947,585.

J. A. ASHTON, Sr.

ELEVATOR.

APPLICATION FILED JAN. 7, 1909.

Patented Jan. 25, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

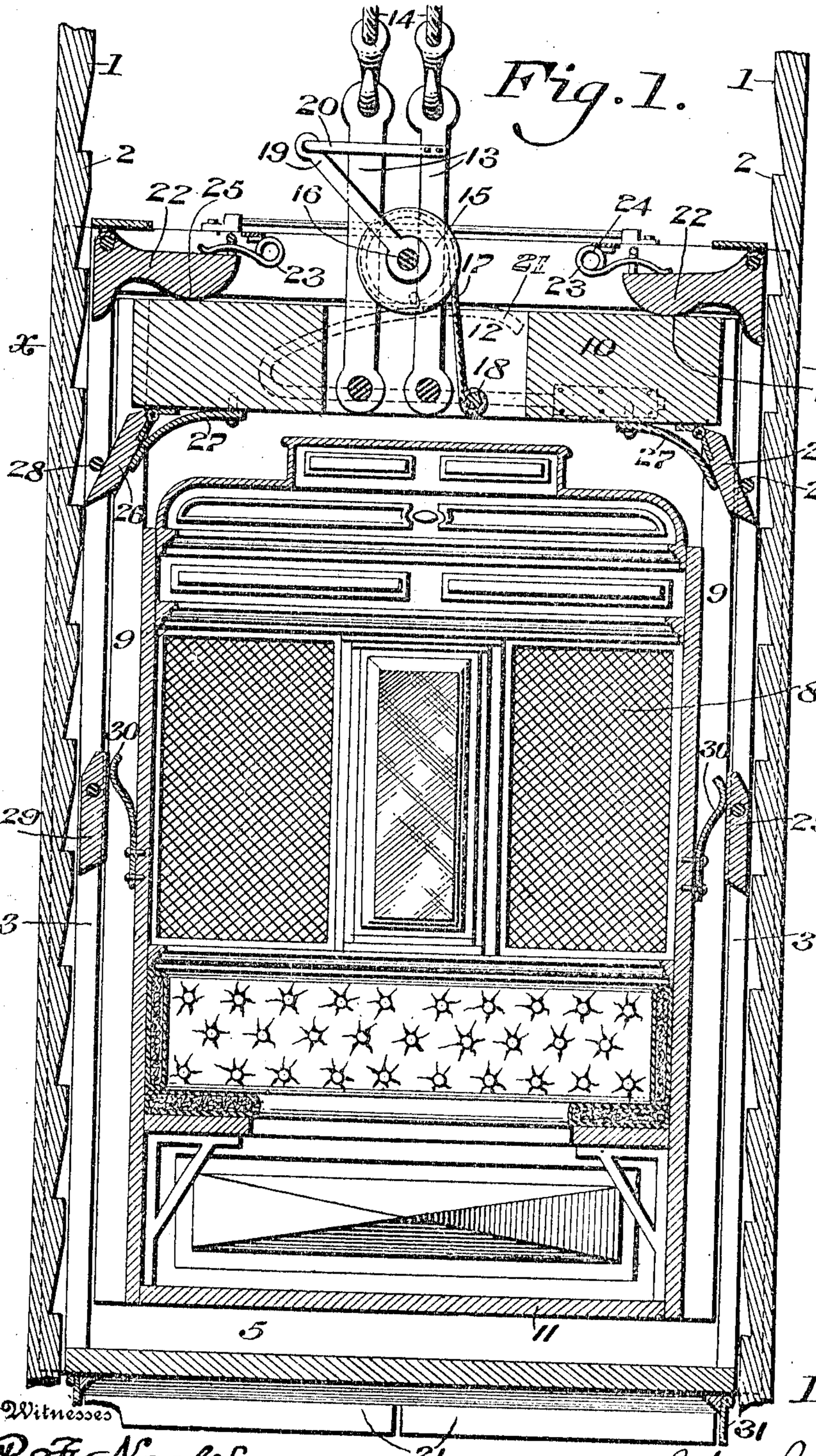
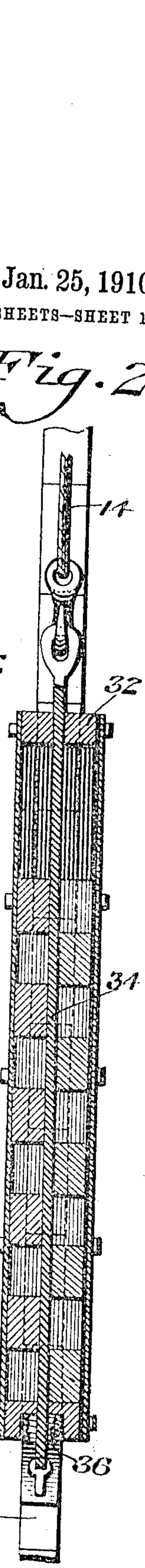


Fig. 2.



