(No Model.) 2 Sheets—Sheet 1.

S. T. RICHARDSON.

ELEVATOR.

No. 311,369. Patented Jan. 27, 1885.

Fig. 1.

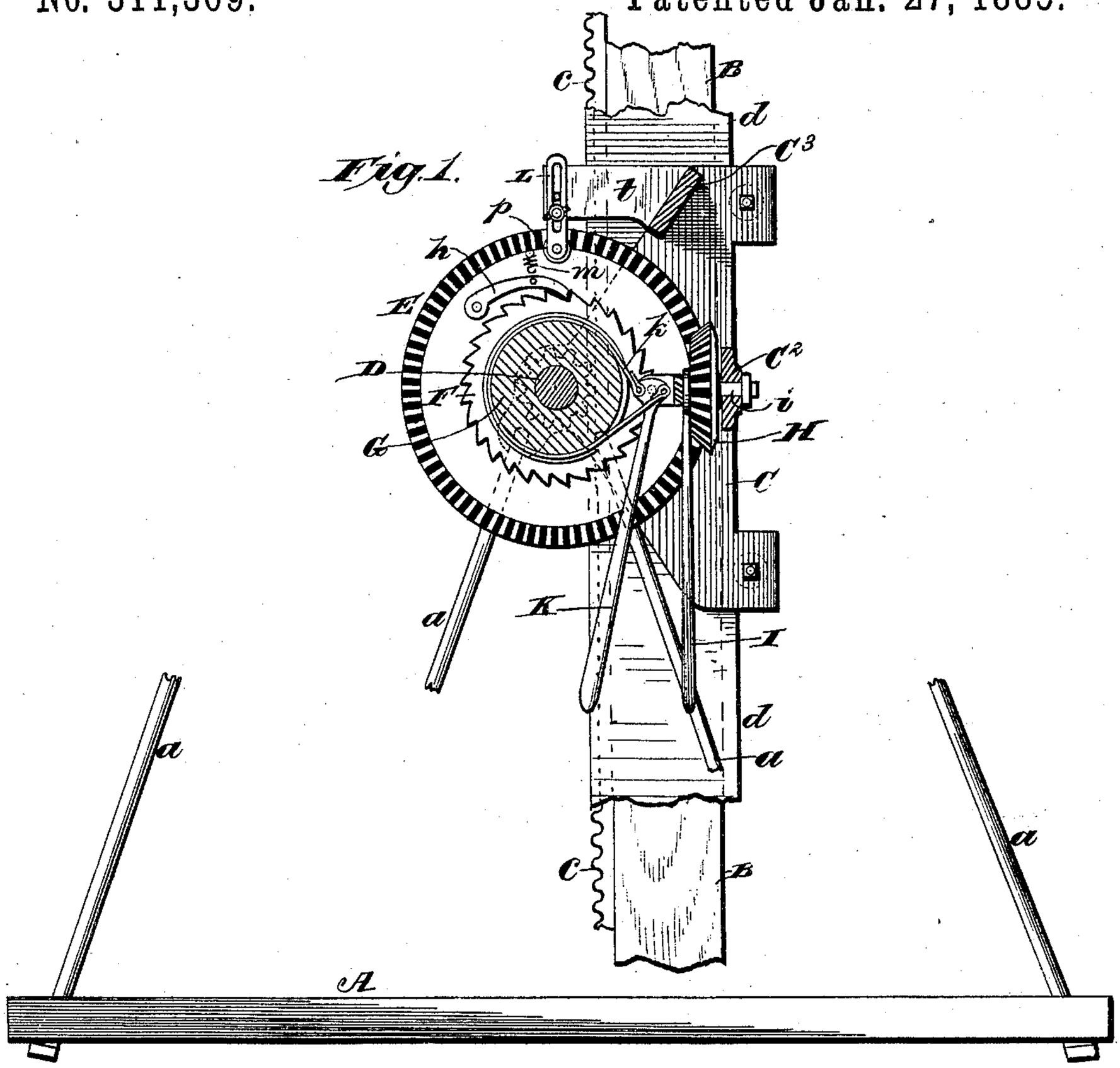
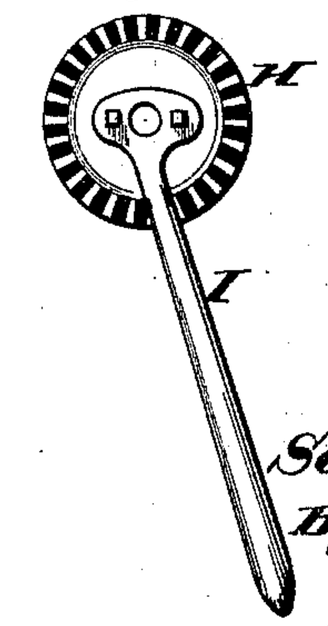


Fig. 5.



