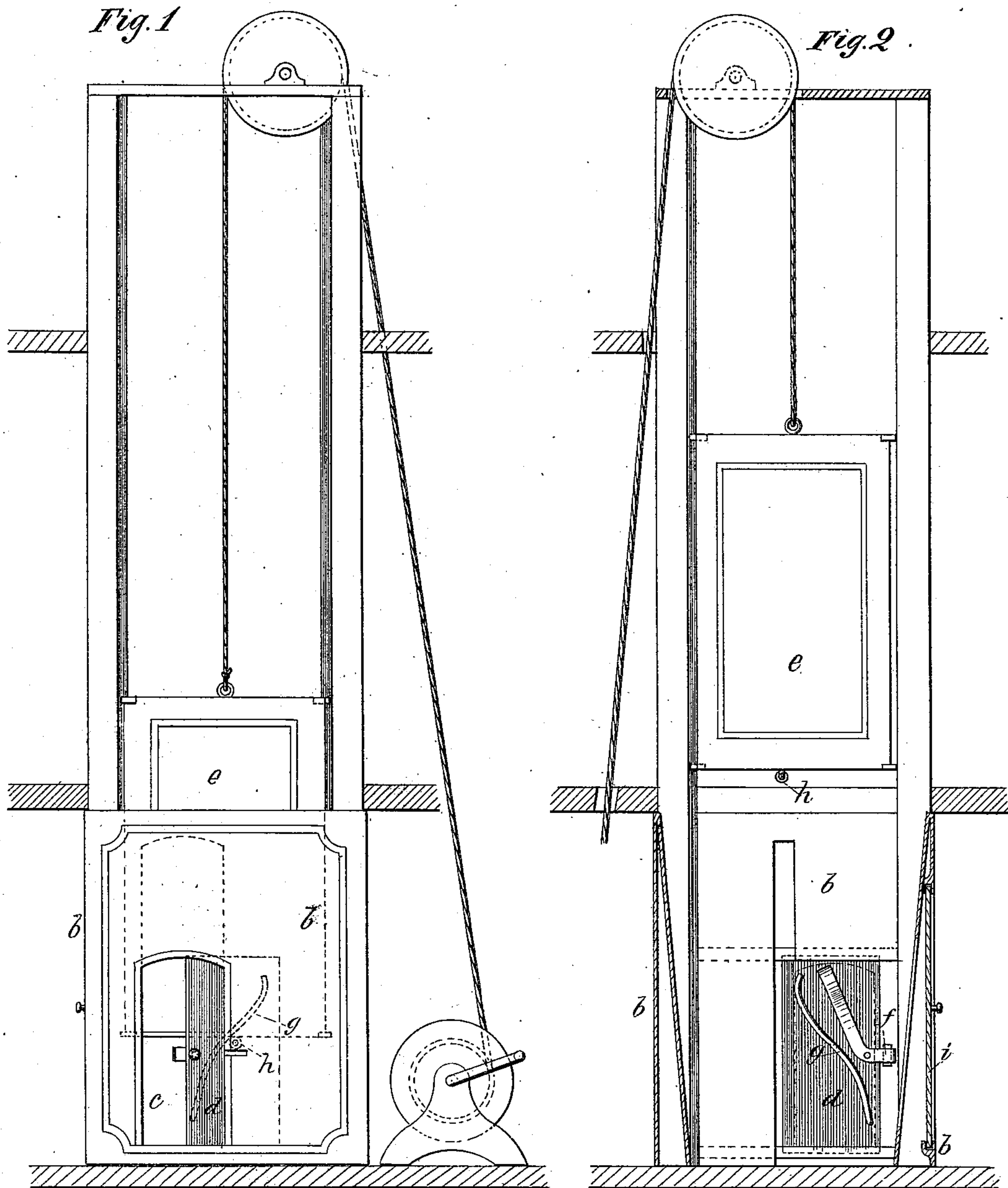


C. R. & N. P. OTIS.  
Elevator.

No. 226,673.

Patented April 20, 1880.



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# UNITED STATES PATENT OFFICE.

CHARLES R. OTIS AND NORTON P. OTIS, OF YONKERS, NEW YORK.

## ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 226,673, dated April 20, 1880.

Application filed February 5, 1880.

*To all whom it may concern:*

Be it known that we, CHARLES R. OTIS and NORTON P. OTIS, both of Yonkers, Westchester county, State of New York, have invented certain new and useful Improvements in Elevators, of which the following is a specification.

Our present invention applies to the construction of the elevator-shaft and its exit-doors and the connection of the car therewith, and it relates to that class of shafts having a portion inclosed or formed to serve as a retarding air-cushion in the event of the car falling.

