(No Model.)

3 Sheets—Sheet 1.

M. N. HUTCHINSON.

ELEVATOR.

No. 299,646. Patented June 3, 1884.

Fig. 1,

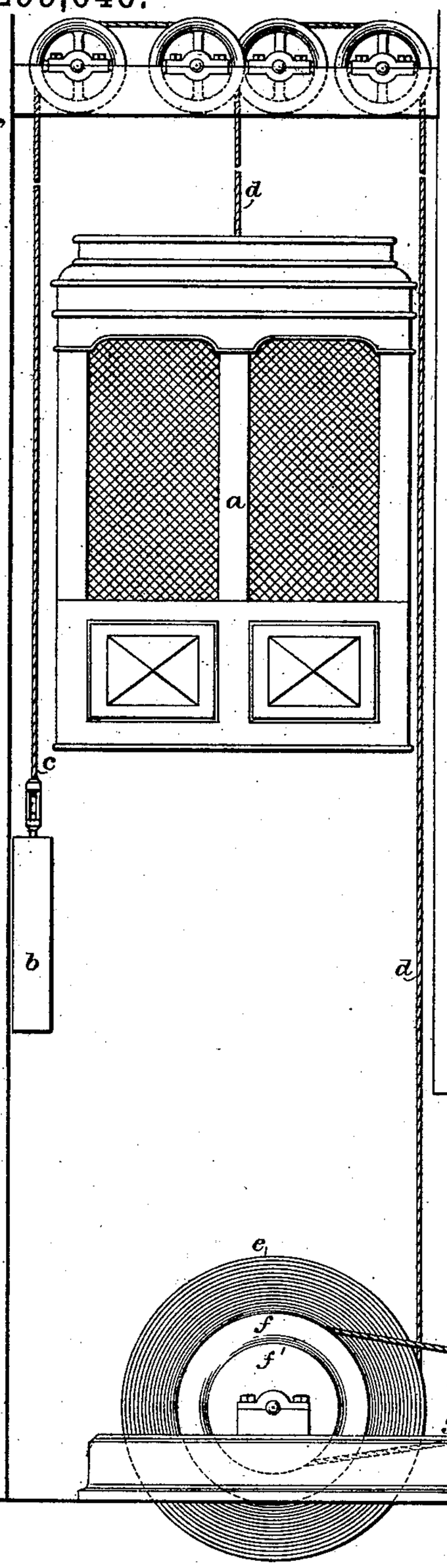
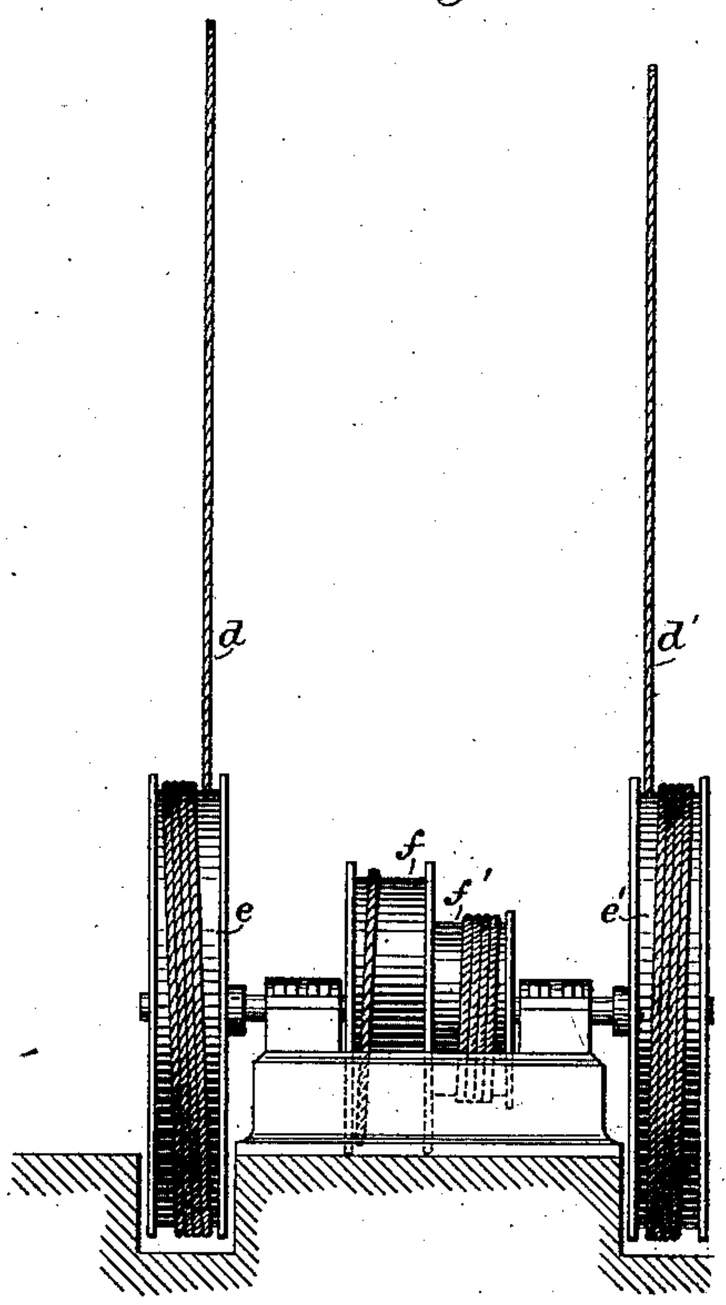


