No. 623,078. Patented Apr. 11, 1899.

F. L. ELLINGWOOD.

SAFETY APPLIANCE.

(Application filed Oct. 29, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

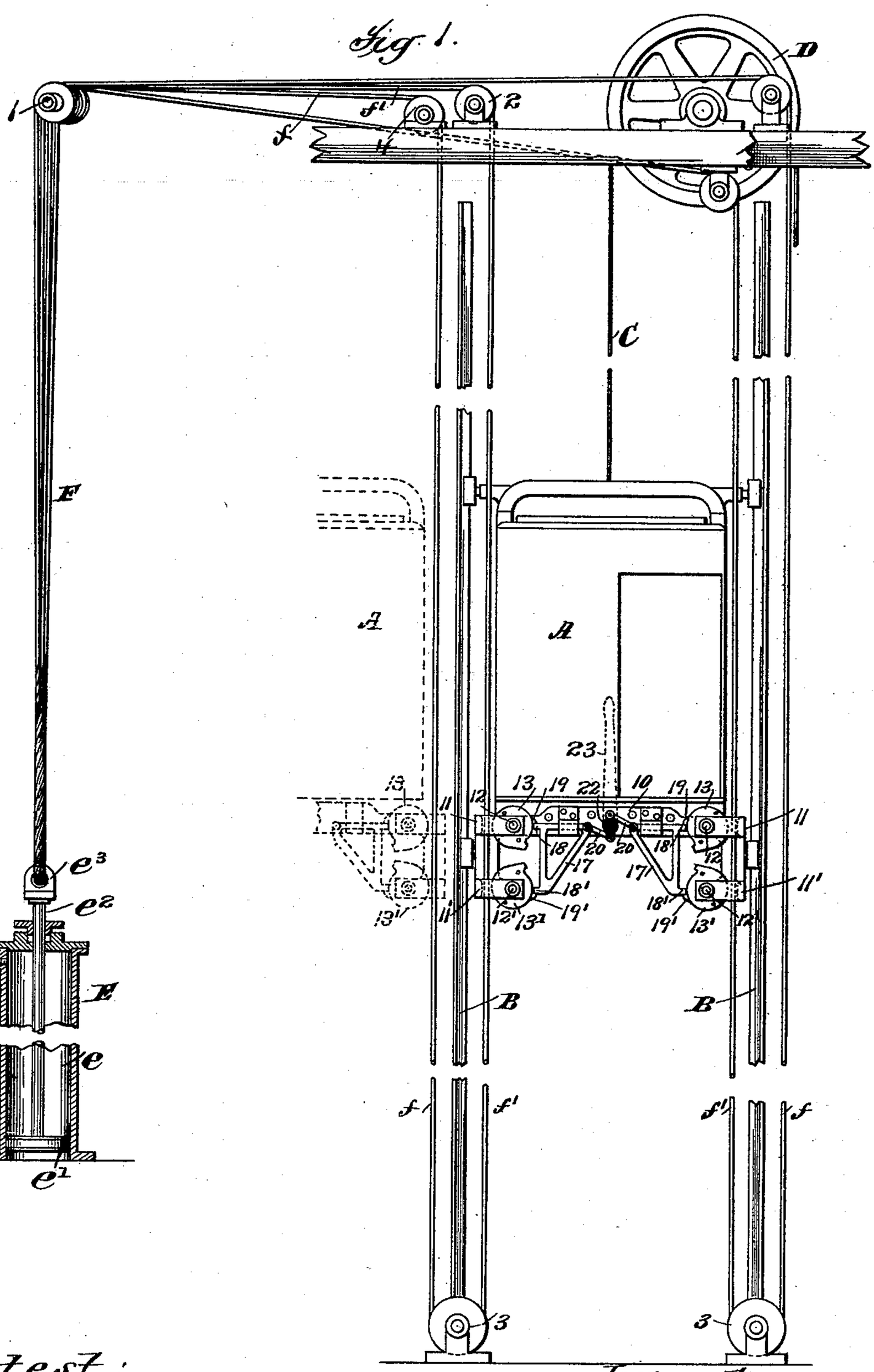

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Fig. 2.

