

(No Model.)

2 Sheets—Sheet 1.

U. P. SMITH.

ELEVATOR.

No. 280,251.

Patented June 26, 1883.

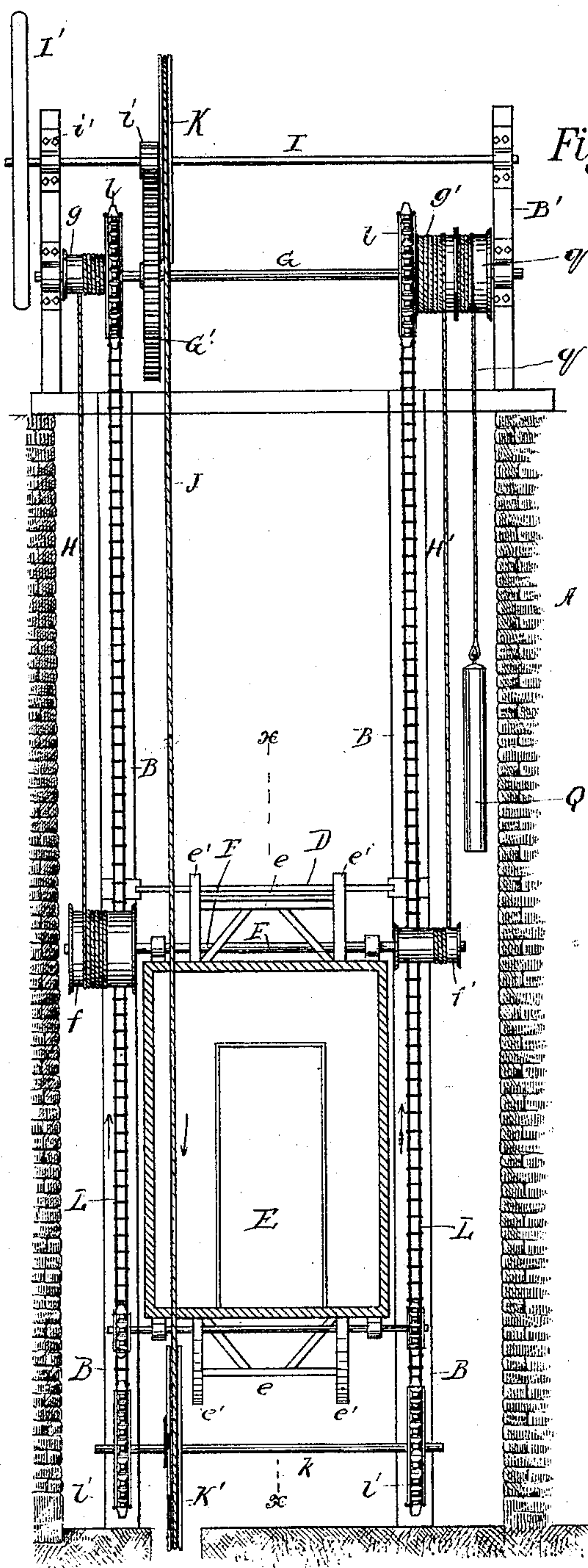


Fig. 1

