No. 684,390. Patented Oct. 8, 1901.

I. H. VENN.

ELEVATOR APPARATUS.

(Application filed Dec. 9, 1899.)

(No Model.) 2 Sheets—Sheet 1.

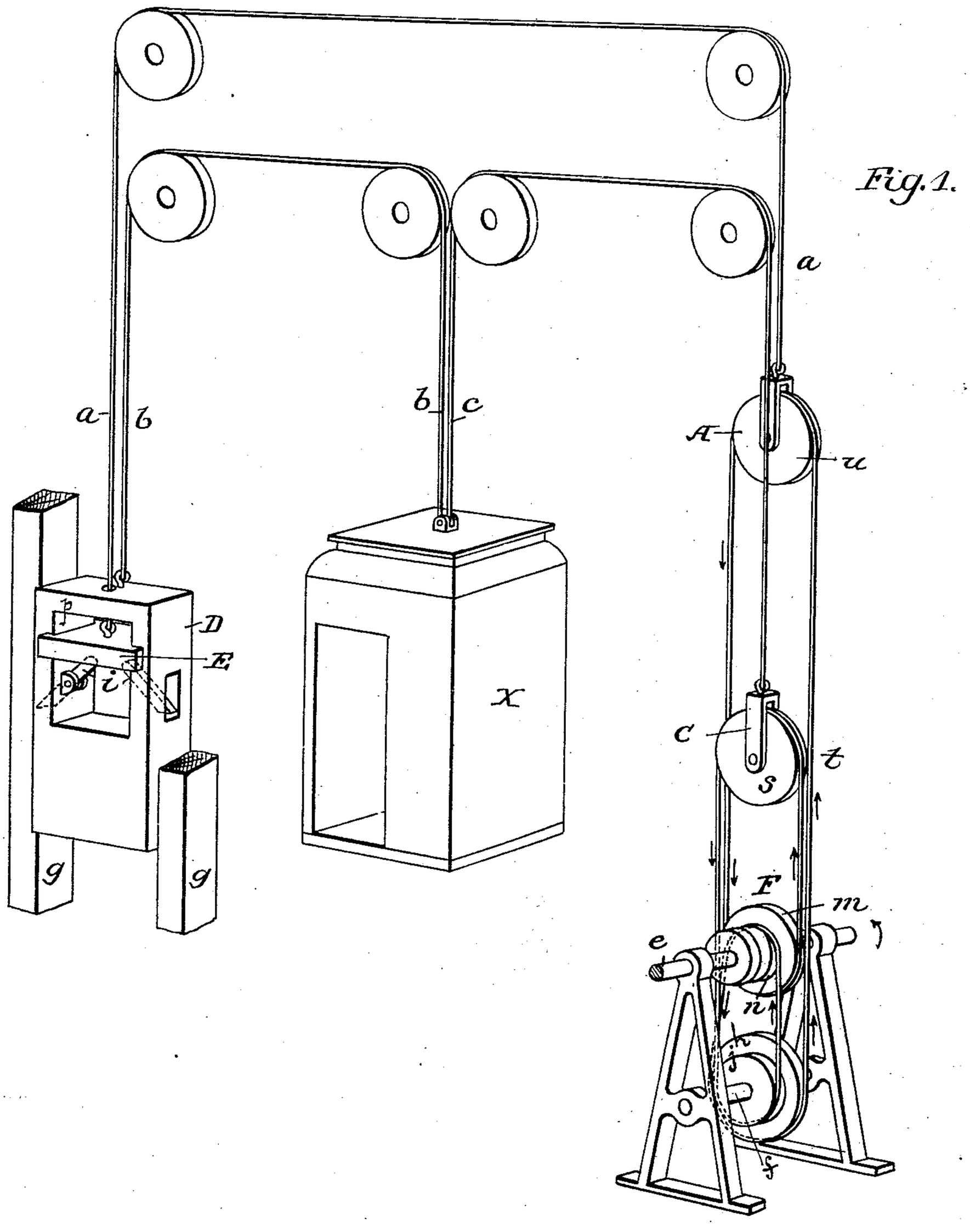

Fig. 1.

Witnesses
J. G. Hinkel
H. M. Gillman, Jr.