Fig. 2,



WITNESSES

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By his Attorney

INVENTOR

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(No Model.)

3 Sheets—Sheet 2.

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ELEVATOR.

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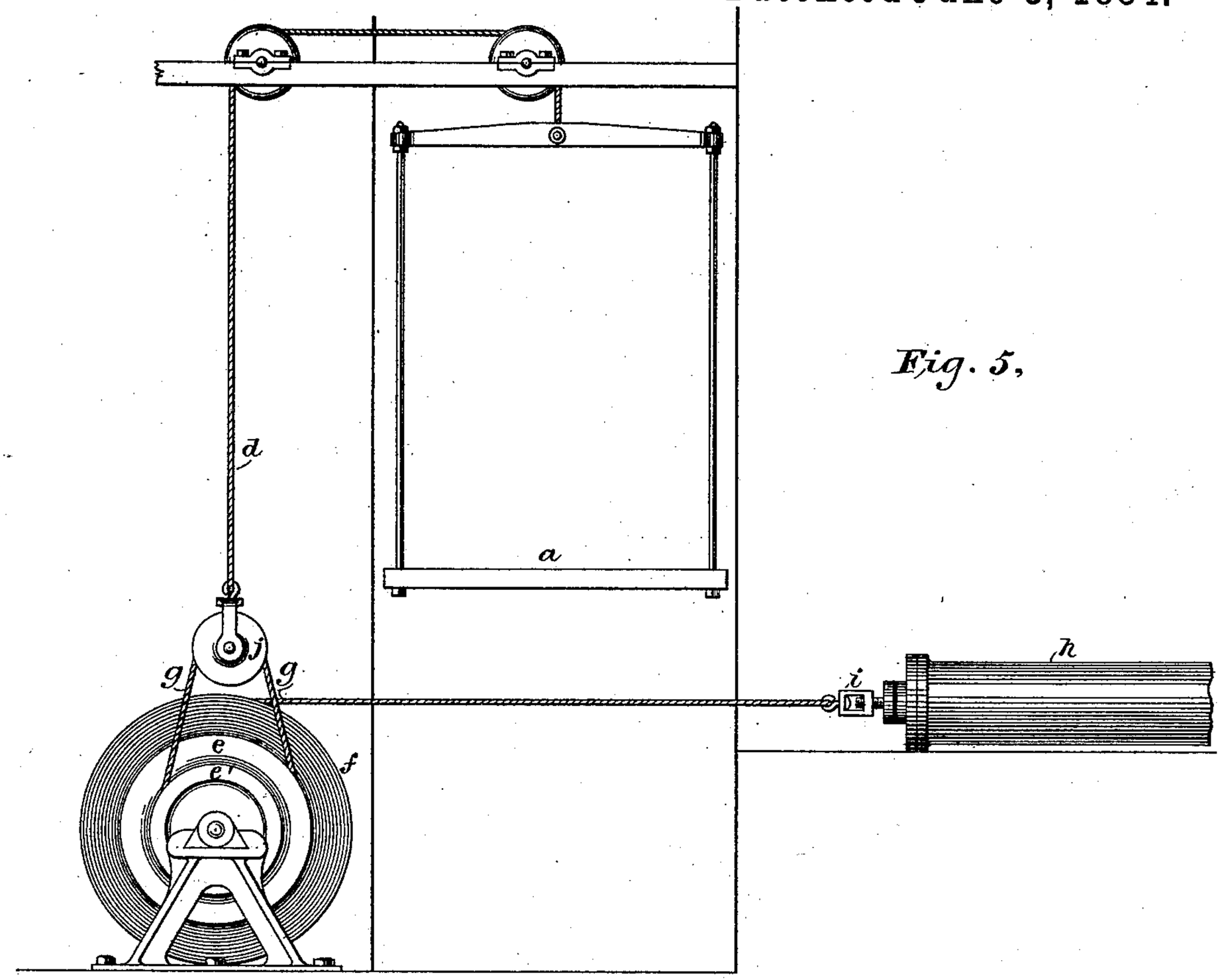