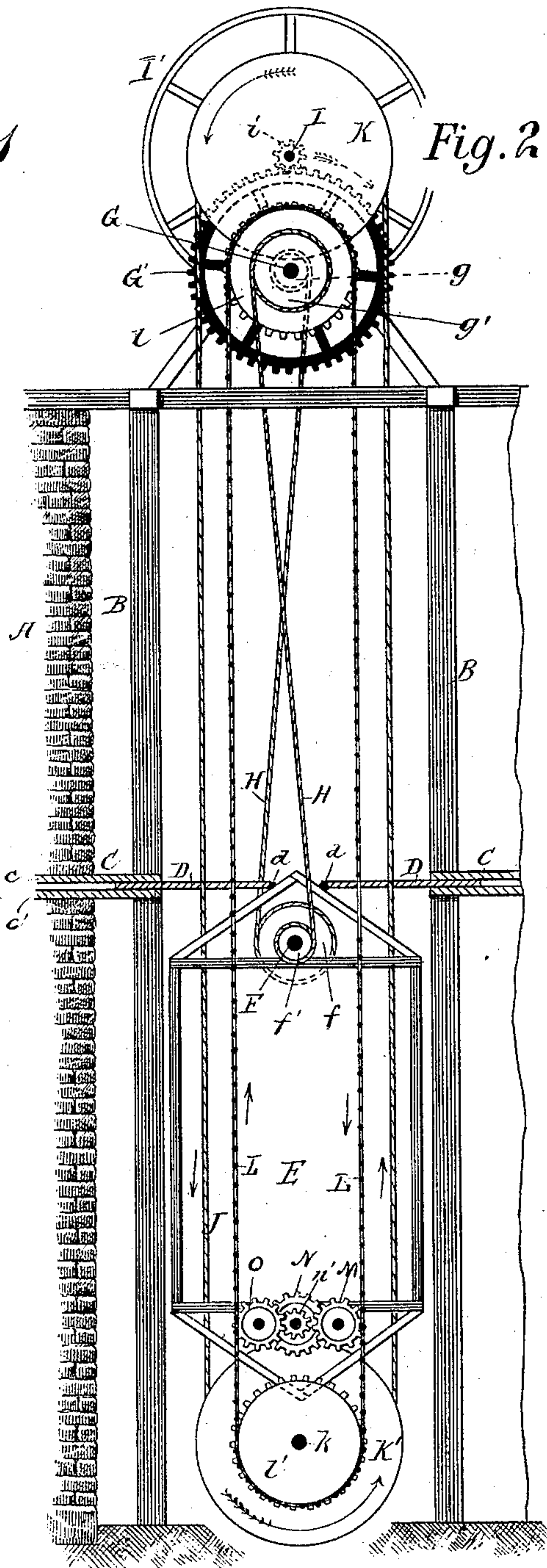


Fig. 2

Witnesses:

N. C. Corlies
J. W. Huntington

Inventor:

Uziel P. Smith

By E. Osburn & Thacher
Attorneys

(No Model.)