Witnesses.
Robt Everett.
Chas. F. Myers.

Inventor.
Samuel T. Richardson.
By James L. Norris.
Atty.

(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

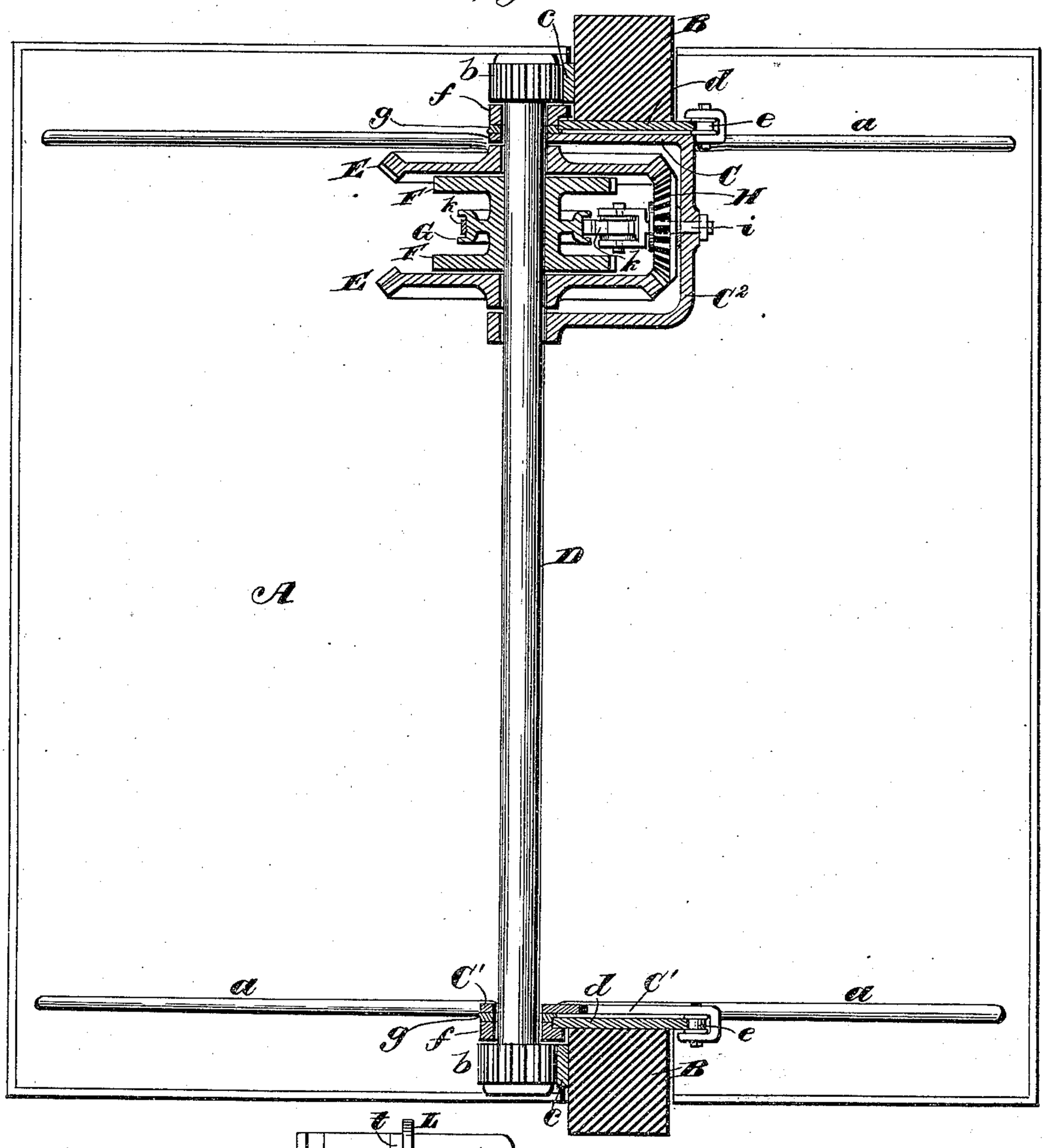
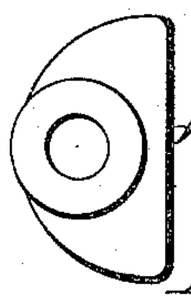


Fig. 3.

Fig. 4.



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Robt Everett,
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UNITED STATES PATENT OFFICE.

SAMUEL T. RICHARDSON, OF BALTIMORE, MARYLAND, ASSIGNOR TO THE RICHARDSON MANUFACTURING COMPANY, OF SAME PLACE.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 311,369, dated January 27, 1885.