Fig. 5,

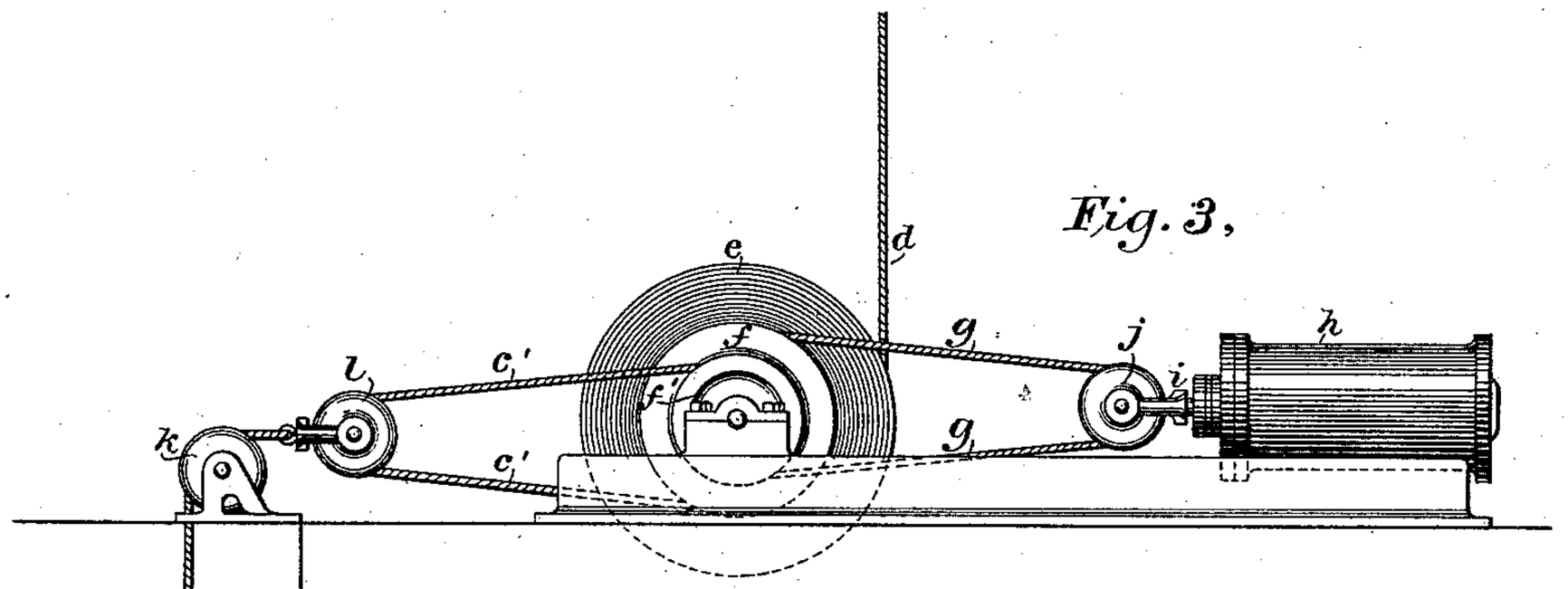

Fig. 3,

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3 Sheets—Sheet 3.