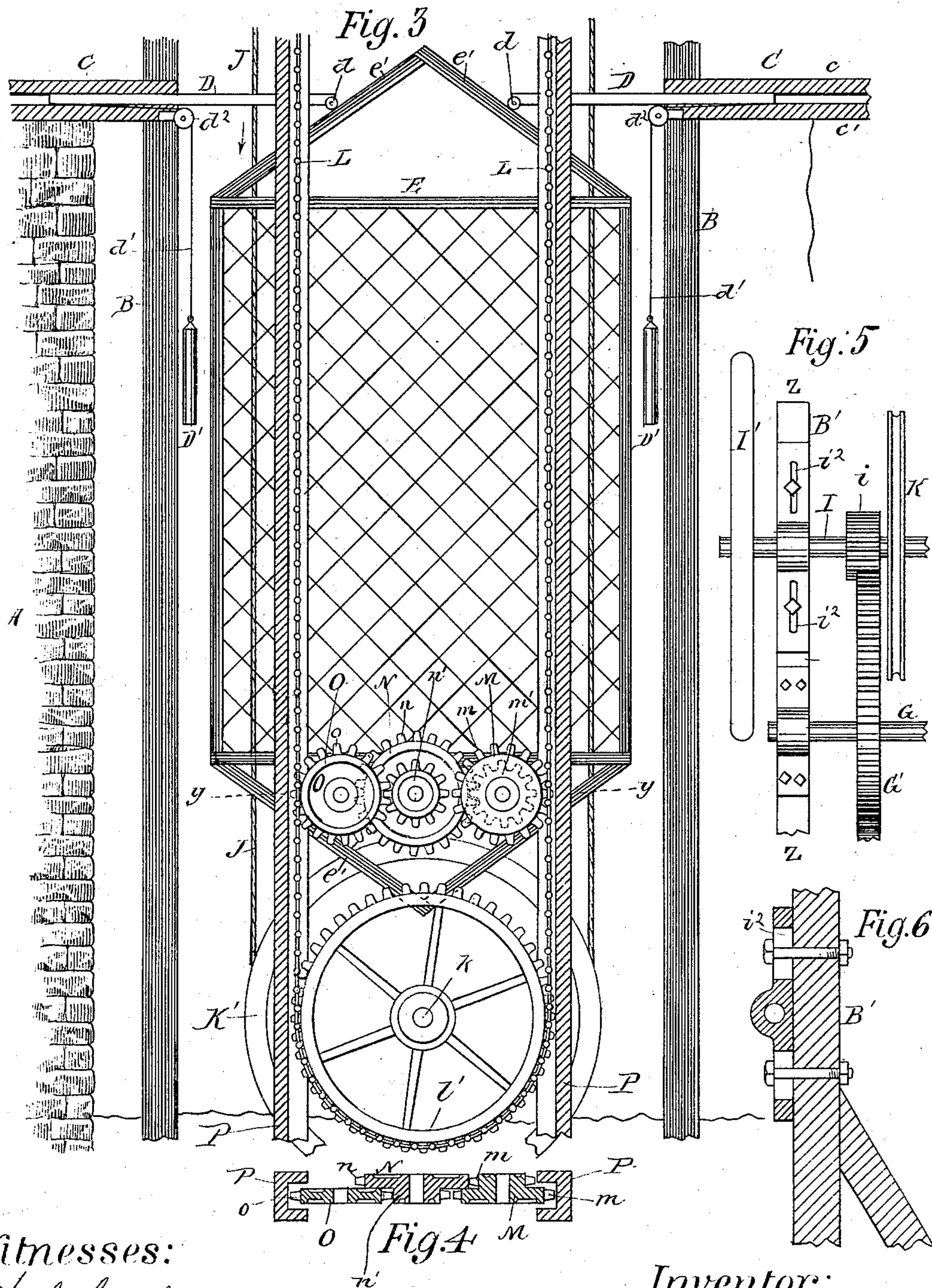
2 Sheets—Sheet 2.

U. P. SMITH.

ELEVATOR.

No. 280,251.

Patented June 26, 1883.



Witnesses:

W. C. Coates
J. W. Millington

Inventor:

Uziel P. Smith

By Leoburn T. Hughes
Attorneys

UNITED STATES PATENT OFFICE.

UZZIEL P. SMITH, OF CHICAGO, ILLINOIS.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 280,251, dated June 26, 1883.

Application filed July 22, 1882. (No model.)

To all whom it may concern:

Be it known that I, UZZIEL P. SMITH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Elevators, which are fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a front elevation of the elevator mechanism, the car being in section; Fig. 2, a side elevation of the same; Fig. 3, a vertical section of the same on an enlarged scale, taken on the line *x x*, Fig. 1, and showing a slight modification; Fig. 4, a detail plan section taken on the line *y y*, Fig. 3; Fig. 5, a detail elevation of the hoisting-gear; and Fig. 6, a detail section taken on the line *z z*, and on a scale somewhat larger than Fig. 5.

My invention relates to elevators for buildings and other hoisting apparatus, being intended for application more especially to passenger-elevators, particularly of a small and cheap class adapted to residence buildings.

The object of my invention is to obtain an elevator which can be easily operated, power being obtained even at an expense of rapidity of movement, and which shall also be substantially perfect in safety.

I will proceed to describe the construction and operation of an elevator embodying my invention as it may be carried out practically in one way, and will then point out definitely in the claims the special improvements which I believe to be new and wish to protect by Letters Patent.