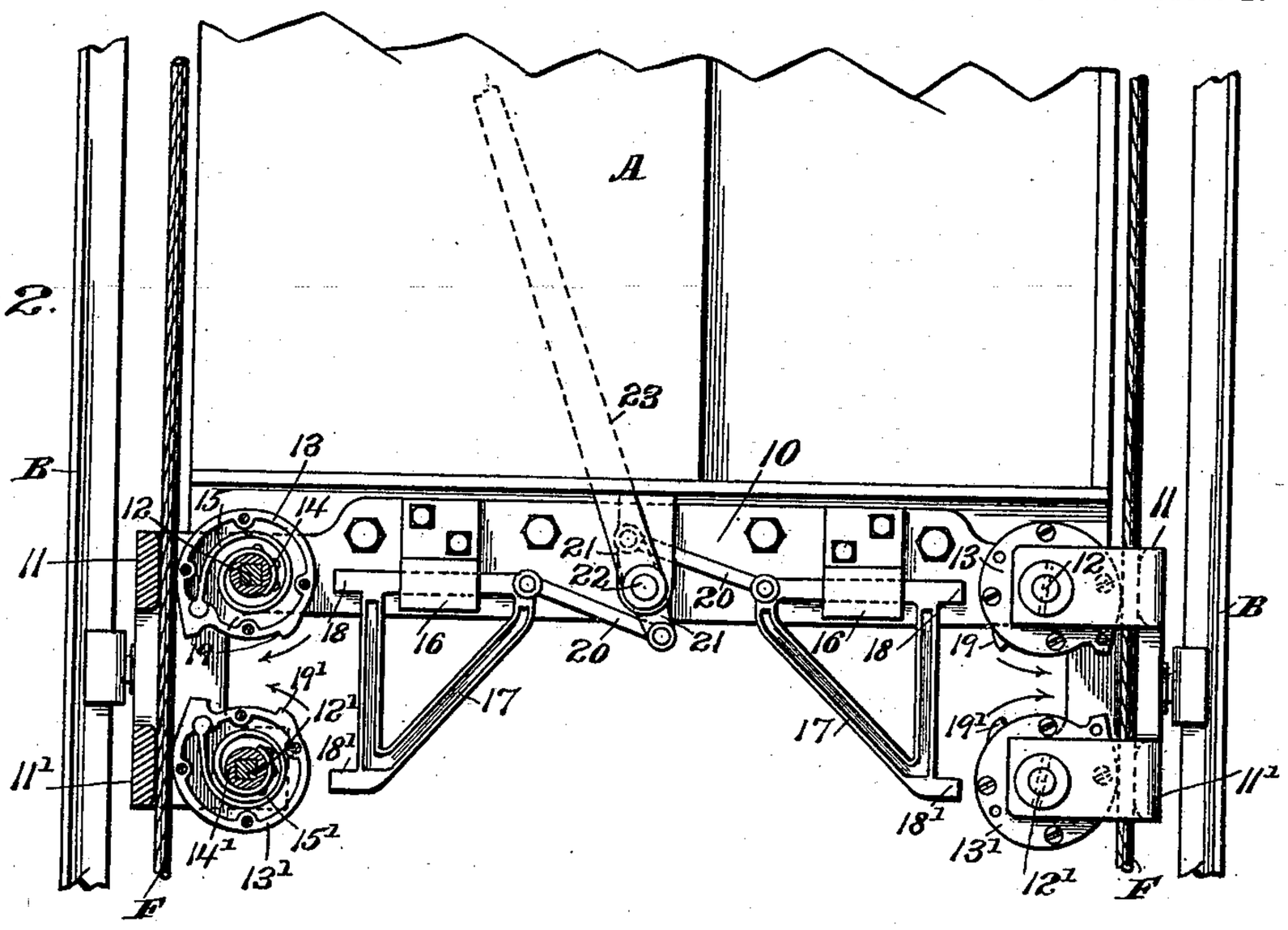
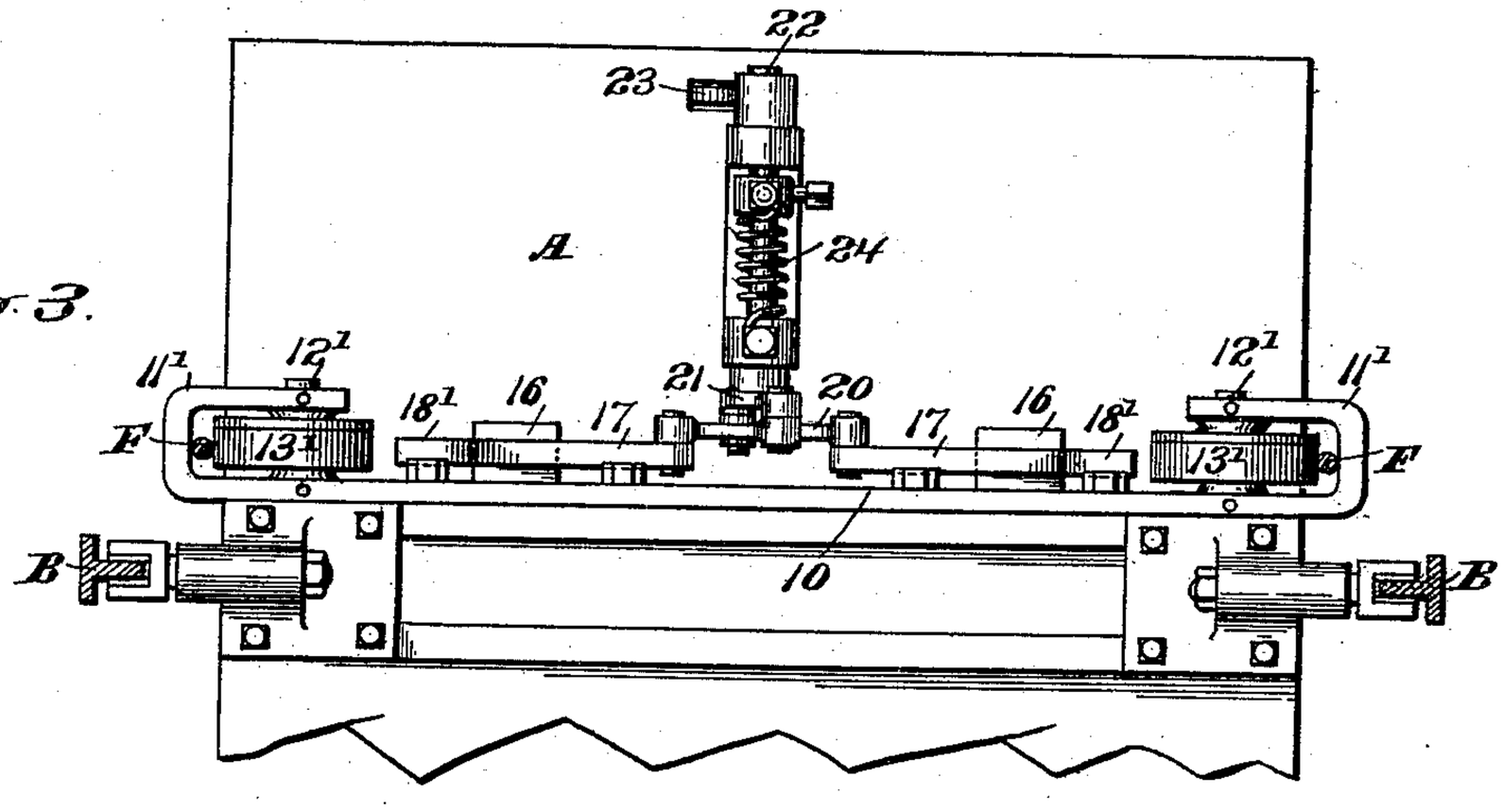


