861, in such elevators as make use of a car guided between ways and suspended from its upper end by two or more ropes or chains, which have the ends of each separately attached to the top of the car and to the winding drum. And my herein described invention consists in a peculiar arrangement of pivoted links herein described, operating automatically to equalize the strain upon a series of ropes or chains, attached each by one end, separately thereunto, primarily and secondarily thereby to the top of a guided and suspended elevator car, and each by the other end to a winding drum.

The object of my invention is the same as that of the strain-equalizing device described in my aforesaid patent, but the construction of the within described device being different, and to a considerable extent better and cheaper for some purposes, it is herein claimed as an improvement.

Figure 1 of the drawings shows in front view an elevator embodying my invention.

Figure 2 is a vertical central section taken in the plane of the line *z z*, fig. 1.

Figure 3 is an elevation of my improved automatic adjuster of the strain on the tensile supports, the scale being larger than that shown in fig. 1; and

Figure 4 is a detail introduced merely to show how the automatic strain adjuster may be located at the drum, instead of at the top of the car, though I would remark that such a change is not accompanied with any beneficial results.

The 1st and 2d figs. of the drawing show plainly the general arrangement of an elevator, in which the car is guided by ways, and is suspended from its upper end by a series of ropes or chains which pass over a guiding pulley to a winding drum, all of which forming no part of my present invention, will not be more particularly referred to herein.

Pivoted to a suitable casting, *a*, which is securely fixed at the top of the car, is a series of double or opposite links, exceeding in the number of pairs thereof the number of suspending ropes or chains, *b b b b*, by one. Of these links the extremes, *c c*, of the series are longer than the intermediates, *d d d*, which have but two pivot centres, *e* and *f*, while the extremes have three pivot centres, *e*, *f*, and *g*. Each of the centres *f f f f*, are connected with each of the adjoining centres *f*, by pairs of links, *h h h*, said links also taking hold of cross-connecting bars, *i i i i*, on which the links *h* pivot, each of said bars serving for a point of attachment of one end of one of the ropes *b*. The tops of the links *c c* are united by a pair of connecting links, *j*, pivoted at *g g*, and acting as a strut or brace to keep the extreme centres *f* from approaching each other under the strain upon the ropes or chains *b b b b*. The arrangement of all of these links in pairs enables me to connect the ropes *b b b b*, centrally between them to the bars *i i i i*, and the pair of links *j*, are so united by studs *k*, that they act together as one link with the ropes passing between its two parts.

The operation of this apparatus is as follows: If all the ropes are of an exact length from the points where, as tangents, they touch the periphery of the winding arm, to the points of their attachment to the bars *i i*, and if there is the same strain on each rope or chain, then the angles formed by the links *h* will all be equal to each other, and the links *c d d c* will be vertical. Suppose, now, one of the ropes to shrink or to shorten from any cause, it is evident that it will either sustain the whole weight of the car and its contents, leaving the other ropes slack, or else that the links *h* will so move as to bring an equal stress on all of the ropes. The latter will be the case, as it is clear that the links *h*, embracing that piece *i* which receives the shortened rope, will form a more acute angle by rising, which act causes the other links *h* to descend and form more obtuse angles, while the links *d* will swerve from their vertical position toward the shortened rope, and the strain on all the ropes will be thus automatically adjusted to an equal strain on each. If one of the ropes stretches, then the links which are connected to those pieces *i*, to which the other ropes are attached, rise, while the links attached to the piece *i* which receives the lengthened rope fall, the links *d* inclining from the lengthened rope, and the strain,

is automatically adjusted on all the ropes provided, as also in the previous instance, that the change in the condition of the ropes is not too great for the range of action of the adjusting mechanism. When one or more of the ropes break, then the car falls till the links *h*, attached to the piece or pieces *i*, receiving the broken rope or ropes, assume a horizontal position, the other links *h* forming smaller angles than before such breakage, and the stress will then be automatically transferred equally to the ropes remaining whole. The object of pivoting the links *c* at the bottom, as the links *d* are pivoted, is to allow the whole system of links to sway from right to left, or vice versa, according as the tendency of the draught of the ropes inclines the system to move with reference to the centre of gravity of the suspended car. Except for the advantages derived from the swinging movement of the entire system of links, the extreme links *h* might be pivoted to immovable supports, and yet the system so modified would operate as described in respect to automatically equalizing the strain on the ropes or chains. As the range of motion of the parts of the described apparatus is but comparatively small, and as it is necessary for its operation that the length of the ropes should be such as to cause the links *h* to assume about a medium position between those extremes of movement which, under the contemplated contingencies in practical operation, they may be caused to make, so that under changes of the conditions of the ropes or chains any of their points of attachment, *i i i*, may be free to move up or down, it is extremely desirable to combine with an automatic adjuster of the strain upon the tensile supports, some convenient means for so adjusting, by manipulation, the length of such supports, as that thereby the automatic adjuster may itself be adjusted as to the position of its parts, to bring them to a mean of the extremes of their limit of motion. This I accomplish as follows: Each rope or chain *b*, forming one of the tensile supports of the guided and suspended car, is attached to the winding drum *m*, as follows: Tubular screws, *z*, are made, through which the ropes or chains *b* can pass, and to which they are secured by enlargements thereof, which cannot pass through the bore of the screws, which by turning, can be adjusted in the drum relative to its periphery, thus lengthening or shortening the effective winding length of the tensile supports, so that the centres of the pieces *i i i* may all be brought to the same line, from which they depart on account of various reasons, in the actual use of the elevator, causing the said centres to assume positions not in the same line or plane, as illustrated by red lines in fig. 3.

I claim, for the purpose of automatically adjusting the strain upon the ropes or chains *b b*, the mechanism herein described, when arranged to operate substantially as specified.

Witnesses:

J. B. CROSBY,
W. B. GLEASON.

OTIS TUFTS.