(No Model.)

# W. E. SAWYER.

## Electrical Safety Device for Elevators.

**No. 229,658.** **Patented July 6, 1880.**

*Fig. 1.*

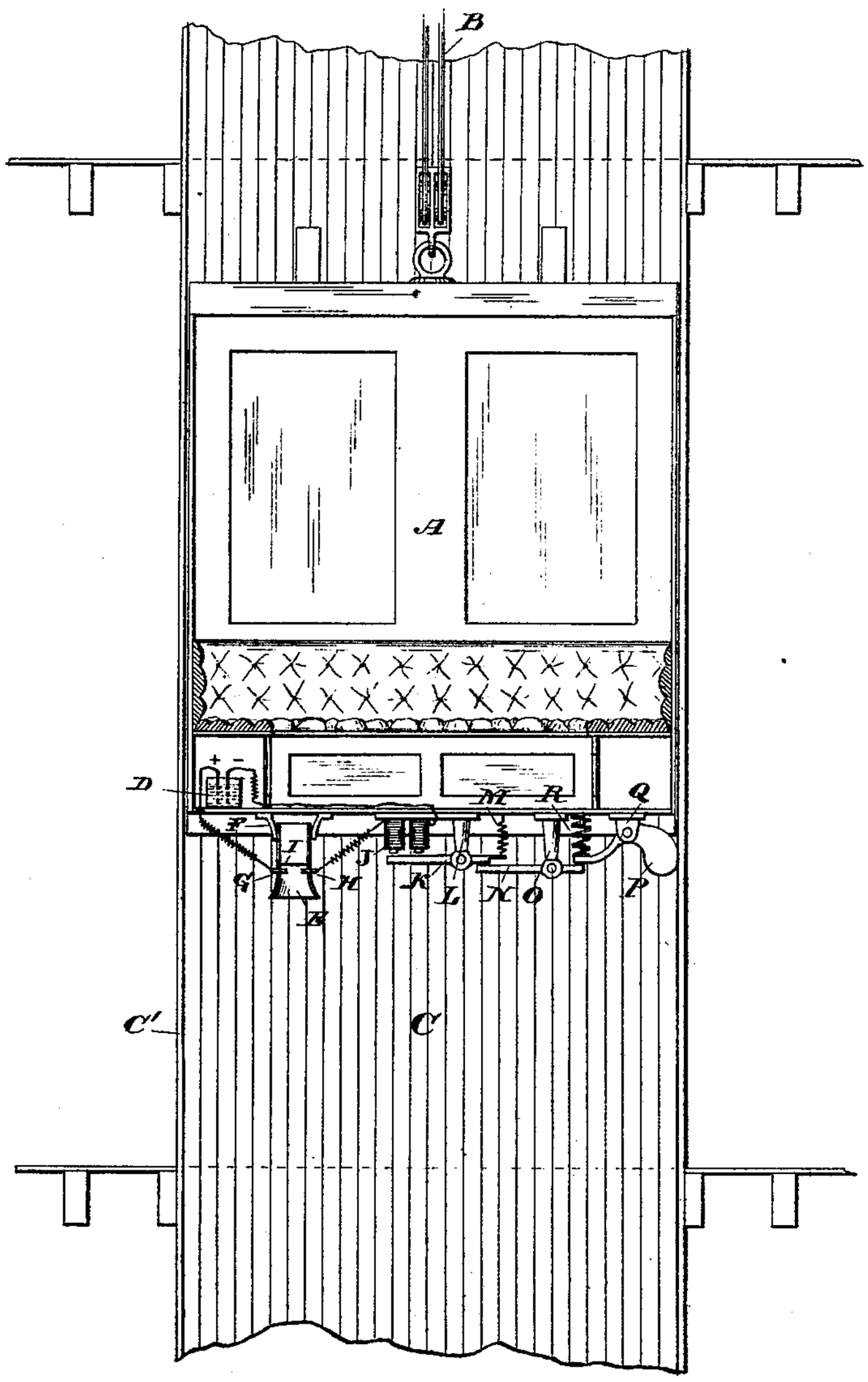
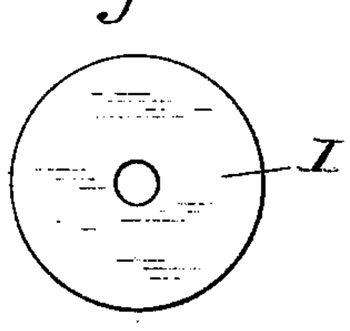



*Fig. 2.*

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# UNITED STATES PATENT OFFICE.

WILLIAM E. SAWYER, OF NEW YORK, N. Y.

## ELECTRICAL SAFETY DEVICE FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 229,658, dated July 6, 1880.

Application filed June 5, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM EDWARD SAWYER, 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 Safety Hoisting Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

The object of my invention is to provide means for instantly arresting the downward movement of hoisting apparatus in case of the breaking of the hoisting rope or wire, or other derangement of the hoisting mechanism.

Various kinds of safety devices have been employed for the purpose stated, such as expanding springs, endless screws, and coiled springs with pawl and ratchet attachment, &c.; but in all the various devices the momentum obtained by the car when the hoisting-rope gives away is so quick and great that the mechanism provided for the purpose is unable to arrest the downward movement of said car, and in most instances of this kind there is loss of life and property. More especially is this the case in passenger and mine elevators, where the distance to be traversed by the car is great, and danger of accidents consequently increased.

