(No Model.)

F. T. ELLITHORPE.

SAFETY APPLIANCE FOR ELEVATORS.

No. 602,437. Patented Apr. 19, 1898.

Fig. 1.

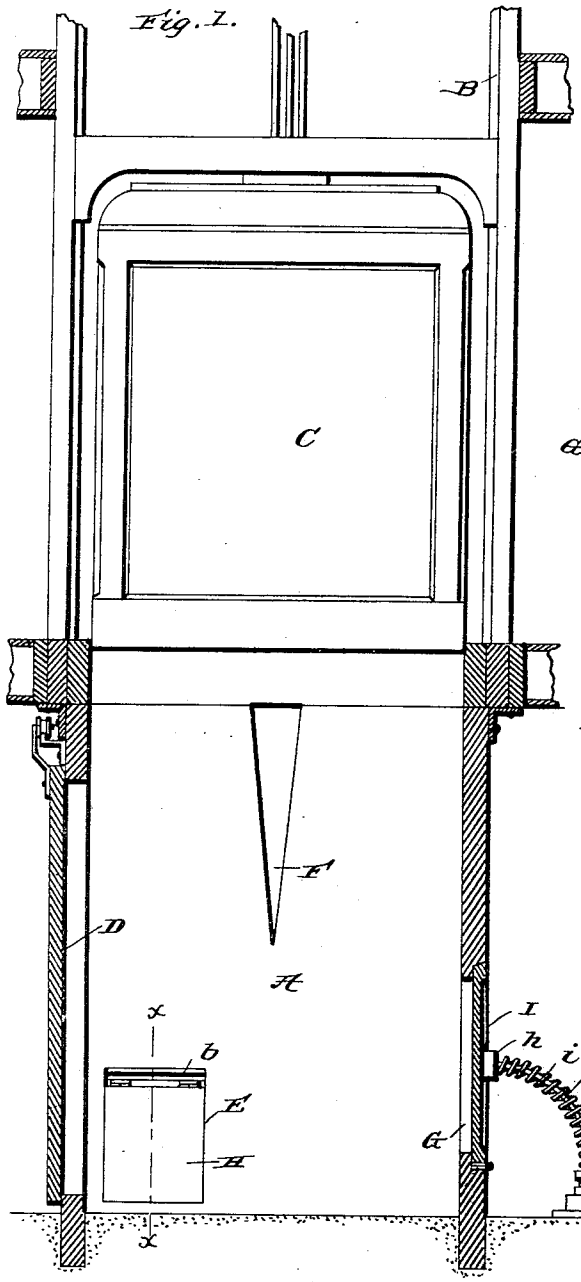


Fig. 2.

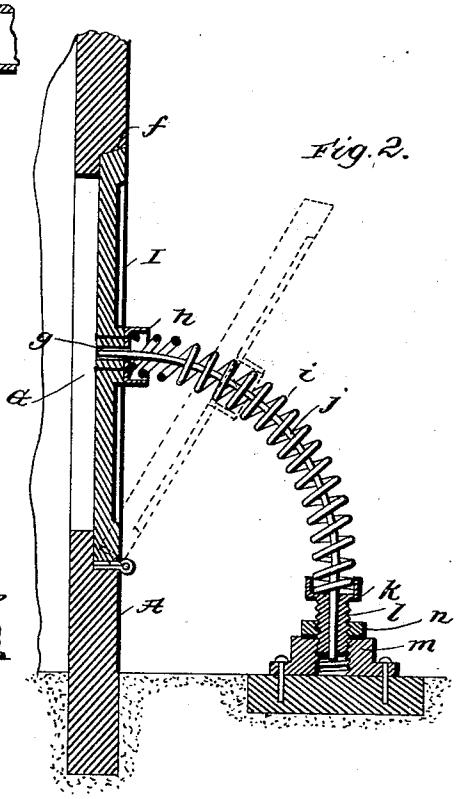
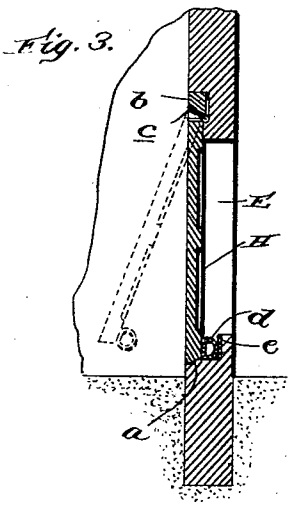


Fig. 3.