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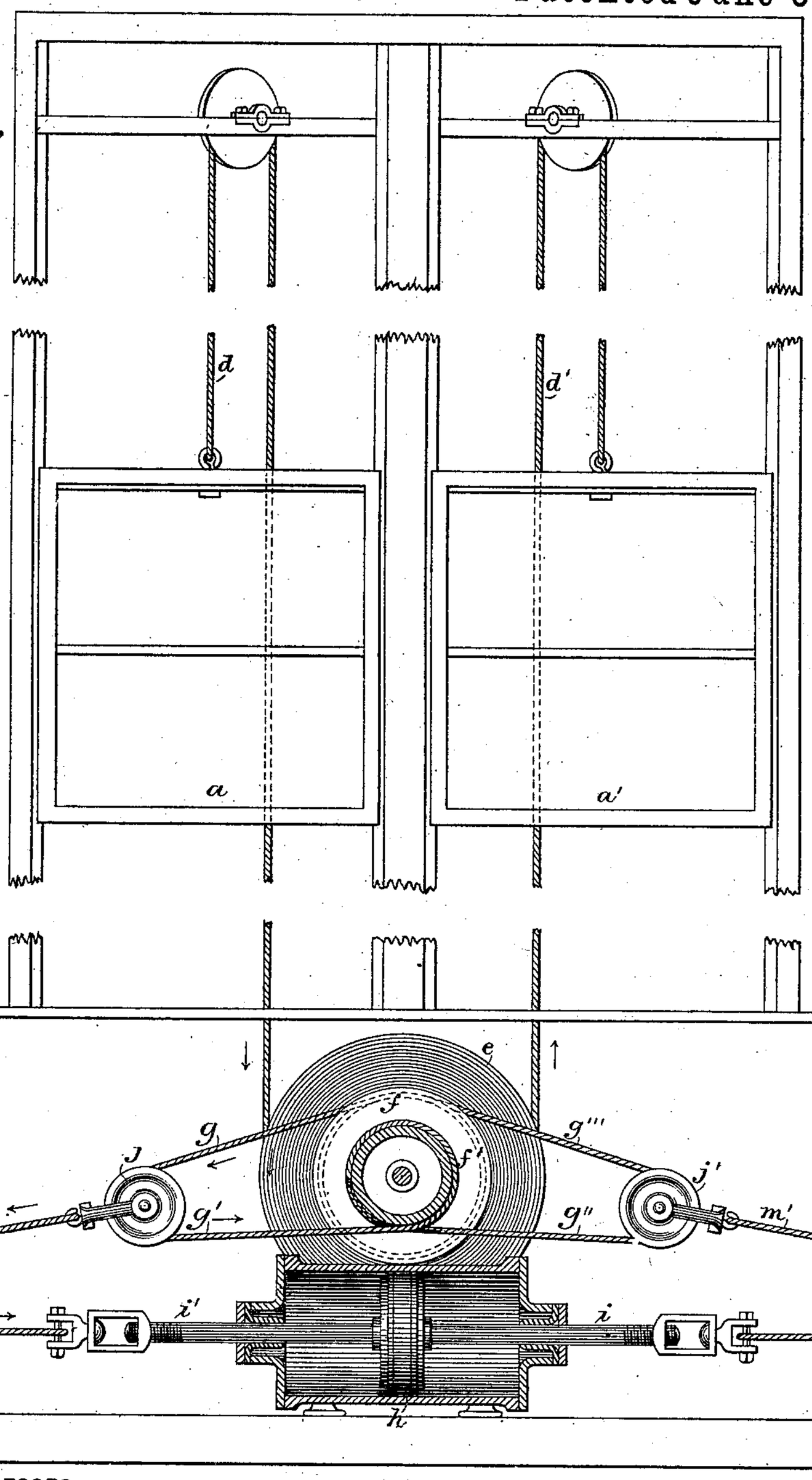
ELEVATOR.