In the drawings, A represents the elevator-well, which may be constructed as usual, within which is an upright frame, B. The flooring C of the different stories extends inward to this frame, and at each floor is arranged a pair of sliding doors, D, supported between the floor and ceiling *c c'*, between which they slide back each way, but when projected into the well meet near the middle thereof. On the edges of these doors, projecting into the well, are anti-friction rollers *d*, and a weight, D', is attached to the other edge of each door by means of a cord, *d'*, which is carried inward to the well, passing over a pulley, *d''*, just inside thereof, so that the weights hang within the well and tend to close the sliding doors. The car E is

of ordinary construction, except that at each end there is a frame, *e*, extending above and below the respective ends of the car, the side bars, *e'*, of which are inclined, meeting each other in the middle over the car, and sloping downward and outward to the edge thereof, this inclination being in the direction of the movement of the sliding doors, which close the elevator-well, so that the apex of the frame-arches will strike between the doors and separate them as the car passes up and down. The car is attached at its upper end to a shaft, F, running across it, on one end of which is a drum, *f*, and at the opposite end a smaller drum, *f'*.

At the top of the well is a supplementary frame, B', in which is mounted a shaft, G, parallel with the shaft F, carrying at one end a small drum, *g*, corresponding to the small drum *f'*, but arranged on the end of the shaft corresponding to the drum *f*. On the opposite end of the shaft G is a large drum, *g'*, corresponding to the drum *f*. The car is mainly suspended by cables H and H', the former attached to the drums *f g*, so as to wind and unwind upon them, and the latter attached to and winding and unwinding upon the drums *f' g'*; but the cables cross each other so as to run in the opposite direction. A gear-wheel, G', is also fixed on the shaft G, and in the upper part of the supplementary frame a shaft, I, is mounted parallel with the shaft G, on which is a pinion, *i*, arranged to engage with the gear-wheel G'. At one end of this shaft there is also a balance-wheel, I', to give steadiness of motion. The boxes *i'*, in which the shaft I is mounted, are provided with slots *i''*, through which the fastening-bolts pass, so that the shaft may be adjusted to pinions of different size, as occasion may require.

Obviously the rotation of the shaft I will revolve the drum-shaft G, and so raise and lower the car. This is accomplished by means of a rope, J, passing around a pulley, K, on the shaft I and a similar pulley, K', on a shaft, *k*, at the bottom of the well, the rope being arranged to run through the car, so as to be grasped by the occupant and pulled on one side or the other, according to the direction in which it is desired the car should move; or one side of the rope may be arranged outside of the car.

An endless sprocket-chain, L, is arranged

on each side of the car, just outside thereof, running over sprocket-wheels l on the shaft G , and similar wheels, l' , on the shaft k , at the bottom of the well.

5 On each side of the car is a train of gear-wheels, M , N , and O , all of them mounted on journals attached to the car, and in this instance arranged at the lower end of the latter, though this particular location is not essential.
 10 These wheels are arranged in train between and within the endless sprocket-chains, respectively, the outside wheels, M and O , being located so that the teeth m and o on their periphery will engage with the chain on opposite sides, respectively. These wheels M and
 15 O are of the same size and have the same number of teeth, adapted to work in the links of the chains. The middle wheel, N , is in this instance larger than the other two, and is provided with a series of teeth, n , on its periphery, and a smaller gear, n' , on one side thereof, with which the teeth on the wheel O engage. A gear, m' , is also provided on the back side of the wheel M , with which the teeth n on the
 25 periphery of the wheel N engage; but the teeth m have no engagement with the wheel N .

Now, from the way in which the hoisting apparatus is geared and the train of gears just described is arranged, it is obvious that when-
 30 ever the car is moved up or down that portion of the chain with which the wheel M engages will move in a direction opposite to the car, while that portion of the chain on the other side of the train with which the wheel O engages will move with the car, and of course
 35 this will cause the wheel M to rotate in a direction opposite to the movement of its section of chain, while the wheel O must rotate in a direction with its section of chain, or the car could not move. As the car with the train of
 40 gears attached moves in a direction opposite to the section of chain with which the wheel M engages, the latter will of course be rotated more rapidly than the wheel O , if both wheels
 45 are free to rotate with the movement of their respective sections of the endless chain.

It will be seen that the small gear-wheel on the wheel M engages with the larger gear-wheel N , the small gear of which in turn engages with the wheel O ; hence the motion imparted to the wheel O from the wheel M would be considerably slower than the rotation of the latter, and the gears are so calculated that this difference will be the same as that due to the
 55 different directions in which the respective chains move.