Fig. 3.



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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.

SAFETY APPLIANCE.

SPECIFICATION forming part of Letters Patent No. 623,078, dated April 11, 1899.

Application filed October 29, 1898. Serial No. 694,893. (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 Safety Appliances, 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 safety appliances.

The safety appliance which embodies this invention, while useful in other relations, is more particularly designed for use with elevators. The invention will therefore be described in connection with elevators; but it is to be understood that the invention is not to be limited to use in connection with elevators, as it is useful in other relations and such use is contemplated.

Elevators as now usually constructed may be generally divided into three classes. The first of these classes may be said to include those elevators in which the loaded car is caused to ascend by the pull of the operating mechanism and to descend by gravity against the pull of said mechanism, there being provided a counterbalance of a weight equal to or approximating the weight of the car. The second class includes those elevators in which there is provided a counterbalance which is equal to the weight of the car plus the mean passenger load. In this class when the car is carrying more than its mean load it is hoisted by the operating mechanism and descends by its own weight controlled, of course, by the operating mechanism. When an elevator of this class is carrying less than its mean load, it is hoisted by the counterbalance acting against the pull of the operating mechanism and is caused to descend by the pull of the operating mechanism acting against the pull of the counterbalance. The third class includes those elevators in which there is provided a counterbalance which is greater than the weight of the car plus the maximum load. In this class of elevators the counterbalance always causes the car to ascend against the pull of the operating mechanism, and the operating mechanism always causes the car to descend against the pull of the counterbalance.