Witnesses

P. F. Nagler.

H. G. Dieterich

Inventor

By John A. Ashton Sr.

Wiedersheim & Fairbank.

Attorneys

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2 SHEETS—SHEET 2.

Fig. 3.

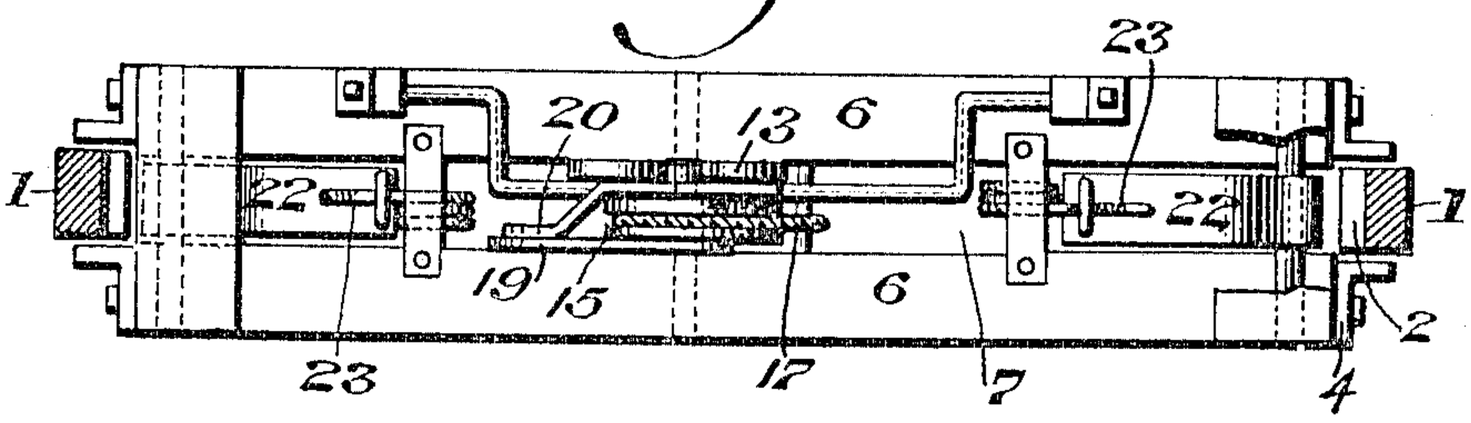


Fig. 4.