To this end the main feature of our invention may be stated to consist in constructing the shaft, or the lower portion thereof, with inclosed air-tight, or proximately air-tight, sides, and providing the same with a door of ingress or egress, so constructed and arranged relatively to the car that the same may be automatically closed by the upward movement of the car, to insure in all cases the retention of the air and the formation of an air-cushion in such inclosed portion of the shaft for the car should the car happen to fall into the same, as hereinafter fully set forth.

In the adjoined drawings, Figure 1 is a front elevation of the shaft and car of an elevator embodying our improvement; and Fig. 2, a rear elevation of the same, showing the lower or inclosed portion of the shaft in section.

According to our invention, the entire shaft may be inclosed with air-tight, or nearly air-tight, sides from top to bottom; but we preferably inclose only the lower portion, or first story, of the shaft, as shown in the drawings. The inclosed sides *b b* are provided with a doorway, *c*, for ingress and egress, and a sliding door, *d*, is arranged to close the doorway air-tight, or nearly so, as is usual in inclosed shafts.

The car *e* is made, as usual, to closely fit the inclosed portion of the shaft, like a piston in a cylinder, sufficient clearance, however, being allowed to prevent the frictional contact of the car with the inclosing sides, yet allow but a slow escape of the air between the two. The inclosed portion of the shaft may also be slightly tapered or narrowed toward the bottom, as shown in Fig. 2, so as to cause the re-

sistance of the confined air-cushion to increase in about the same ratio as the speed of a falling body tends to increase. This portion of the shaft may also have a sliding valve, *i*, Fig. 2, by which a graduated escape of the air may be allowed to regulate the resistance of the air-cushion, if desired.

In this class of inclosed shafts it is obvious that if the door of the inclosed portion should be left open the air would be free to escape, and hence there would be no confined air-cushion to retard the car in case the same should fall under these conditions, which would hence result in disaster.

To obviate this condition of danger, therefore, we so construct the door of the shaft and the car relatively to each other that in case the door is left open at any time after the car has reached the bottom of the shaft and discharged its load, the car, when making the next ascent, at once engages with the door and closes and fastens the same with positive-ness and certainty in such manner that it cannot be again opened except from within the car when the car again reaches the door, thus insuring the constant existence of the cushion of confined air beneath the car as an element of safety in case the same should ever be required; and this construction constitutes the essential feature of our invention.

To this end we provide the door, on its inner side, as shown best in Fig. 2, with a spring or automatic catch or lock, *f*, which, when the door is closed automatically, engages with the door-casing, as will be understood. This automatic lock can therefore be reached and unlocked only from the interior of the shaft or car, and is not accessible from the exterior, so that when once locked the door is not capable of being opened except by the action of the operator or other person within the car, and when the car arrives on a level therewith, as will be readily perceived.

In addition to this automatic lock or catch, the internal side of the door is also provided with an inclined or curved cam rib or bar, *g*, projecting therefrom toward the car, as shown in full lines in Fig. 2 and dotted lines in Fig. 1, and the car is provided with a protruding roller or projection, *h*, which extends toward and is adapted to engage with the cam-rib of



the door. It will now be readily observed that when the door is closed the car may descend on a level with the threshold, and the roller *h* will freely pass the cam-rib *g* without affecting the same.

When the operator now unlocks the door and slides it back or open the cam-rib *g* will overlie the roller *h* on the upward path thereof; hence, should the operator avoid or forget to close the door when the car again ascends, the roller *h* will always engage with the rib *g*, as shown in Fig. 1, and by its upward movement with the car will close the door and cause the same to become fastened by its automatic or spring lock in a positive and certain manner, thus always insuring the safe condition of the shaft below the car.

We do not, of course, confine ourselves to the precise form of engaging mechanism shown, as different devices may be employed for causing the car to engage the door in the manner described without departing from the principle of our invention, as those familiar with mechanics will readily understand.

What we claim as our invention is—

1. The combination, in an elevator, of a shaft having its sides inclosed air-tight, or

nearly so, at its lower portion, or up its whole extent, with a door or doors in such inclosing sides, and a car to fill, or nearly fill, such inclosed shaft, together with an engaging connection between said car and door, whereby the door becomes automatically closed by the movement of the car within the shaft, to insure the retention of the air within such portion of the shaft, substantially as and for the purpose herein set forth.

2. The combination, with an elevator-shaft having the lower portion thereof inclosed by air-tight, or nearly air-tight, sides, with a door therein, and a car moving within the shaft past said door, and an automatic or spring catch or lock on the inner side of said door, and operative or accessible only from the interior of the shaft or car, of an automatic connection between the car and door, whereby the door becomes automatically closed and locked by the movement of the car, substantially as and for the purpose herein set forth.

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