It is the object of the invention to produce a safety appliance which shall be cheap in construction, simple in operation, and which shall be capable of being applied to any of the classes of elevators above specified or modifications thereof, as well as to the control of other moving bodies, cars, or carriers, and which shall act to insure against accident which results from a failure of either the operating or counterbalance mechanism, or both, to properly operate, whereby control might be lost of the car when it is moving in either direction, and also to act to stop the car or carrier at any point, if desirable to do so for any reason whatever, and to do this when it is moving in either direction.

A further object of the invention is to provide a safety appliance of such a character that a bank or series of elevators may be connected to a single resistance or stopping mechanism and to provide connections of such a character that when desired a single set may be made to serve for each pair of cars of the series.

A further object of the invention is to provide a single car or each car of a series of cars with a plurality of devices by which the car can be connected to the safety appliances when moving in either direction, which devices shall be in the first instance under the control of the operator, but which, after being released, shall automatically act to connect the car to said appliances, whereby the movement of the car may be controlled no matter in which direction it is traveling.

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 accompanying drawings, which form a part of this specification, in which like characters of reference indicate the same parts, Figure 1 is a diagrammatic view representing the construction of the improved safety appliance and showing its arrangement when it is used in connection with a bank or series of elevators, one elevator being shown in full lines and a second indicated in dotted lines.

Fig. 2 is a sectional detail showing the construction and arrangement of a series of devices which may be employed to connect the car to the safety appliance, and Fig. 3 is an underside detail plan view of the construction shown in Fig. 2.

Referring to the drawings, A indicates an elevator-car of any approved construction. The car is guided in any suitable manner in the usual guides or ways B and has connected thereto a cable C, running over a sheave or pulley D and thence to any desired or approved form of hoisting mechanism.

Located at any desirable or suitable point with respect to the elevator or its shaft is a resistance device E. This resistance device E is herein shown as consisting of an air-cylinder *e*, having a piston *e'* working therein, to which is connected a piston-rod e^2, said piston-rod working through a stuffing-box at the top of the cylinder, as is usual. This form of resistance has been chosen to illustrate the principle of the invention; but it is to be understood that any other form of resistance device may be substituted therefor, as the invention is not to be limited to any particular construction of resistance mechanism.

Connected to the piston-rod e^2 in any suitable manner, as by an eye e^3, is a set of connections which may be formed from a cable F, which is run in a loop into the elevator-shaft. When the resistance is located with reference to the elevator in the manner shown in the drawings, the connection or cable preferably runs over a guide which is preferably in the form of a pulley or sheave on a shaft 1, though any other suitable guide may be used. From the pulley on the shaft 1 one part *f'* of the cable, which forms one side of the loop, runs over a guide 2, which is also preferably in the form of a pulley, and down through the elevator-shaft in position to be acted upon by certain clutching devices on the car, which will be hereinafter described. At the bottom of the shaft is located a guide 3, also preferably consisting of a pulley, around which the cable passes. It then runs upward over a guide 4, also preferably consisting of a pulley, thus forming the second part of the loop, which is marked *f*. After leaving the pulley 4 the cable runs over a guide-pulley, which is preferably located on the shaft 1, and preferably down to the eye e^3 on the piston-rod, to which it is connected. It is apparent that with the cable connected and running as shown and described a circuit of connections extending from the resistance device is formed, as distinguished from a single connection—such as would be formed, for instance, by a cable or other similar or equivalent connecting means extending from the resistance device to some point in the path of travel of the car. While in the apparatus shown this circuit of connections is formed by a cable, it is of course obvious that it may be formed by other means. If now clutching devices on the elevator-car or other moving body or connected to said car or body be thrown into action when the car or body is moving in either direction, a pull will be exerted on the circuit of connections. In the construction shown if the clutches are thrown in when the car is descending the pull will be exerted on the circuit by the part *f'* of the cable to which the clutching devices are connected and this pull will be transmitted directly to the resistance devices by that part of the circuit made by the cable, thus raising the piston in the cylinder and when the air therein is sufficiently compressed bringing the car to a stop. If, on the other hand, the clutching devices be thrown into action when the car or other body is ascending or moving in the opposite direction, an upward pull or a pull in the opposite direction will be exerted on the circuit of connections. In the construction shown this pull will be transmitted to the resistance device through the part of the circuit made by the cable *f*, which runs over the guides 3 and 4, and will also tend to raise the piston in the air-cylinder and stop the car or other moving body. It is obvious, therefore, that by thus forming a circuit of connections by a cable or other equivalent means arranged in a loop the circuit of connections and resistance devices can be made to control the car when it is going in either direction.