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UNITED STATES PATENT OFFICE.

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SAFETY APPLIANCE FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 602,437, dated April 19, 1898.

Application filed February 8, 1898. Serial No. 669,509. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK T. ELLITHORPE, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented new and useful Improvements in Safety Appliances for Elevators, of which the following is a specification.

My invention relates to elevators, and more particularly to air-cushion chambers which are provided at the bottom of elevator shafts or wells with a view of confining air below and thereby gradually arresting the descent of a falling car, so as to prevent injury to the same and its freight.

Air-cushion chambers such as at present in use have an inwardly-opening valve for the admission of air to prevent suctional resistance from interfering with the upward movements of the elevator-car, and they also have a tapered vent in their side walls, the purpose of which is to permit the escape of compressed air when the car falls, so that said car will be brought to a gradual stop and will not be arrested as suddenly as it would be if no provision were made for the escape of air. Such air-cushion chambers are thoroughly capable of effecting a gradual stop of a falling elevator-car provided the fall is not too great, and they are therefore well adapted for use at the bottom of elevator shafts or wells in buildings of ordinary height—say from six to ten stories. They are not, however, accurately reliable when placed in the elevator shafts or wells of buildings of extraordinary height—say from fifteen to twenty-five stories—because in such cases in the event of the elevator-car falling from the top or from a height adjacent to the top it will gain such a momentum that only a comparatively small volume of air can escape through the vent in the side wall of the air-cushion chamber. This might result in considerable concussion and cause the car to rebound with great force, and in consequence the shaft or well, the car, and the passengers or freight on the car might be injured.

My invention has for its general object to provide an air-cushion chamber which is thoroughly capable of effecting a gradual stop or arrest of a car falling from any reasonable height; and with this end in view said invention will be fully understood from the following description and claims when taken in conjunction with the annexed drawings, in which—

Figure 1 is a vertical sectional view of an elevator shaft or well provided with my improved air-cushion chamber at its bottom. Fig. 2 is an enlarged detail section illustrating the supplementary valve-controlled air-vent of the air-cushion chamber, and Fig. 3 is a detail section taken in the plane indicated by the line $x\ x$ of Fig. 1.

Referring by letter to said drawings, A designates my improved air-cushion chamber, which is arranged at the bottom of an elevator shaft or well B, and C designates an elevator-car, which is constructed in a staunch manner and is designed to be raised and lowered in the shaft B by suitable mechanism. (Not illustrated.)

The air-cushion chamber A is built in a strong manner of steel, masonry, or other suitable material, so as to be able to withstand the tremendous pressure incident to the fall of a heavy car, and is of a height proportionate to the height of shaft B, being extended when necessary up to the second and third or higher floors of a building and being preferably provided at each landing with a suitable air-tight or substantially air-tight door D, such as shown in Fig. 1. Said chamber A has an air-inlet opening E, an air-vent F, and a supplementary air-vent G. The opening E is designed to admit air to the chamber, so as to prevent suctional resistance from interfering with the upward movements of the elevator-car, and it is controlled by an inwardly-opening valve H. (Better shown in Fig. 3.) This valve H is snugly set in a rabbet a in the chamber-wall and is connected at its upper end in a hinged manner with a strip b, which is beveled, as indicated by c, so as to serve as a stop in limiting the inward movement of the door. At its lower end and on its outer side the valve is provided with a buffer d, of rubber or other suitable material, which strikes a strip e of similar material in the rabbet and thereby prevents noise when the valve is forcibly closed by the downward movement of the car. Said buffer and strip

also prevent the valve from being damaged when forcibly closed and thereby materially prolong the usefulness of the same.