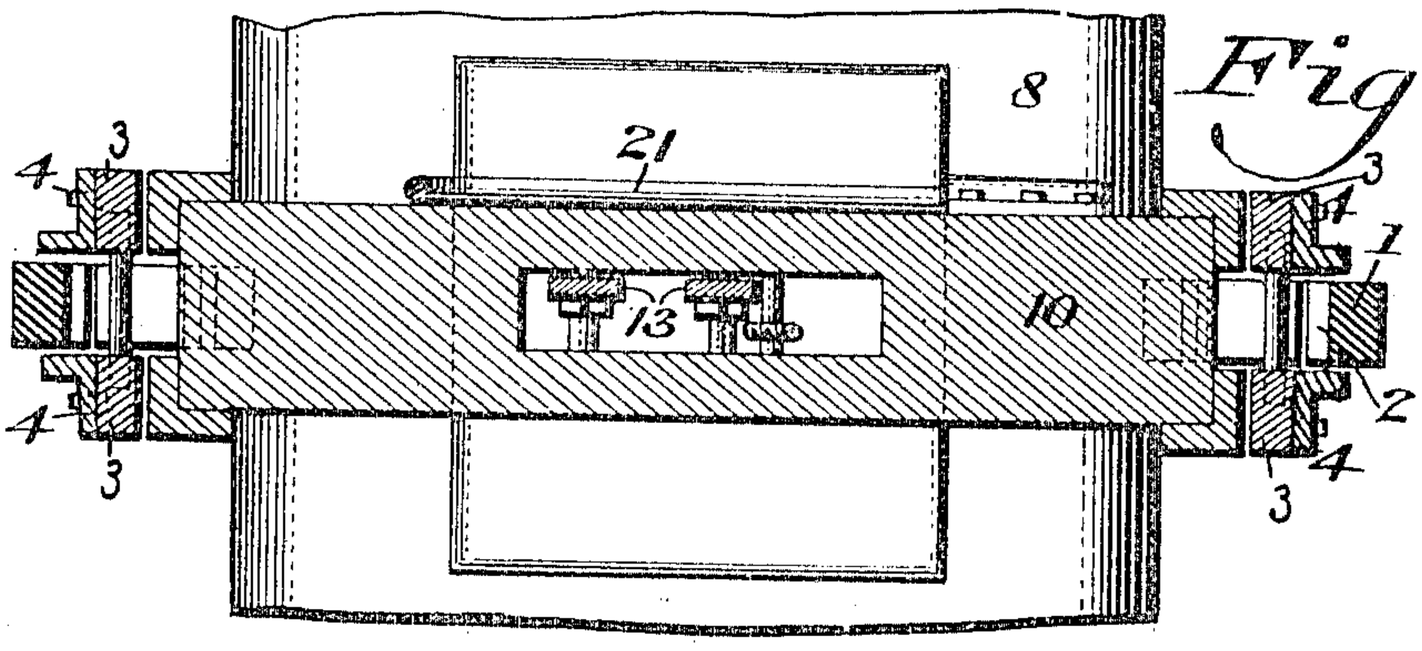
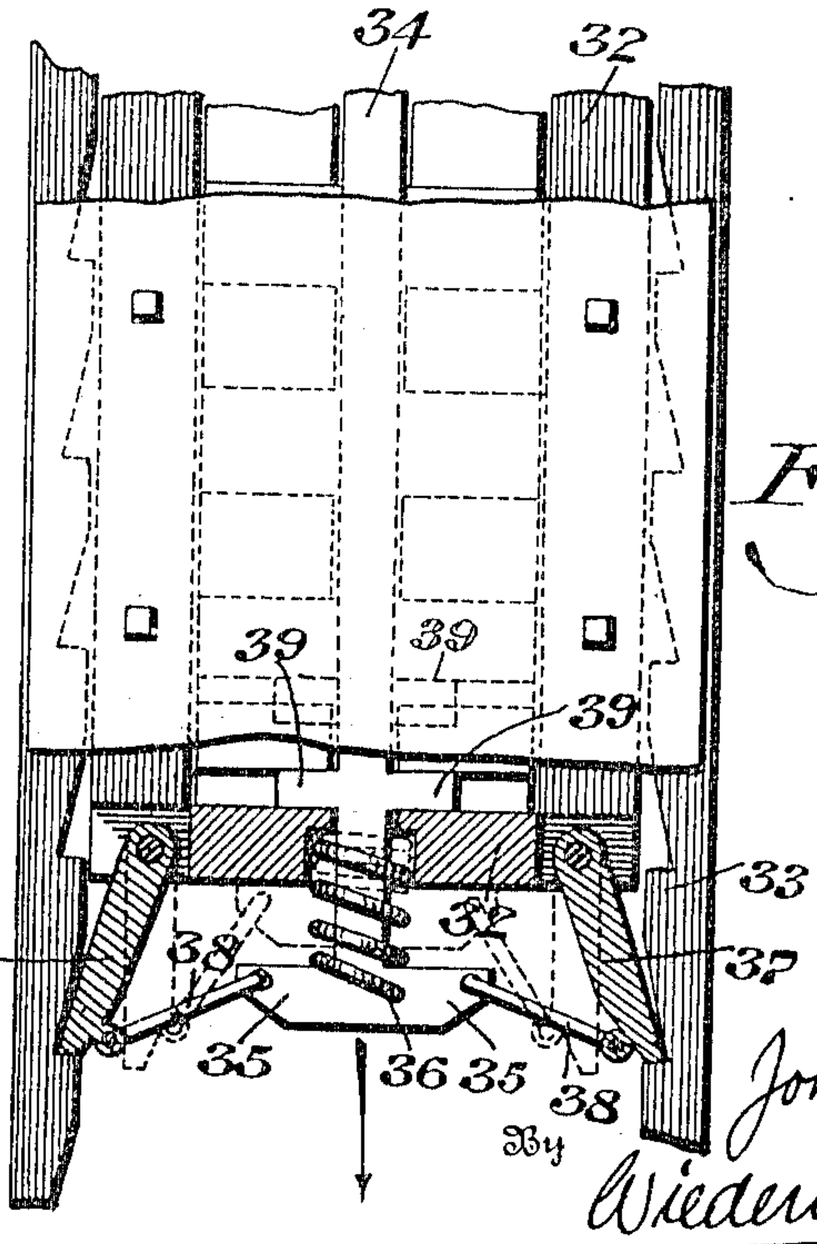