No. 299,646. Patented June 3, 1884.

Fig. 4.



WITNESSES

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UNITED STATES PATENT OFFICE.

MERRILL N. HUTCHINSON, OF NEW YORK, N. Y.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 299,646, dated June 3, 1884.

Application filed November 12, 1883. (No model.)

To all whom it may concern:

Be it known that I, MERRILL N. HUTCHINSON, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Elevators, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention consists, generally, in the combination, with the hoisting apparatus of an elevator or elevator-platform or other hoist, of a differential windlass in such manner as to facilitate the regulation and transmission of power and speed and enable winding-drums of comparatively large diameter to be used, and thereby preventing short turns in the ropes or chains employed in the hoisting apparatus; and, more specifically, my invention consists in combining a differential windlass with the hoisting-rope, or the rope connected with the motor, for the transmission of power from the motor to the hoisting-rope. Heretofore a single rope from the motor has generally been coiled upon a drum fixed upon the same shaft upon which is fixed the drum bearing the hoisting-rope, and the difference in the distance traveled by the elevator-car and by the motor has been regulated by the difference in the diameter of these two drums. Where large differences were desired, it has thus been necessary to make the hoisting-drum extremely large in diameter, or so reduce the diameter of the drum connected with the motor as to endanger the use of a wire rope upon it.

In the drawings I have shown apparatus sufficient to illustrate my invention and some of its modifications.

Figure 1 is a side view of an elevator-car and an apparatus for hoisting it, and a hydraulic cylinder. Fig. 2 represents a modified arrangement of winding-drums, to be used in place of those shown in Fig. 1, to operate two elevator-cars. Fig. 3 represents the same arrangement of hoisting-rope, drums, and motor that are shown in Fig. 1, but with a different arrangement of counter-weight. Fig. 4 represents the arrangement of two elevator-cars, winding-drums, ropes, and cylinder when a double-acting cylinder is employed. Fig. 5 represents a modification of that shown in Fig. 1, especially adapted for raising heavy weights through short distances.

In all of said drawings the same letters of reference are used to denote like parts. *a* is the elevator car or platform. *b* is the counter-weight. *c* is the rope by which said counter-weight is suspended. *d* is the rope by which the elevator car or platform is suspended, and which is also connected with the hoisting-drum. *e* is the hoisting-drum. *f* is the drum located upon the same shaft as the hoisting-drum, and upon which the rope connected with the motor is coiled. *g* is the rope connected with the motor. *h* is the cylinder of the motor, and *i* the piston-rod thereof.