Inventor
Isaac H. Venn
by Fowler Freeman
Attorneys

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Fig. 3.

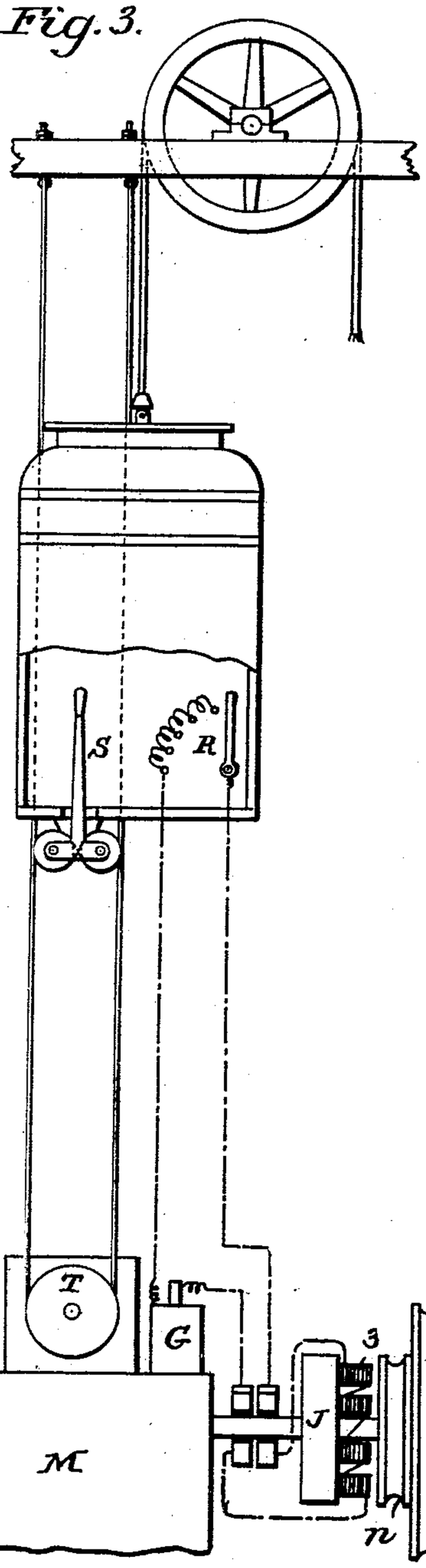
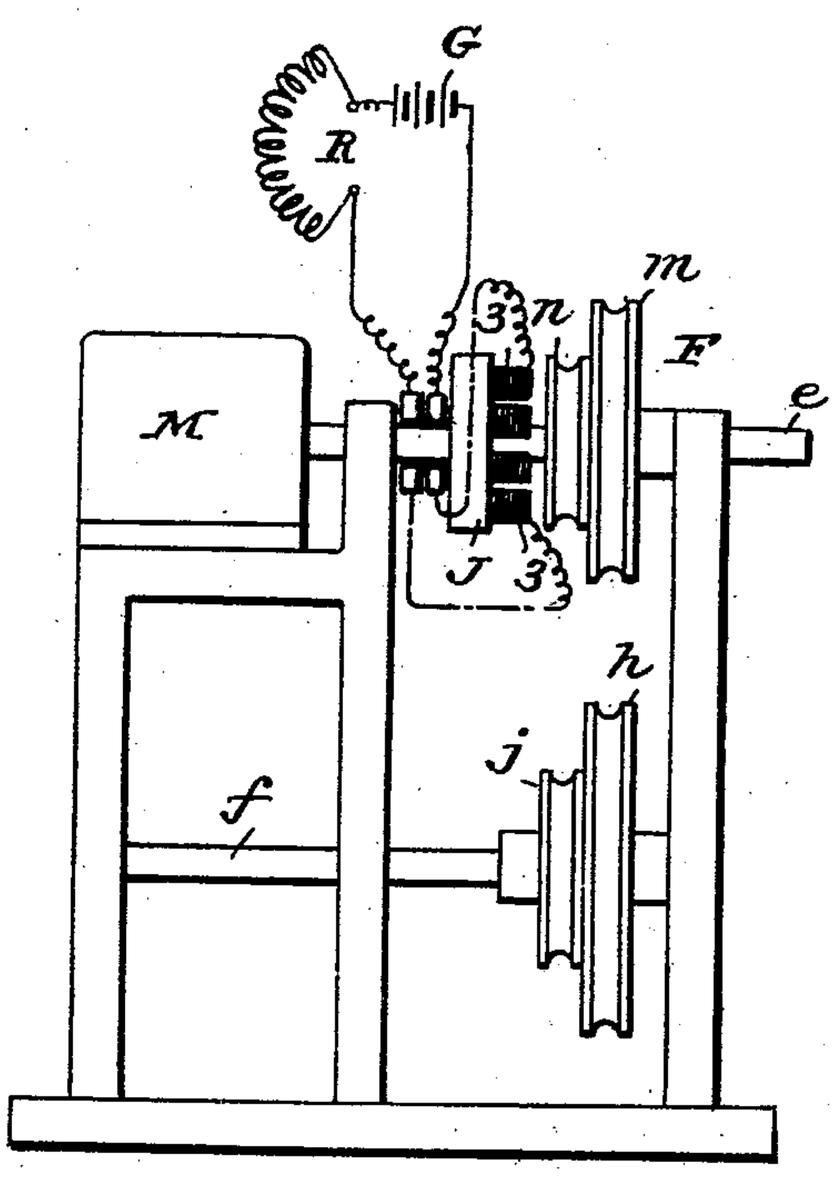