As elevators are now usually constructed in banks or series, especially in large buildings, the looped cable will preferably be arranged so that one part of the loop will lie in one elevator-shaft and the other part of the loop will lie in another elevator-shaft, as indicated in Fig. 1. By this arrangement one looped cable can be made to operate in connection with two elevators, if desired, thus making a very economical construction. The construction is of course equally applicable to single elevators, in which case both parts of the loop might be, if desired, arranged in the elevator-shaft, though only one portion of it would be in position to be seized by the clutching devices, or one part of the loop might be returned in any suitable manner outside the shaft.

Any form of clutching device may be used to connect the car to the cable. In the present form of the invention, however, I employ clutching devices which are normally locked out of operation, the locking mechanism being under the control of the elevator attendant. The clutching devices are preferably arranged in pairs, one or more pairs being used. When the locking mechanism is released, both clutching devices are automatically operated and one clutching device of each pair acts to grip the cable, and thereby connect the car thereto, when the car is ascending, and the other clutch operates in the same manner when the car is descending.

The car, preferably at its bottom, carries a strong casting or forging 10. This casting or forging is formed at each end to provide, pref-

erably, two sets of stationary jaws 11 and 11′, as shown, though only one set need be used. Extending between each jaw 11 and the body of the casting or forging is a short support or non-rotatable shaft 12, and extending between the jaws 11′ and the body of the casting or forging are similar supports 12′. These supports carry rotary clutch members 13 and 13′. Each of the supports 12 is provided with a squared collar 14, and each of the supports 12′ is provided with a squared collar 14′, which collars are located inside of the clutch members. To these squared collars are connected springs 15 and 15′. The other ends of the springs are connected in any suitable manner to the clutch members 13 and 13′. The connection shown consists of enlarged heads on the springs, which fit in sockets in the clutch members. The rotary clutch members are journaled eccentrically or have cam sides which coöperate with the stationary jaws to pinch the cable F between them and the jaws, thus connecting the car to the cable. The springs 15 and 15′ tend to rotate their respective clutch members in opposite directions, and the arrangement is such that when the clutch members are thrown in by the springs the movement of the car in either direction tends to tighten the grip of one of the clutch members and loosen the grip of the other. For instance, in the arrangement shown if the car is ascending and the clutch members are thrown in the movement of the car will tend to rotate the clutch member 13 in such a direction as to increase its grip on the cable F, while it produces a contrary action on the clutch member 13′. One clutch member of each pair might of course be arranged on opposite sides of the car, if desired, or the clutch members on one side might be arranged to grip the cable if thrown out when the car is ascending, the clutch member on the other side acting in a similar manner when the car is descending. The arrangement shown, however, is regarded as the preferable one.

The clutch members may be held out of action by any suitable mechanism. Preferably, however, they are held out of action by means of sliding bolts of the construction best shown in Fig. 2.

The casting or forging 10 carries two brackets 16, in which slide triangular locking-bolts 17, having locking projections 18 and 18′. These locking projections normally engage with projections 19 and 19′ on the rotary clutch members 13 and 13′ and hold the same out of action and against the stress of the springs. The triangular locking-bolts 17 are operated by links 20, which are connected to rock-arms 21 on a short rock-shaft 22. This rock-shaft 22 has a lever 23 secured thereto and is normally forced by a spring 24 into such position as to hold the locking projections 18 and 18′ of the locking-bolt 17 into contact with the projections 19 and 19′ of the rotary clutch members. When, however, the car for any reason passes beyond the control of the operator, he throws the lever 23 against the stress of the spring 24. This withdraws the locking-bolts, as shown in Fig. 2, and permits the springs to throw the clutches into engagement with the cables F. The car is thus made fast to the cables, and the resistance is thrown into operation to stop the car.