Fig. 5.



Witnesses

P. F. Nagle.

H. G. Dieterich

Inventor

John A. Ashton Sr.

By Wiedersheim & Laubaus.

Attorneys

UNITED STATES PATENT OFFICE.

JOHN A. ASHTON, SR., OF PHILADELPHIA, PENNSYLVANIA.

ELEVATOR.

947,585. Specification of Letters Patent. Patented Jan. 25, 1910.

Application filed January 7, 1909. Serial No. 471,150.

To all whom it may concern:

Be it known that I, JOHN A. ASHTON, Sr., a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Elevator, of which the following is a specification.

This invention relates to safety attachments for elevators and has for an object the arresting or stopping of the descent of an elevator in case the hoisting cable should for any reason become slackened or broken and thereby prevent the sudden drop of the elevator to the bottom of the shaft resulting in its destruction and injury to the life of the persons therein.

In elevators as heretofore constructed, the safety devices have been variously arranged in connection with the cage proper but in practice it has been found that the breaking of the hoisting rope causes such a sudden descent of the elevator and its contents that the safety devices do not have time to engage with their coöperating parts to check the descent and before they assume an effective position for this purpose the elevator has reached such a high velocity that the devices are either torn from their fastenings or rendered inoperative in other ways.

In my present invention I have devised a structure wherein the safety devices are thrown into immediate action upon the slackening of the cable rope and before there has been any appreciable downward falling movement and in which construction a number of auxiliary safety devices are employed which act substantially simultaneously with and reinforce the action of the first safety catches operated directly upon the breaking of the cable.

Figure 1 represents a sectional elevation of an elevator embodying my invention. Fig. 2 represents a vertical section through the elevator counterweight mechanism. Fig. 3 represents a plan of my novel safety mechanism in locked position. Fig. 4 represents a section on line *x*—*x*, Fig. 1. Fig. 5 represents a front elevation of a portion of one of the counterweights.

For the purpose of illustrating my invention, I have shown in the accompanying drawings one form thereof which is at present preferred by me, since the same has been found in practice to give satisfactory and reliable results, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described.

1 designates the usual guide sills secured in the ordinary manner to the side walls of an elevator shaft and provided in the present instance on their opposed faces with a series of stops 2, for a purpose to be hereinafter described. It will be noted that there is some appreciable distance between each stop and if desired the guide sills may be slightly tapered from one stop to another in order to insure proper action of the coöperating mechanism.

3 designates the side frames of an auxiliary car structure adapted to operate within the shaft the same having secured thereto guide bars 4 shown as formed of angle-iron construction whereby the car proper is correctly guided in its movement up and down between the sills 1. These frames 3, as here shown, are secured together at the bottom by a platform 5 and at the top by the cross beams 6 spaced apart to form an opening 7 therebetween for the purpose of receiving a novel type of safety apparatus.

8 designates a passenger elevator car of customary construction the same being secured to guides 9, which latter are braced by a top cross beam 10 whereby the main elevator structure is formed inclosed by the auxiliary frames 3, the two parts being relatively of somewhat varying height in order that a space may exist between the bottom 5 of the auxiliary frames and the bottom 11 of the main passenger elevator to permit relative and independent movement between the two car frames. The cross beam 10 in the present instance is provided with a suitable aperture 12 to receive a number of links 13 attached in any desired manner to the cross beam 10 and serving as a connecting means for the hoisting cables 14 to permit raising and lowering of the elevator and the operating of the counterweight mechanism, as desired. It will be apparent when the hoisting cables 14 are drawn upward that the cross beam 10 will contact with the

strips 6 of the auxiliary frame and thus produce a simultaneous movement of the two cage like structures.

