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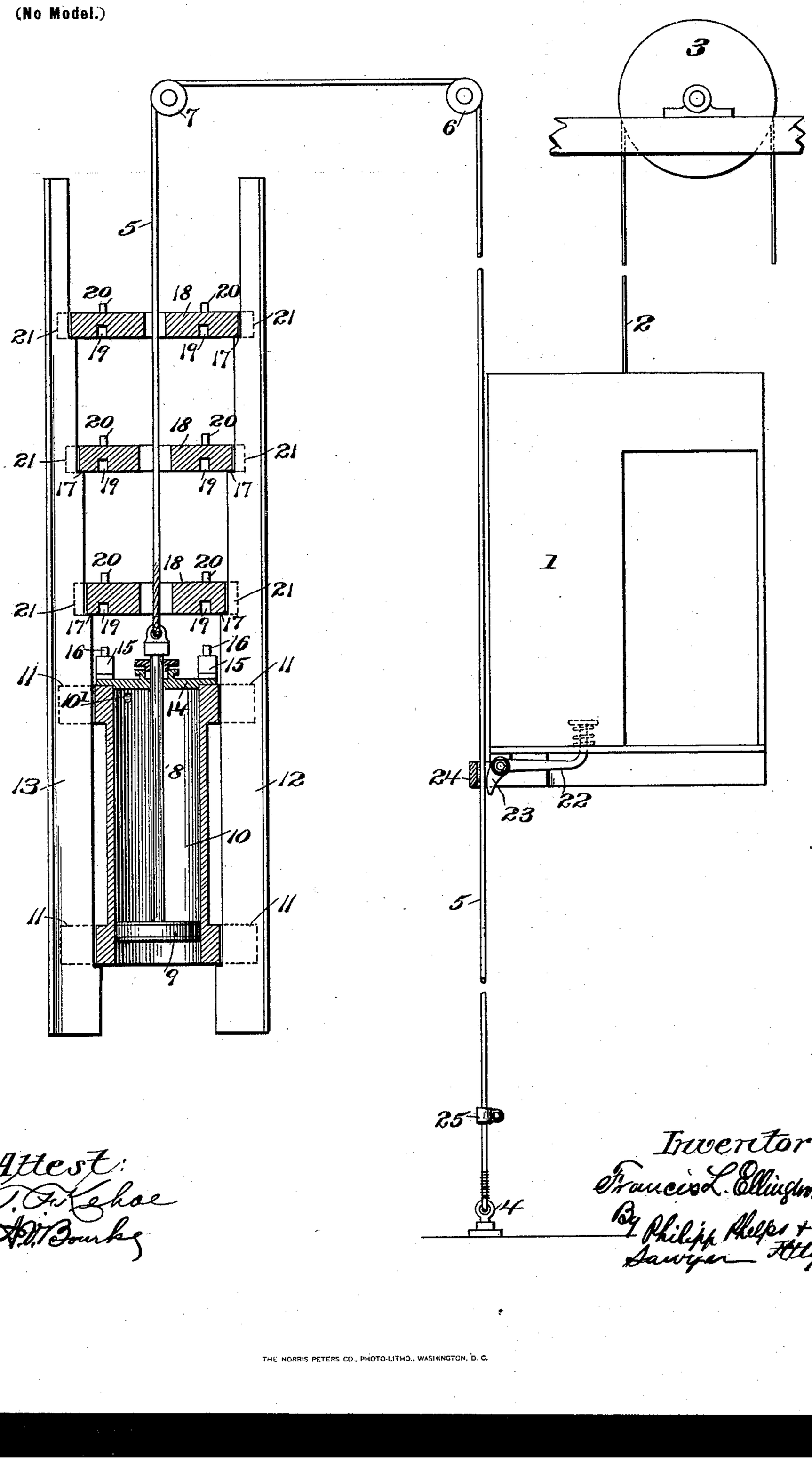
F. L. ELLINGWOOD.

RESISTANCE DEVICE.

(Application filed Oct. 29, 1898.)

(No Model.)



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UNITED STATES PATENT OFFICE.

FRANCIS L. ELLINGWOOD, OF NEW YORK, N. Y., ASSIGNOR OF THREE-FIFTHS TO CHARLES W. SCHUMANN, JR., OF ORANGE, NEW JERSEY.

RESISTANCE DEVICE.

SPECIFICATION forming part of Letters Patent No. 623,079, dated April 11, 1899.

Application filed October 29, 1898. Serial No. 694,894. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS L. ELLINGWOOD, a citizen of the United States, residing at New York city, county of New York, and State of New York, have invented certain new and useful Improvements in Resistance Devices, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to certain improvements in devices for producing a constantly-increasing resistance to movement produced by the application or development of force or power.