Application filed June 24, 1884. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL T. RICHARDSON, a citizen of the United States, residing at Baltimore, Maryland, have invented new and useful Improvements in Elevators, of which the following is a specification.

This invention relates to mechanism for operating freight and passenger elevators by lever-power, the objects being to produce a convenient and efficient means of rapidly converting the oscillatory movement of a pivoted gear into a continuous rotary movement of a shaft that is journaled in the supporting plates or frames of the elevator cage or platform, said plates being adapted to move on vertical guideways, and the shaft having pinions engaging with racks secured to standards forming part of the elevator frame-work.

The invention consists in the combination, with an elevator cage or platform and its vertical racks and guideways, of supporting-plates carrying a rotary shaft having pinions meshing with the racks, mechanism connected to said shaft for converting an oscillatory movement into a continuous rotary movement, means for arresting or retarding the movement of the shaft, and means for controlling its backward rotation, so as to permit a gradual descent of the load; and it also consists in certain details of construction, as hereinafter more fully specified.

Figure 1 is a sectional elevation of a portion of an elevator embodying my invention. Fig. 2 is a sectional plan view of the same. Figs. 3, 4, and 5 are detail views of parts to be hereinafter described.

The letter A designates the platform of a freight-elevator or the top of a passenger-elevator cage, and B B are standards or posts forming part of the inclosing frame-work. The cage or platform A is suspended by rods *a a* from bearing-plates or supporting-frames C C′, one on each side. In these bearing-plates are journaled the opposite ends of a shaft, D, that carries pinions *b b*, which mesh with racks *c c* on the standards B B, as shown in Fig. 2.

To the inner sides of the standards B B are secured flanged guides or ways *d d* for the engagement therewith of guide-rollers *e e*, that are journaled in the plates C C′ on the side opposite to the racks and pinions, which are thus held in proper contact. A flanged washer, *f*, Fig. 4, surrounds each end of the shaft D on the inner sides of the pinions *b b*, and in contact with the guideways *d d*, and other washers, *g g*, which may also be flanged, are placed on the shaft D, between the washers *f f* and the plates C C′, as shown in Fig. 2. These washers prevent endwise movement of the shaft D in its bearings, and assist in holding the racks and pinions in operative contact.

On one end of the shaft D, at the inner side of the plate C, are loosely mounted a pair of bevel-gears, E E, each of which carries a gravity-pawl, *h*, Fig. 1, that is pivoted to the inner side of the gear in position to alternately engage with a ratchet-wheel, F, that is rigidly secured to the shaft D between the loose gears. The ratchet-wheels F F are preferably cast in one piece with a connecting-hub, on which is formed a friction-pulley, G, as shown in Fig. 2; but, if desired, the pulley and ratchet-wheels may be formed separately and secured to the shaft in any suitable manner. An intermediate bevel-gear, H, is arranged in a plane at right angles with the bevel-gears E E, so as to mesh therewith, and is journaled upon a pin or stud, *i*, that is supported in a transverse arm, C^2, of the plate C. This transverse or horizontal arm C^2 is bent or curved, as shown in Fig. 2, and carries at its end a sleeved bearing, through which the shaft D passes.

To the intermediate bevel-gear, H, is attached a lever, I, Figs. 1 and 5, by which said gear is oscillated for the purpose of actuating the oscillating gears E E, the reciprocal movement of which in opposite directions causes their pawls *h h* to alternately take into the rigid ratchet-wheels F F, thereby imparting a continuous rotary movement to the shaft D and pinions *b b*, the engagement of which with the racks *c c* enables the elevator cage or platform to be raised at will.

In the inner bifurcated end of the stud *i*, that carries the gear H, is pivoted a brake-lever, K, Fig. 1, to which are secured the opposite ends of a brake-strap, *k*, that is passed

around the grooved pulley G on the shaft D in such a manner that by throwing the lever K in the proper direction the rotation of the shaft can be retarded or arrested when the elevator cage or platform is descending.