Fig. 1 represents an elevator-car and apparatus for hoisting it, and a hydraulic cylinder, the differential windlass being connected with the rope connected with the motor—that is to say, upon the same shaft which bears the hoisting-drum *e* is mounted the differential windlass, which consists of two drums, *f f'*, of different diameters, and fixed side by side upon the shaft. The bearings for the shaft may be dovetailed fast to the supporting-bracket, as shown in Fig. 5, for greater security. The sheave or pulley *j* is mounted upon bearings in the piston-rod *i* of the motor, and around this pulley is passed the rope *g*. One end of this rope is secured on the large drum *f* of the differential windlass, and the other end of the rope is secured upon the small drum *f'*. When the elevator-car is down and the piston is at the left-hand end of the cylinder *h*, the rope *g* is almost entirely coiled upon the drum *f*, and is not coiled upon the drum *f'*. When the apparatus is set in motion and the piston is driven toward the right-hand end of the cylinder, the pull upon the rope *g* upon both sides of the pulley *j* will be equal, but the difference in the diameter between the drum *f* and the drum *f'* will cause the rope *g* to be unwound from the drum *f* and wound upon the drum *f'*. This causes both drums to revolve, and they carry with them the hoisting-drum *e*, so that the hoisting-rope *d* is coiled upon that drum and the elevator is raised. By this arrangement the difference in the distance traversed by the piston of the motor and the elevator car or platform is not due solely to the difference in diameter between the hoisting-drum and a single drum upon which the

rope *g* is wound, but is due also to the difference between the diameter of the hoisting-drum *e* and the extent to which the diameter of the drum *f* of the differential windlass exceeds the diameter of the drum *f'*. Therefore, if it is desired to increase the speed and distance traversed by the elevator for a given stroke of the piston, it is only necessary to increase the diameter of the drum *f'*, the diameters of the drums *f* and *e* remaining unchanged; and in this way any desired speed or distance of travel may be obtained without reducing the diameters of the drums connected with the motor below the size upon which it is safe to coil a wire rope; nor is it necessary to increase the hoisting-drum *e* above the size which can be conveniently accommodated and used. Another advantage of the arrangement described is that the line of pull between the piston of the motor and the drum may remain unchanged, no matter to what extent the rope *g* be coiled upon the drum *f* or the drum *f'*, because the rope may be attached to the said drums in such manner that on the drum *f* it winds toward the drum *f'*, and on the drum *f'* it winds away from the drum *f*, as shown in Fig. 2. Thus the point at which the strain of the rope *g* comes upon the drum *f*, and the point at which the strain of said rope comes upon the drum *f'*, may be always equally distant from the junction of the drum *f* and the drum *f'*, thereby always preserving the line of pull upon the piston and the motor constant, and preventing the liability of breakage and wear which were incident to the use of the old form of hoisting apparatus, where the rope connected with the piston is coiled upon a single drum and the line of pull is constantly changing.

In Fig. 2 is represented an arrangement of pulleys and ropes similar to that illustrated in Fig. 1, but with the addition of the hoisting-drum *e'* mounted upon the same shaft with the hoisting-drum *e* and the differential windlass. The object of this addition is to provide for running two elevators or platforms from the same motor. They may either be run in unison or alternately by coiling the hoisting-rope upon the drums *e* and *e'* in the same direction, as shown in Fig. 2, or in opposite directions.

Fig. 3 represents the same arrangement of hoisting-rope, drums, and motor that is shown in Fig. 1, with the addition that the counterbalance-weight *b*, instead of being suspended from a rope connected with the elevator-car, as shown in Fig. 1, is suspended from a rope which passes over the pulley *k*, and to which the movable pulley *l* is attached. Around this pulley *l* the rope *c'* passes, one end of which is secured to the drum *f*, the other end of which is secured to the drum *f'*, so that the counterbalance-rope will begin to unwind at the same time as the hoisting-rope. In this arrangement the operation of the rope *c'* under the pull of the counter-weight *b* is the same upon the drums *f f'* and *e* as that already described for the rope *g*, and the counter-weight may thus be used to assist the motor in lifting the elevator without traveling through the long distance required when suspended from a rope attached to the elevator, as shown in Fig. 1. This construction of course requires a very heavy counter-weight in comparison with the old construction, since the diminution in the distance traveled is accompanied by a corresponding loss of power; but it will be usefully applied in places affording too little space for the ordinary counter-weight, and where it would be convenient to locate a heavy counter-weight in the basement of the building or other convenient locality.