It is also obvious that, in accordance with the well-known laws of mechanics as applied to gearing, the force applied to the wheel M
 60 exerts a greater power at the wheel O , which moves slower than the wheel M . The movement of the chains, effected by their respective driving-wheels, has a tendency to move the car up and down, and, in fact, this portion of the
 65 apparatus may be sufficiently strong to accomplish this result alone. The power ap-

plied to the wheel M , then, will be increased as it is applied to the opposite chain through the wheel O , and therefore I gain power, as it assists in the hoisting, though of course at a loss
 70 of speed. In the drawings it will be seen, too, that the pulley over which the hand-rope passes is provided with a large gear on the elevated shaft, by which arrangement I also gain power, so that with the entire apparatus
 75 an occupant of the car will be enabled to lift a considerably greater weight than himself, though of course the movement will be comparatively slow.

The three wheels M , N , and O have been described above as having a certain relative size and arrangement. This, however, is a mere illustration of the application of this device, as the only rule necessary to be observed is to so
 80 construct and combine these gears that they will have the relative movement of their respective chains, as described above, and this can always be determined mathematically in connection with the main apparatus for hoisting the car and the size of the sprocket-wheels
 85 over which the chains run; and the number of gears may be increased, if desired.

The chain and gear-train also furnish a complete safety-brake to the car, so that if the main hoisting apparatus gives way the whole
 90 weight of the car is obviously thrown upon the chains, and the descent of the car would then exert a force on each side of the chain in the same direction, thereby tending to turn the wheel O in the opposite direction from the
 95 wheel M . The gear-train is therefore set by the weight of the car, and the latter will be held fast, supported by the chains and gear-wheels engaging therewith. It will be observed that this locking effect is always pro-
 100 duced the moment the hoisting-power ceases to be applied, whatever may be the location of the car, for the latter will at once settle back slightly, which throws the lock into operation, and the car is therefore always locked except
 105 when the hoisting-power is applied; but the moment this power is applied to move the car in either direction it at once releases the lock by causing the wheels M and O to move in the same direction and in proper relation to the
 110 movement of their chains, while before they were under the influence of a force tending to move them in opposite directions, and hence opposed to the movement of the chains.

In order to prevent spreading of the chains, upright ways P may be arranged on each side, presenting grooves or shallow troughs next to the chains, in which the latter run, as shown in Figs. 3 and 4 of the drawings. A balance,
 115 Q , is also provided, attached to a rope, q , which is wound upon a drum, q' , on the main drum-shaft, being arranged to operate in the usual way to fall as the car ascends and rise as it descends.

The safety device described above may be applied to a different style of elevator, and I do not limit myself to its application in the

precise connection explained above, nor to the precise details of construction in the several parts of the elevator as herein described and shown. In some instances a single chain and train of gears will be sufficient, in others this device should be arranged on each side of the car, and in others still it may be desirable to arrange two or more trains on each side of the car, engaging with the same chain. Springs may also be substituted for the weights operating the sliding doors, and a flexible gear-belt for the sprocket-chains.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An elevator-car, in combination with an endless chain or belt running over suitable driving-pulleys, and a train of gears, as M N O, attached to the car, and of which the outer ones engage with the chain or belt on opposite sides, respectively, substantially as and for the purposes set forth.

2. The elevator-car E, in combination with the chains or belts L, the chain-wheels *l* and *l'*, and the gear-wheels M, N, and O, all arranged and operating substantially as and for the purposes set forth.

3. The elevator-car E, in combination with the driving-rope J, pulleys K K', hoisting-shaft G, hoisting-cables H H', endless chains or belts L, chain-wheels *l* *l'*, and gears M, N, and O, attached to the car, substantially as described.

4. The elevator-car, in combination with the gear-wheels M, N, and O, attached thereto, endless chains or belts L, and guideways P, substantially as described.

UZZIEL P. SMITH.

Witnesses:

JNO. C. MACGREGOR,
J. W. MILLINGTON.