When it desired to lower the elevator cage or platform, the pawls *h h* are normally held away from their engagement with the ratchet-wheels F F by means of springs *m m*, attached to the periphery of the gears E E, and an adjustable side bar, L, that carries at its lower end a pair of rollers, *p p*, is lowered a sufficient distance to enable said rollers to overcome the tension of the springs *m* and force the pawls *h* into engagement with the ratchet-wheels as the oscillations of the gears E bring said pawls alternately beneath the rollers. The pawls *h h* are thus made to act as brakes in retarding the backward revolution of the shaft D, thereby permitting the elevator to descend gradually. The adjustable slide-bar L is attached to a forward projection, *t*, on a horizontal arm, C^3, that forms the upper part of the plate or frame C, as shown in Figs. 1 and 3. It will be understood that in the forward movement or rotation of the shaft D in raising the elevator the springs *m m* are disconnected from the pawls *h h*, and the slide-bar L and its rollers *p p* are adjusted up out of range of contact with the pawls *h h* in their movement, so that when the gears E E are actuated the said pawls will act simply by gravity to engage with and urge the ratchet wheel or wheels F forward, thereby giving a continuous forward motion to the shaft and its pinions, and consequently raising the elevator. When, however, the cage or platform A is to be lowered, the springs *m m* are connected to the pawls *h h*, so as to hold the latter away from the ratchet-wheels F and permit a backward rotation of the shaft D due to the weight of the load acting through the intermediate gearing.

In order to provide for a gradual descent of the elevator, the slide-bar L, with its rollers *p p*, is adjusted down to a point where the pawls *h h* in passing will be subjected to a pressure sufficient to force them into engagement with the ratchet-wheels F F, and the gears E E and attached pawls are then reciprocally oscillated by means of the intermediate gear, H, and its lever I, so as to check the backward rotation of the shaft D step by step, and thereby cause the elevator to descend gradually. If it is desired to stop the elevator at any point in its course, the movements of the lever L will be discontinued, and the brake-lever K will be moved into position to apply the brake *k* to the pulley G on the shaft.

It is obvious that the gearing for rotating the shaft D may be applied to both ends of said shaft, if desired, in which event the bearing-plate C′ would be replaced by one like that employed at the other end.

In the drawings the gears E and H are represented as perfect wheels, but as they are designed to have an oscillatory movement it is apparent that they may, if desired, be made in the form of segments.

Having thus described my invention, what I claim is—

1. In an elevator, the combination, with standards having stationary racks and guideways, of bearing-plates supporting the elevator and having guide-rollers for engaging said guideways, a rotary shaft journaled in said bearing-plates and carrying pinions for engaging the racks, a ratchet wheel or wheels rigidly secured to said shaft, a pair of oscillating bevel-gears mounted loosely on the shaft at the outer sides of the ratchet-wheels and carrying pawls adapted to engage therewith, and an intermediate bevel-gear journaled in a plane at right angles with the loose bevel-gears and provided with an actuating-lever, substantially as described.

2. In an elevator, the combination, with stationary racks and guideways, and bearing-plates for supporting the elevator cage or platform, said plates having rollers for engaging the guideways, of a rotary shaft journaled in said plates and carrying pinions for engaging the racks, a ratchet wheel or wheels, and a brake-pulley rigidly secured to said shaft, a pair of bevel-gears mounted loosely on the shaft and having pawls for alternately engaging the ratchets, an intermediate gear for actuating said loose gears, and a brake-lever and strap for acting upon the brake-pulley to arrest the motion of the shaft, substantially as described.

3. In an elevator, the combination of the stationary racks *c c* and guideways *d d*, the bearing-plates C C′ for supporting the elevator cage or platform, said bearing-plates having guide-rollers *e e* for engaging with the stationary guideways, a shaft, D, journaled in the bearing-plates and carrying pinions *b b* for engaging the racks, a ratchet wheel or wheels, F, rigidly secured to said shaft, bevel-gears E E, loosely mounted on the shaft and carrying pawls *h h* for engaging the ratchet-wheels, an intermediate bevel-gear for actuating the loose gears, means for arresting the motion of the shaft, and means for retarding the backward movement in lowering the elevator, substantially as described.

4. In an elevator, the combination, with the standards B B, having racks *c c* and guideways *d d*, of the bearing-plates C C′ for supporting the elevator platform or cage, said plates being provided with guide-rollers *e e*, a rotary shaft, D, journaled in said plates and carrying pinions *b b* for engaging the racks, and mechanism connected to the driving-shaft D for converting an oscillatory movement into a continuous rotary movement, substantially as described.

5. In an elevator, the combination, with the standards B B, having racks *c c* and guideways *d d*, of the bearing-plates C C′, having guide-rollers *e e*, the platform A, connecting-

rods *a a*, shaft D, having pinions *b b* and washers *f f g g*, the ratchet-wheels F and pulley G, rigid on said shaft, the loose gears E E, having pawls *h h*, the intermediate gear, H, having lever I, and mounted on a stud, *i*, in the bearing-plate C′, the brake-lever K, pivoted in the end of said stud and connected to the pulley G by a brake-strap, *k*, the springs *m*, and the adjustable slide L, carrying rollers *p p*, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

SAMUEL T. RICHARDSON.

Witnesses:
A. H. NORRIS,
JOS. L. COOMBS.