In Fig. 4 I have shown a manner of applying my invention to the apparatus described in the patent granted to Arthur Granville, dated December 20, 1881, and numbered 251,042. This arrangement is designed to operate two elevators from a single piston, which is so connected with the elevators as to raise one by its stroke in one direction and the other elevator by its stroke in the opposite direction. In applying my invention to this construction I place upon the shaft which bears the hoisting-drum *e* a differential windlass. To the ropes *m m'*, connected with the piston, and which pass around the pulleys *n n'*, I attach the movable pulleys *j j'*. *g g' g'' g'''* is a single continuous and endless rope, which passes around the pulleys *j j'*, and intermediate these two pulleys one branch of this rope, as *g g'''*, is given one or more turns around the drum *f*, and the other branch, as *g' g''*, is given one or more turns around the drum *f'*. In the operation of this arrangement, when the motion of the rope *m* is in the direction of the arrows shown in the figure, the effect which the rope *g g'* produces upon the differential windlass and the hoisting-drum is substantially the same as that described for the rope *g* in Fig. 1 of the drawings; and when the stroke of the piston is in the opposite direction and the pull is upon the rope *m'*, the same effect is produced by the portion of the rope marked *g'' g'''*.

In Fig. 5 an arrangement is shown which is designed for raising a heavy elevator or platform through a comparatively short distance, and in this case the rope *g*, connected with the differential windlass, and the pulley *j* are attached to the hoisting-rope *d*, instead of to the piston *i*, of the motor, as in Fig. 1, and the piston *i* is attached to a rope which passes around the drum which was previously described as the hoisting-drum, instead of around the differential windlass, as in Fig. 1. The result of this arrangement is that power is gained with a loss of speed and distance traversed; but it enables pulleys of convenient diameter to be used and preserves the direction of pull constant. The differential windlass in this relation has similar advantages to those described in relation to Fig. 1.

I do not intend to limit myself to the details of arrangement shown.

For the support of the weight of the piston a friction roller or shoe may be employed bearing upon a suitable surface below the piston-rod, as shown in Fig. 1.

I am aware of Letters Patent of the United States No. 130,468, dated August 13, 1872, granted to P. J. Borger, and I do not claim that which is therein shown and described.

I claim—

1. The combination, substantially as described, of the differential windlass and hoisting-drum interposed between the elevator car or platform and the motor, as and for the purpose set forth.

2. In combination, the elevator car or platform *a*, the hoisting-rope *d*, the differential windlass *f f'*, the rope *g* and pulley *j*, and cylinder *h* and piston thereof, substantially as described.

3. In a hoisting apparatus, the combination, with the piston-rod of the motor, of the rope *g* and the differential windlass, the said rope being attached to said windlass, substantially as described, whereby the line of pull on said piston-rod is preserved constant, as and for the purpose set forth.

4. In combination with the differential windlass *f f'*, the two hoisting-drums *e e'*, each connected by a rope or chain with an elevator car or platform, substantially as and for the purpose set forth.

5. In a hoisting apparatus, the combination of the differential windlass, the rope *g*, connected with the motor, substantially as described, and the rope *c c'*, and the pulley *l*, connected with the counter-weight, as and for the purpose set forth.

6. In combination with the hoisting-drum of an elevator and the motor whereby the same is operated, the counter-weight and ropes connected with said hoisting-drum and suspending said counter-weight, whereby the pull of said counter-weight assists said motor by exerting its force upon the said drum, substantially as set forth.

7. In combination with the double-acting motor and the elevator cars or platforms *a a'*, to be operated therefrom, the differential windlass *f f'*, the rope *g g' g'' g'''*, and the hoisting-drum *e*, substantially as and for the purpose set forth.

8. In combination with the hoisting-rope of an elevator car or platform, the pulley *j*, attached thereto, and combined with a differential windlass connected with the motor *h*, substantially as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

MERRILL N. HUTCHINSON.

Witnesses:

W. F. HAPGOOD,

D. H. DRISCOLL.