15 designates a drum mounted on a shaft 16 in the space 7 between the braces 6 and serving as a winding means for a cable 17 fixedly secured at 18 to the cross beam 10, while said drum 15 has secured thereto an operating arm 19 connected in any suitable manner, as by the rod 20, to one of the links 13 whereby the cable 17 is maintained tightly wound to the drum and serves to hold the two elevator frames in close contact during the up and down movement of the elevator.

In the present instance, 21 designates a spring member fixedly secured to the cross beam 10 and adapted when in normal expanded position to extend some distance above the cross beam 10 but when the two top beams 10 and 6 are drawn together under the action of the cable 17 the spring will be compressed, as shown in dotted lines, Fig. 1, and thereby placed under a heavy tension so that should the cable 14 break causing relaxation of the cable 17, the spring 21 will be released and kick the two members apart to throw into operation the safety device now to be described. As here disclosed, it will be noted that I employ a single spring 21 serving as a means to separate the two cross beams when the cable is broken although it will be apparent that I may employ two or more springs in order to insure definite operation at the time desired. It will be noted that the spring or springs 21 act directly against the lower side of the cross beams 6 and thereby form supporting means for the auxiliary car when the cable 17 is under tension. The spring 21 is compressed sufficiently to allow the auxiliary car to rest substantially in contact with the cross beam 10, though, of course, all the time, the spring 21 is under compression relatively supporting the same.

22 designates a plurality of safety catches pivoted in any desired manner to the cross beams 6 and located adjacent the edge of the side strips 3, being in normal position substantially flush with the edge thereof, while in operative position they project a sufficient distance beyond the edge to engage the stop portion 2 or rack of the guides 1. In order to bring these safety catches into operation at the desired time, a spring 23 is secured by clips 24 or otherwise to the cross beam 6 and when the safety catches are in normal position this spring is placed under tension so that when the catch 22 is released it will be swung on its pivot to the outward engaging position. It will be noted that each catch 22 has a cam like face 25 thereon adapted to extend into the path of movement of the cross beam 10 and be engaged thereby to be pushed back into the position shown in Fig. 1 when the beam 10 is drawn up the normal position in substantial contact with the cross beams 6. It will therefore be evident that if for any cause the elevator car 8 drops away from the cross beams 6 the cross beam 10 being attached thereto will have the same movement and thereby release the safety catches which under action of the springs 23 will swing outwardly to stop the downward movement of the auxiliary car. Pivoted in any desired manner to the cross beam 10 is another set of safety catches 26 with each of which engages a spring 27 the tendency of which is to force the safety catches 26 outwardly and into engagement with the stops 2 at certain intervals. In order that these catches may not be thrown into operative position at the wrong time stops 28 are mounted on the side guide 3 against which the safety catches 26 are held and it is only when the cage 9 drops below the stop members 28 that the safety catches 26 may project beyond the edge of the auxiliary car to perform the function described. A similar set of catches 29 are pivoted to the side guides 3 and are acted upon in the present instance by springs 30, normally pressing against the end of the safety catches to hold the rack engaging ends out of contact with the rack. Of course, it will be evident since as shown, the springs 30 act at a point substantially coincident with the pivot, that under normal conditions there will be no movement of the safety catches but as soon as a release movement takes places between the side guides 3 and the guides 9 of the inner car the springs 30 being attached directly to the elevator car are brought into engagement with the longer arm of the safety catch 29 thereby forcing the same outwardly to act as another stop for the car.

It is well known that an elevator car as it nears the bottom of a shaft produces a compression of the air beneath it and as there is a comparatively small space between the sides of the elevator car and the walls of the shaft this trapped air acts as a cushion to retard the movement of the elevator and lessens the shock at the bottom. In order to still further reduce the contact with the bumpers at the bottom of the shaft, I have provided a means to retard the escape of the trapped air and in the present instance, I disclose a plurality of depending plates 31 pivoted to the bottom of the car structure and so arranged that the edge of each is adjacent the side of the bottom of the car so that the upwardly traveling air will press these members outwardly to engage with the walls of the shaft thus retarding the escaping air and increasing the cushioning effect of the air trapped beneath the car.