It is obvious that many changes may be made in the details of construction by which the invention is carried into effect. Indeed, some modifications have been suggested and many others are possible. The invention is not, therefore, to be limited to the specific details of construction shown and described or to use in connection with elevators, as it may be used in other relations, such as to control the cars of gravity-railways, in hoisting mechanism, and generally where it is desired to control the movement of a carrier or other moving body which travels in two directions.

What is claimed is—

1. In a safety appliance for elevators the combination with a single resistance device, of a series of elevators, and means for connecting each elevator of the series to said resistance device, substantially as described.

2. In a safety appliance, the combination with a car or carrier, of a resistance device mounted independently of the car or carrier, and means whereby the resistance device may be brought into operation to control the movement of the car or carrier in two directions, substantially as described.

3. In a safety appliance, the combination with a resistance device, of a car, carrier or body having a movement in two directions, a circuit of connections from said resistance device lying along the path of travel of the body, and means for connecting the body to the circuit of connections, substantially as described.

4. In a safety appliance for elevators, the combination with a resistance device, of a cable having both ends connected to the resistance device, thus forming a loop, one part of the loop being located in the elevator-shaft, and a guide at the end of the loop which is farthest from the resistance device, substantially as described.

5. The combination with an elevator, of a resistance device, a looped cable connected thereto, one part of the said loop being located in the elevator-shaft, and devices for connecting the elevator to the loop of the cable, the construction being such that a pull on the loop in either direction will be transmitted to the resistance device, substantially as described.

6. In a safety appliance for elevators, the combination with an elevator, of a resistance device, a circuit of connections extending therefrom, and means for connecting the elevator to said circuit when the elevator is moving in either direction, substantially as described.

7. In a safety appliance for elevators, the combination with two elevators, of a resist-

ance device, a looped cable connected thereto, one part of the loop lying in each elevator-shaft, a guide for the loop, and means for connecting each elevator to the loop, substantially as described.

8. The combination with a series of elevators, of a resistance device, a series of looped cables, the loops between each pair of elevators lying in the shafts thereof, and means for connecting each of the elevators to one side of a loop, substantially as described.

9. The combination with a pair of elevators, of a resistance device, a pair of pulleys located near one end of the elevator-shaft, a single pulley located near the other end of the elevator-shaft, a looped cable running around the pulleys, and means for connecting each elevator to that part of the loop lying in its own shaft when the elevator is moving in either direction, substantially as described.

10. In a safety appliance, the combination with a resistance device, of a circuit of connections extending therefrom, a car or carrier moving in two directions along said circuit, a pair of oppositely-acting clutch members on the car or carrier, a locking mechanism for holding the clutch members out of action, and manually-operated devices for unlocking the clutch members whereby the car or carrier may be gripped to the circuit of connections when it is moving in either direction, substantially as described.

11. In a safety appliance, the combination with a car or carrier, of a resistance device, a looped cable connected to the resistance, a guide at the end of the loop which is farthest from the resistance device, a pair of oppositely-acting clutch members on the car or carrier, a locking mechanism for holding the clutch members out of action, and manually-operated devices for unlocking the clutch members whereby the car or carrier may be gripped to the looped cable when it is moving in either direction, substantially as described.

12. In a safety appliance, the combination with a car or carrier moving in two directions, of a looped cable, one side of which lies along the path of the car or carrier, a guide at the end of the loop which is farthest from the resistance device, a pair of oppositely-acting clutch members, connections between said members and the car, a locking mechanism, and means for operating the locking mechanism whereby the car or carrier may be gripped to the looped cable when it is moving in either direction, substantially as described.

13. In a safety appliance for elevators, the combination with a bank or series of elevators, of a resistance device, a series of looped cables extending therefrom, the loop between each pair of elevators lying in the shafts thereof, a pair of oppositely-acting clutch members carried by each elevator-car, a locking mechanism for holding the clutch members out of action, and manually-operated devices for operating the clutch members, substantially as described.

14. In a safety appliance for elevators, the combination with a resistance device, of a circuit of connections extending therefrom into the elevator-shaft, a car in the shaft, a pair of oppositely-acting clutches carried by the car, a locking mechanism for holding the clutches out of operation, and manually-operated devices for unlocking the clutches, 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.