Fig. 2.



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Attorneys

UNITED STATES PATENT OFFICE.

ISAAC H. VENN, OF YONKERS, NEW YORK, ASSIGNOR TO OTIS ELEVATOR COMPANY, OF EAST ORANGE, NEW JERSEY.

ELEVATOR APPARATUS.

SPECIFICATION forming part of Letters Patent No. 684,390, dated October 8, 1901.

Application filed December 9, 1899. Serial No. 739,841. (No model.)

To all whom it may concern:

Be it known that I, ISAAC H. VENN, a citizen of the United States, residing at Yonkers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Elevator Apparatus, of which the following is a specification.

My invention relates to elevators; and it consists in certain improved connections between the motor and the car and counterweight, in improved means for putting the driving-pulley into and out of connection with the motor-shaft, and in certain safety devices for preventing the dropping of the counterweights, as fully set forth hereinafter and as illustrated in the accompanying drawings, in which—

Figure 1 is a perspective elevation of an elevator apparatus embodying my improvements. Fig. 2 is a side view of part of the apparatus, and Fig. 3 is a diagram showing the electric connections.

The cage X rises and falls between suitable guides, (not shown,) and is connected by a cable *b*, passing over upper guide-pulleys, with a counterbalance-weight D, which may be in any suitable proportions to the weight of the cage, as desired. With the cage is connected the usual suspensory cable *c*, passing over upper guide-pulleys and connected to a block C, and around the sheave *s* of the latter passes a cable *t*, which also passes around the driving-pulleys and guide-pulleys, hereinafter described, and around the sheave *u* of a block A, which is connected by a cable *a* passing over an upper guide-pulley to the counterweight E.

The driving drum or pulley F is a differential pulley having two connected sheaves *m n*, turning loosely upon a shaft *e*, to which motion is imparted from a suitable motor M, and beneath the shaft *e* is a stationary shaft *f*, upon which turn loosely two guide-pulleys *j h*, arranged below the pulleys *m n*. The continuous cable *t* passes from the sheave *s* downward beneath the pulley *j*, upward and over the sheave *n* of the drum or pulley F, down beneath and around the guide-pulley *h*, upward over the sheave *u*, down and beneath the sheave *m*, and up to and over the sheave *s*. As a result of this construction the rotation of the shaft *e* in the direction of the arrow, Fig. 1, will pay out the loop of cable *t* passing around the sheave *s* of the block C faster than it is taken up by the sheave *n*, so that the block C will rise, while at the same time the loop of cable passing around the sheave *u* is drawn downward, whereby the cage is lowered while the counterweights are raised. If the shaft *e* is turned in a reverse direction, the loop passing around the sheave of the block A will be relaxed, allowing the block A to rise, while the loop passing around the block C will be contracted, drawing the latter down, so that the cage will be lifted and the counterweights will descend.