Of course it will be evident that one of

the cables 14 is secured to the usual counterweight structure as 32 which is adapted to travel at the side of the elevator shaft in the guides 33 which in the present instance are shown as notched guides 33 forming a series of stops adjacent the sides of the counterweight. In the present instance the cable 14 is attached directly to a bar 34 mounted for sliding movement in the counterweight frame which latter is supported and operated by means of extensions 35 formed on the end of the bar 34 which are adapted to extend beneath the counterweight frame and raise the same as the elevator is lowered.

In my preferred construction I employ a spring 36 mounted between the extensions 35 and the frame 32 whereby if for any cause the cable 14 slackens the spring will act to quickly separate the bar 34 from the bottom of the frame 32. This action serves to operate the safety catches 37 of the counterweight structure and which as herein disclosed are pivoted to the bottom of the frame 32 and secured by rods 38 to the extensions 35 of the bar 34. It will be seen as long as the bar 34 is under tension of the cable 14 that the spring 36 will be compressed and the safety catches 37 maintained out of contact with the guide racks 33. For the purpose of more quickly and clearly operating the safety catches 37, and also insuring their operation should the spring 36 become broken I preferably form integral with the bar 34 side lugs 39 upon which the counterweights are directly supported thereby permitting gravity to operate the rod 34 in case the cable parts to throw the safety catches into operative position.

In normal operation the safety devices are positioned as illustrated in Fig. 1, the cross bar 10 being held by the cable 14 causes a tightening of the cable 17 whereby as the bar 10 is brought into contact with the strip bar 6 the spring 21 is placed under tension and all of the catches are held out of engaging position, as already described. Should the hoisting cable 14 break the sudden releasing of the spring or springs 21 causes the two cars to be forced suddenly apart at the top, space for which movement is permitted at the bottom of the floor 11, and the catches 22 are immediately thrown outwardly by the springs 23 and engage stops in the guides 1. Simultaneously with this movement the safety catches 26 and 29 have been brought into the outward position through the medium of their operating springs 27 and 30 and form a still further safeguard to prevent the car from being precipitated to the bottom of the shaft. In case the counterweight cable should break the bar 34 is immediately relieved and the spring 36 and counterweights throw the safety catches 37 outwardly to engage the rack 33 and thereby prevent dropping of the counterweight and consequent damage or danger.

It will be noted that the distance between the guide stops 2 is such as to insure the outwardly pressed stops coming into instant engagement with a stop to simultaneously arrest the downward movement of the car and as herein disclosed, I prefer to make the distance between the stops at least a quarter as long again as the stops proper.

It will now be apparent that I have devised a novel and useful construction which embodies the features of advantage enumerated as desirable in the statement of the invention and the above description, and while I have in the present instance shown and described the preferred embodiment thereof which has been found in practice to give satisfactory and reliable results, it is to be understood that the same is susceptible of modification in various particulars without departing from the spirit or scope of the invention or sacrificing any of its advantages.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. The combination with an elevator car, consisting of a plurality of frames, of a hoisting cable connected to one of said frames, a plurality of spring pressed stops on each frame and stationary means adjacent said car adapted to coöperate with said stops.

2. The combination with an elevator car, consisting of a plurality of frames, of a hoisting cable connected to one of said frames, and means to normally hold said frames together.

3. The combination in an elevator car, consisting of a plurality of independently movable frames, a hoisting cable connected to one of said frames, means to maintain said frames together during a hoisting operation, a plurality of spring pressed stops on each frame, stationary guide members for said frames provided with means to cooperate with said stops, and means to separate said frames when said hoisting cable breaks.

4. The combination in an elevator car, consisting of a plurality of independently movable frames, a drum rotatably mounted on one frame, a cable connecting said drum and the other frame, means normally tending to rotate said drum to relax said cable, a hoisting cable secured to one frame and connected to said drum to hold said drum from rotating, a plurality of spring pressed stops on each frame, and stationary guide members for said frame provided with means to coöperate with said stops.

5. The combination in an elevator car, consisting of a plurality of independently

movable frames, a drum rotatably mounted on one frame, a cable connecting said drum and the other frame, means normally tending to rotate said drum to relax said cable, a hoisting cable secured to one frame and connected to said drum to hold said drum against rotation, a plurality of spring pressed stops on each frame, and stationary guide members for said frames, each having a rack thereon adapted to coöperate with said stops.

JOHN A. ASHTON, Sr.

Witnesses:
ROBERT M. BARR,
C. D. McVAY.