My device is intended to remove the above-noted objections.

The nature of the device will be more fully described in the accompanying specification, and pointed out in the drawings, in which—

Figure 1 is a side elevation, partly in section, of my device, and Fig. 2 a plan view of a metallic iaphragm.

C is the well, and C′ C′ the sides, which may be provided with guides, as in mine and freight elevators. A is the car, supported in the ordinary manner by ropes or wires B.

E is an insulated tube, open at both ends, which may be placed either at the top or bottom of the car. It is, however, preferably secured to the under side of the car by supports F. In this tube E are let projecting metal pieces H G, upon which lightly rests a free metal diaphragm, I. This diaphragm is perforated, as shown in Fig. 2, the perforation being large enough to allow the air entering the flared mouth of tube E to escape or pass through without lifting the diaphragm from the projections H G when the car is moving at a proper rate of speed.

D is a galvanic battery, connected, by way of metal pieces H G and metal diaphragm I, with the coils of an electro-magnet, J, as shown. Any other suitable generator of electricity may be used instead of the battery above referred to.

The armature K of the electro-magnet, pivoted in standards L, is retracted by a spring, M, and the end of said armature-lever opposite the magnet touches a lever, N, pivoted in standards O. A cam-lever or clutch, P, provided with a compression-spring, R, bears upon one end of lever N, as shown, and the three levers thus constitute a compound lever.

I do not limit myself to any particular form of levers, compound or otherwise, and may operate them by the direct action of magnetism developed by any kind of generator located at the source of hoisting power or elsewhere.

When the car is moving at a proper or ordinary rate of speed the air enters and passes through the tube E without lifting the diaphragm, and thus breaks the circuit of magnet J. When, however, owing to accident, the car descends too rapidly, or departs from its normal speed downward, the upward column of air in tube E lifts the diaphragm from the projections H G and breaks the circuit of magnet J. This action releases the armature, which in turn allows the long end of lever N to rise and forces the cam-lever P down, which cam, by its friction against the side of the well or guides, prevents the car from falling, and obviates all loss of life or limb to the passengers or destruction of property.

It is obvious, of course, that the tube E may be placed in the center of the under side, and two armatures and magnets and another system of levers be placed on the opposite side of the well, or, indeed, a single magnet can control the double system of levers and the two cams or clutches.

It is evident the action referred to is instan-

taneous, and when the car has been arrested it cannot be moved from its position except manually, for the magnet J is not strong enough to draw back the clutch or cam P.

There is nothing in the device to get out of order and prevent the action desired. If the battery should fail to act the car will be as instantly and securely locked as though the elevator-rope had broken, for the reason that if the battery fails to act the magnet loses its attractive force and allows the armature to fall, as above described.

I do not depend alone on spring M to draw the armature away from the magnet, as the weight of the armature itself may perform that function; nor do I depend alone upon spring R to cause the cam or clutch P to operate, as a weight or any other suitable mechanism may be substituted therefor without departing from the spirit of my invention; nor is it absolutely necessary that the diaphragm should rest on the projections H G and the magnet be in a closed circuit, as said diaphragm might be located below said projections and the position of the magnet and armature be reversed, so that the increased upward current of air would cause the diaphragm to rise and come into contact with the projections, close the circuit, draw up the armature, release the clutch, and allow it to act, as before described.

To insure additional safety, more than a single tube and diaphragm may be employed, preferably in series, so that should one fail to act or close the circuit another may act. I may employ an equivalent device to control the speed or even to stop the hoisting-drum in case of too rapid descent.

What I claim as new is—

1. A safety device for elevators controlled by a generator of electricity, in combination with a circuit closer or breaker automatically controlled by the descent of the car, substantially as described.

2. In an elevator, a car the downward movement of which is automatically controlled by a clutch actuated by electricity through the intervention of suitable mechanism brought into action by any abnormal speed of descent of the car, substantially as described.

3. In an elevator, a car provided with a tube and a metal diaphragm in said tube, the diaphragm being operated by a column of air to open or close an electric circuit, in which circuit is an electro-magnet controlling an armature-lever and safety-clutch, as described.

4. An elevator-car the downward movement of which is controlled by a column of air passing through a tube and perforated diaphragm, said diaphragm being in an electric circuit, with an electro-magnet operating a safety-clutch, as described.

5. In an elevator provided with a generator of electricity, the combination, with a tube to receive a column of air and having a circuit closer or breaker in said tube, of an electro-magnet and lever-armature, the armature controlling a safety cam or clutch, as described.

6. In an elevator provided with a generator of electricity, the combination, with an air-receiving tube and perforated diaphragm, of the metallic connections H G, whereby the electric circuit leading to an electro-magnet controlling a safety-clutch is opened or closed by said diaphragm, as described.

7. In an elevator, the combination of the air-receiving tube E, diaphragm I, and metallic connections H G with the electric generator, as described.

8. In an elevator, the combination of the air-receiving tube E, diaphragm I, connections H G, battery D, and electro-magnet J with the armature-lever K, as described.

9. In an elevator, the combination, with the air-receiving tube E, diaphragm I, connections H G, battery D, electro-magnet J, and armature-lever K, of the lever N and safety-clutch P, as described.

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