The rapidity with which the cage will be raised or lowered will depend upon the rapidity of the rotation of the differential driving-drum F, regulated by the speed of the motor in normal operations, and it will be seen that when the movement of the driving-pulley F is arrested the draft of the different loops of the cable in different directions will be such that the cage will be retained fixedly in any position to which it has been adjusted without the necessity of any brake or retaining device upon the elevating mechanism.

The cage has a hand-lever S, by which to turn the switch-lever T, connected with any suitable stopping and starting device to control the motor, which is of any required character.

It is desirable in many instances to stop and start the movement of the elevator and to regulate its speed to a certain extent without the necessity of stopping or starting or changing the speed of the motor itself. To effect this result, I make use of a magnetic clutch J, the same being constructed in any suitable manner—as, for instance, of a disk carrying a series of electromagnets 3 3 3, in circuit with an electric generator G and with a resistance or other device R, suitably arranged—as, for instance, within the cage—and with means whereby the current may be regulated so as to only partially excite the magnets when the cage is to be started, so that they will exert a certain amount of friction on the side of the opposite metallic drum F, tending to turn the latter with a certain amount of slippage which is reduced in proportion as the strength of the current is increased until the drum and the clutch turn

together as the clutch-disk is driven by the motor. By the employment of a magnetic clutch as thus described the frictional adhesion of the clutch may be gradually increased and reduced, so as to start and stop the cage without any abrupt movement, while as the cage and the sheaves A C are counterbalanced and there is no tendency from the weight of the cage to rotate the sheave F there is not that resistance to the clutching action which would otherwise be experienced.

As before stated, the counterweight E counterbalances the block A and the counterweight D counterbalances the weight of the cage, and in order to prevent accident from the breaking of the cables supporting the counterweights, or either of them, I support the counterweight E adjacent to the counterweight D and also adjacent to pawls or other safety-catch devices *i*, so that if the cable *a* should break the counterweight E by falling on the pawls will thrust them outward against the guides *g g* to engage the latter and prevent the descent of either of the weights. The counterweight E is preferably movable between guides upon the counterweight D and below the cross-bar *p* or other stop at the top thereof, so that if the cable *b* supporting the weight D should break the weight will fall until its cross-bar or stops are in contact with the counterweight E, when the latter will support the weight and prevent further descent.

Without limiting myself to the precise construction and arrangement of parts shown and described, I claim—

1. The combination with the cage, its counterweight and a cable directly connecting them, of a block *s* and a cable directly connecting it to the cage, another block A and a separate counterweight connected to it, an endless cable having loops engaging the blocks, a differential drum for driving the cable, and a motor for driving the drum, substantially as set forth.

2. The combination with the cage, its counterweight and a cable directly connecting them, of a block *s* and a cable directly connecting it to the cage, another block A and a separate counterweight connected to it, an endless cable having loops engaging the blocks, a differential drum for driving the cable, loose pulleys opposite those of the drum and around which the cable passes, and a motor for driving the drum, substantially as set forth.

3. The combination with the cage, its counterweight and a cable directly connecting them, of a block *s* and a cable directly connecting it to the cage, another block A and a separate counterweight connected to it, an endless cable having loops engaging the blocks, a differential drum for driving the cable, a motor for driving the drum, a magneto friction-clutch between the drum and the motor, and means for varying the power of the clutch from the cage, substantially as set forth.

4. The combination with the cage and its counterweight, of the driving-cable connected to the cage, a movable block over which said cable runs, a counterweight connected to said block and supported in the path of movement of the first-named counterweight, and safety-catches supported by one of said counterweights in position to be operated by the other of said counterweights in falling, substantially as set forth.

5. The combination with the cage and its counterweight, the latter being recessed and provided with safety-catches, of the driving-cable connected to said cage, a movable block over which said cable runs, a second counterweight connected to said block and supported in the recess of the first-named counterweight to have independent movement therein, and to operate the safety-catches on falling, and said second counterweight serving to support the first-named counterweight in the event the supporting-cable of the latter breaks, substantially as set forth.

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

ISAAC H. VENN.

Witnesses:
S. HEDDING FITCH,
F. L. FREEMAN.