The vent F is in the form of a vertically-elongated opening, and it is designed and adapted to permit the escape of compressed air when the car falls, so that said car will be gradually stopped and will not be arrested as suddenly as would be the case were no escape for the air provided.

If the supplementary vent G were normally open like the vent F, the air would be permitted to freely escape from chamber A, and in consequence no practical cushion would be formed below a falling car. From this it follows that some suitable means must be employed for preventing the escape of air through vent G, except when the air cannot escape through vent F with sufficient rapidity to prevent a sudden stop of a falling car and the consequent concussion and rebound of the same. For such purpose I prefer to employ the outwardly-opening valve I, which normally sets in a rabbet *f* in the chamber-wall and is connected at its lower end to said wall in a hinged manner, as shown. This valve I is provided with an aperture *g* and cup *h* and is backed by a coiled spring *i*, which is interposed between the cup *h* and a cup *k* and surrounds a bowed rod *j*, extending loosely through the said cups, as shown. The cup *k* has a threaded shank *l*, which takes into a threaded socket in a stationary pedestal *m* and is provided with a check-nut *n*. Consequently it will be seen that said cup *k* may be readily adjusted to regulate the tension of spring *i* and adjustably fixed when desired.

I do not confine myself to placing the air-controlling vent as shown in Fig. 2, (on the side.) It may be placed in the bottom of elevator-shaft.

In the event of a car falling from a great height or otherwise gaining such a momentum that the air in chamber A cannot escape through vent F sufficiently fast to prevent a sudden stop of the car the valve I will be forced open against the resistance of the spring *i* by the pressure of air in chamber A and will permit the escape of air, with the result that the descent of the car will be gradually arrested, and it will be permitted to settle gently in the air-cushion chamber. In virtue of the valve I opening outwardly and downwardly the volume of escaping air will be gradually diminished as the car moves downwardly past vent G. This, as will be readily appreciated, contributes materially to the gradual and effectual stoppage of the car.

As stated in the foregoing, my improved air-cushion is designed more particularly for use at the bottom of elevator shafts or wells of extraordinary height. I desire it understood, however, that it may be employed to advantage at the bottom of shafts or wells of ordinary height, when desired, inasmuch as the valve I remains tightly closed until the vent F fails to permit the air to escape from the chamber with sufficient rapidity to prevent the sudden stop of a heavy or loaded car, when said valve I will be opened and will effect a gradual stop of the car and prevent damage, as before described.

Having thus described my invention, what I claim is—

1. The combination of an elevator-car and a shaft or well, an air-cushion at its bottom provided with two air-vents and also provided with suitable means for preventing the escape of air through one vent until the other vent fails to permit the air to escape with sufficient rapidity to prevent the sudden stop of a falling car, substantially as specified.

2. The combination of an elevator-car, and a shaft or well, an air-cushion at its bottom provided with an inwardly-opening valve for the admission of air and also provided with an open air-vent and a valve-controlled air-vent, substantially as specified.

3. The combination of an elevator-car and a shaft or well, an air-cushion at its bottom provided with two air-vents and also provided with a downwardly and outwardly movable valve controlling one of said vents, substantially as specified.

4. The combination of an elevator-car, a shaft or well, an air-cushion chamber at the bottom of the shaft or well having two air-vents, and a spring-backed valve connected at its lower end in a hinged manner to the outside of one wall of the chamber below one air-vent whereby it is adapted to open outwardly and downwardly, substantially as specified.

5. The combination of an elevator-car, a shaft or well, an air-cushion chamber at the bottom of the shaft or well having two air-vents, a valve connected at its lower end in a hinged manner to the outside of one wall of the chamber below one air-vent whereby it is adapted to open downwardly and outwardly, a pedestal, a cup adjustably connected with the pedestal, a bowed guide-rod resting in the cup and extending loosely through an aperture in the valve, and a spring surrounding said rod and interposed between the cup and the valve, substantially as specified.

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

FREDERICK T. ELLITHORPE.

Witnesses:
I. S. LAWRENCE,
FRANK L. BOPPE.