It is desirable in many relations to control, either by checking or stopping entirely, the movement which is the result of a force or power, either gradually or suddenly developed, by opposing to said movement a mechanical resistance which shall act in an elastic or cumulative manner. By bringing the controlling resistance into action in this cumulative manner the strains upon the mechanical parts by or through which the movement produced by the force is applied or transmitted to the resistance are lessened and the liability of injury or breakage is largely avoided.

It is the object of this invention to produce an elastic or cumulatively-acting mechanical resistance which shall be useful in such relations as those above indicated, which shall be cheap in its construction, positive in its action, in which the amount of resistance may be automatically varied by the addition of successive increments of resistance according to variations in the power or force which produce the movement which the resistance is intended to control, and in which the initial action of the resistance shall be elastically applied or applied with a cushioning effect, thereby still further lessening the resulting strains upon the mechanical connections.

A further object of the invention is to produce a mechanical resistance of the class described in which not only is the initial resisting effect applied elastically or with a cushioning effect, but in which the successive increments of resistance are applied in the same manner, thereby still further decreasing the strains developed in the mechanism or connections through which the movement produced by the action of the power or force is transmitted to the resistance devices.

While such a resistance as has been heretofore generally described has a wide field of application and is useful in many and varied relations in the arts, I have for the purpose of clearly illustrating the invention shown it as applied in the form of a safety device for elevators. It is to be understood, however, that the particular embodiment of the invention selected shows only one of the many relations in which the invention can be successfully used and that the invention is not to be limited to this use or to any specific use.

The invention consists in certain parts, improvements, and combinations, which will be hereinafter described, and more fully pointed out in the claims hereunto appended.

In the drawing which forms a part of this specification and in which like characters of reference indicate the same parts the figure represents a diagrammatic view, partly in section, showing one form of the improved resistance applied as a safety device for elevators.

Referring to the drawing, 1 indicates diagrammatically an elevator-car of any usual or approved construction. The car is raised or lowered by means of the cable 2, which runs over a pulley or sheave 3, the other end of the cable being secured to any desired form of hoisting mechanism. To the bottom of the elevator-shaft, by means of a screw-eye 4 or in any suitable manner, is secured a cable 5, which runs up through the shaft. This cable passes over pulleys or sheaves 6 7 and thence to the resistance device, which may be located at any desired or suitable point with reference to the elevator mechanism or its shaft.

In the form of resistance chosen for illustration the cable 5 is connected to a piston-rod 8, the piston 9 of which works in an air-cylinder 10, which may be provided with an air-port 10′, by which air may be admitted to the cylinder when desired, the port being controlled by any suitable valve. (Not shown.) This cylinder 10 is a movable cylinder and is preferably mounted so as to be guided in its

movement. The guiding of the cylinder may be effected in any desired manner. In the form of device shown, however, the cylinder is provided with wings or projections 11, which run between two pairs of guides 12 13. The aperture in the head 14 of the cylinder through which the piston-rod passes will preferably be suitably packed, and the said head is also preferably provided with upwardly-extending projections or blocks 15, terminating in pins 16, for a purpose to be hereinafter described. These blocks and pins, however, form no essential part of the invention and may be omitted, if desired.

The guides or ways 12 and 13 are shown as provided with a series of shoulders or ledges 17. The shoulders or ledges constituting each pair are preferably farther apart than the shoulders of the pair beneath them. On these shoulders rest a series of weights 18, these weights being preferably provided with recesses 19 on their under sides and upwardly-projecting pins 20 on their upper surfaces. The weights are also preferably provided with guides or projections 21, which extend into the space between the ways 12 and 13, so that the weights may be guided in their movement by the ways.

The elevator-car is provided with any suitable clutch device by which the car may be clutched to the cable 5. Such a device is diagrammatically indicated in the figure, the car being shown as carrying a pinch-lever 22, having a jaw 23, which operates in connection with a stationary jaw 24, carried on the car. The operating end of the lever 22 extends into the car and is provided with a head 23, between which head and the floor of the car is interposed a spring 24, which holds the pinch-lever normally out of action.

The operation of the device will be obvious from the description heretofore given. Should the hoisting-cable break or the car start to fall from any cause or should it be desirable to stop the car for any other reason and by means other than those controlling the hoisting and lowering mechanism, any occupant of the car may place his foot on the head 23 of the lever 22, thereby causing the jaw 23 to grip the cable between it and the stationary jaw 24. A downward pull is thus exerted upon the cable, and this pull will in the first instance cause the piston 9 to travel upward in the cylinder, thereby compressing the air therein contained. When the piston has traveled upward sufficiently, so that the air therein is compressed beyond a given point, the inertia of the cylinder will be overcome and it will travel upward with the piston. Should the weight of the cylinder, which it is to be understood is or may be of sufficient weight to in itself counterbalance the car, be insufficient to check the downward movement of the car, the parts will travel up until the first of the weights 18 is picked up, its weight thereby affording an additional increment of resistance to the downward travel of the car. Owing to the fact that the air between the cylinder-head and the piston forms an elastic cushion it will be understood that there is far less shock as the weight is picked up than there would be if there were a rigid connection between the piston and the cylinder, and this is true for each successive weight picked up.

The pins 16 on the blocks of the cylinder-head enter the recesses 19 in the lower weight and serve to additionally guide it in its vertical movements, and the pins 20 perform the same office in connection with the recesses 19 of the other weights. The pins and recesses may, however, be omitted and the projections 21 be depended upon in connection with the ways 12 13, or both these guiding devices may be dispensed with.

The resistance device may, if desired, be used to stop the elevator when it reaches the bottom of its shaft. A simple means of so utilizing it is to provide the cable 5 with a collar or stop, as 25, with which the car will come into contact as it reaches the bottom of its shaft.

It will be understood that in the apparatus described the weight of the cylinder added to that of the successive weights picked up by it in its upward travel must be sufficiently great to overcome the greatest weight of the car and also the momentum developed by the car and its greatest load in its fall.

It is to be understood that the movable cylinder and piston may be arranged to produce the required movement of resistance operating in connection with a single heavy weight or other equivalent movable stopping or checking device, in which case, of course, the series of weights may be omitted.

The advantages of a movable stopping or checking device are of course obvious, as the movement of the car or other body to be resisted and checked will be overcome with far less jar and shock than if the movable cylinder and its piston come into contact with a rigid stopping device—such, for instance, as a fixed shoulder. The series of weights, however, constitutes the preferred form of stopping or checking device.

A spring or a suitable arrangement of springs may be introduced between the first moving part of the resistance device—namely, the piston—and the second moving part—namely, the cylinder—and, if desired, additional cushioning devices might be introduced between the several increments of resistance, so as to still further decrease the shock as each weight is picked up. While also the cylinder and piston are shown in this particular form as having a movement in a vertical direction, it is of course quite possible to arrange the several parts so that they may move horizontally or in any other desired direction. The guiding devices for the cylinder and the weights may also be omitted, if desired.

In general it is to be understood that the invention is generic in its nature and embraces such changes and variations in con-

struction as fall within the spirit and scope of the claims.

What I claim is—

1. In a mechanical resistance, the combination with a movable part, of a movable second part adapted to move by the movement of the first part, means whereby the inertia of the second part is elastically overcome by the movement of the first part and movable means whereby the movement of the second part is checked, substantially as described.

2. In a mechanical resistance, the combination with a moving part, of means for elastically applying a succession of increments of resistance to the movement of said part, substantially as described.

3. In a mechanical resistance, the combination with a movable part, of a second part adapted to be moved by the movement of the first part, means whereby the inertia of the second part is elastically overcome by the movement of the first part, and means for interposing successive increments of resistance to the movement of said part, substantially as described.

4. In a mechanical resistance, the combination with a movable cylinder, of a piston arranged to move therein, means whereby the movement of the piston may be elastically communicated to the cylinder and movable means whereby the movement of the cylinder is checked, substantially as described.

5. In a mechanical resistance, the combination with a movable air-cylinder, of a piston arranged to move therein, the arrangement being such that the cylinder will be moved by the piston after the air has been sufficiently compressed and movable means by which the movement of the cylinder is checked, substantially as described.

6. In a mechanical resistance, the combination with a cylinder, of a piston arranged to move therein, means for elastically communicating the movement of the piston to the cylinder, and means for interposing additional increments of resistance to the movement of the cylinder, substantially as described.

7. In a mechanical resistance, the combination with an air-cylinder, of a piston arranged to move therein, the arrangement being such that the cylinder will be moved by the piston after the air has been compressed to a given degree, and means for interposing additional increments of resistance to the movement of the cylinder, substantially as described.

8. In a mechanical resistance, the combination with a movable cylinder, of a piston arranged to move therein, means for elastically communicating the movement of the piston to the cylinder, guides for controlling the movement of the cylinder and movable means for checking the movement of the cylinder, substantially as described.

9. In a mechanical resistance, the combination with a movable cylinder, of a piston arranged to move therein, means for elastically transmitting the movement of the piston to the cylinder, guides for controlling the movement of the cylinder, a series of weights which are successively applied to the cylinder during its movement, and guides for controlling the movement of the weights, substantially as described.

10. In a mechanical resistance, the combination with a movable air-cylinder, of a piston arranged to move therein, the piston acting to move the cylinder after the air has been compressed to a given degree, a series of weights arranged to be successively picked up by the cylinder in its travel, projections on the cylinder and weights, and guides between which the projections extend, substantially as described.

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

FRANCIS L. ELLINGWOOD.

Witnesses:

T. F. KEHOE,

A. V. BOURKE.