A. C. MOHNIKE.

SAFETY APPLIANCE FOR ELEVATORS.

APPLICATION FILED NOV. 14, 1908. RENEWED SEPT. 7, 1910.

974,414.

Patented Nov. 1, 1910.

4 SHEETS—SHEET 1.

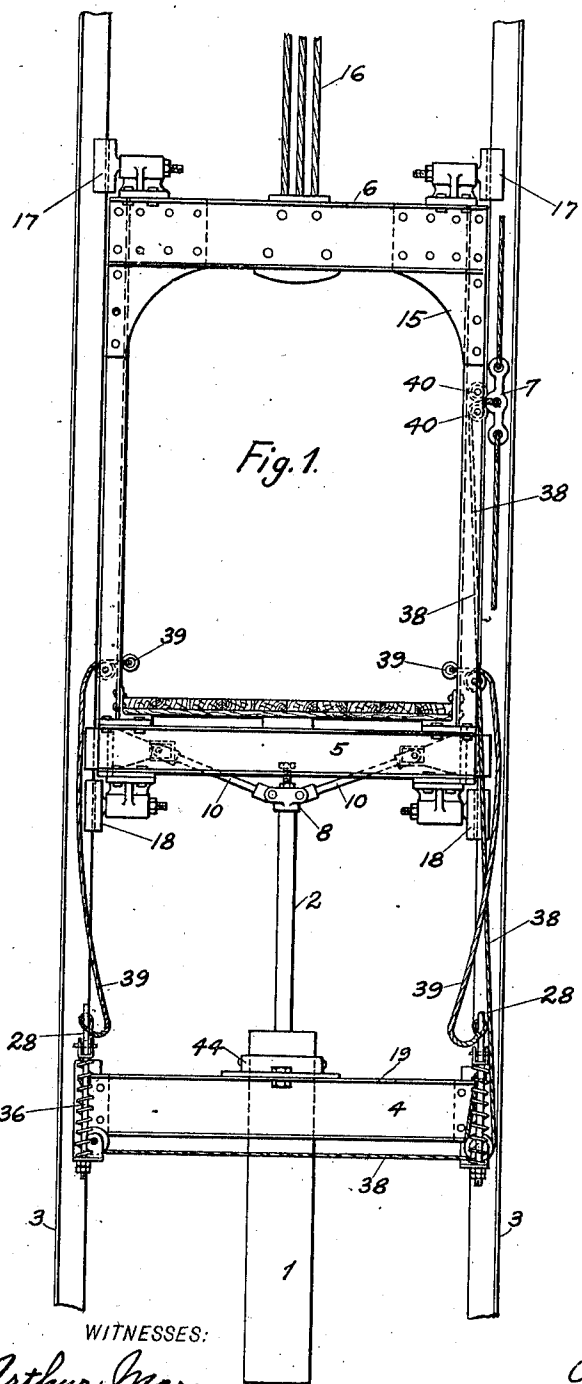
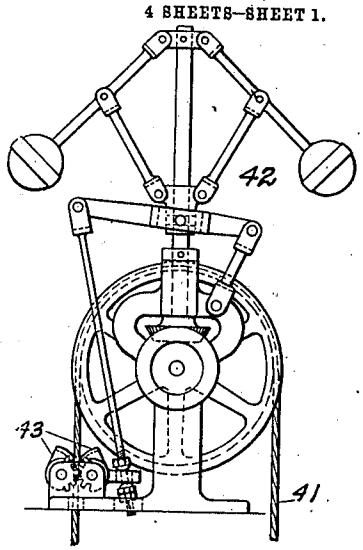


Fig. 1.



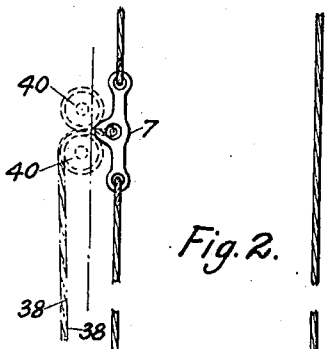
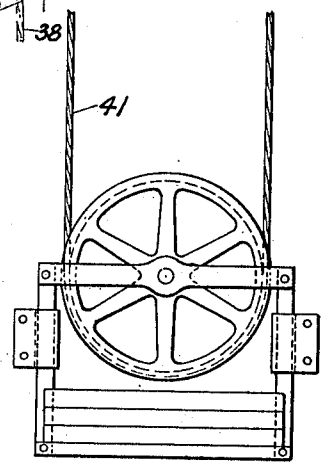


Fig. 2.



WITNESSES:

Arthur Marion

Herman Gustow.

INVENTOR

Albert C. Mohnike

BY

Chas. C. Gill

ATTORNEY

A. C. MOHNIKE.

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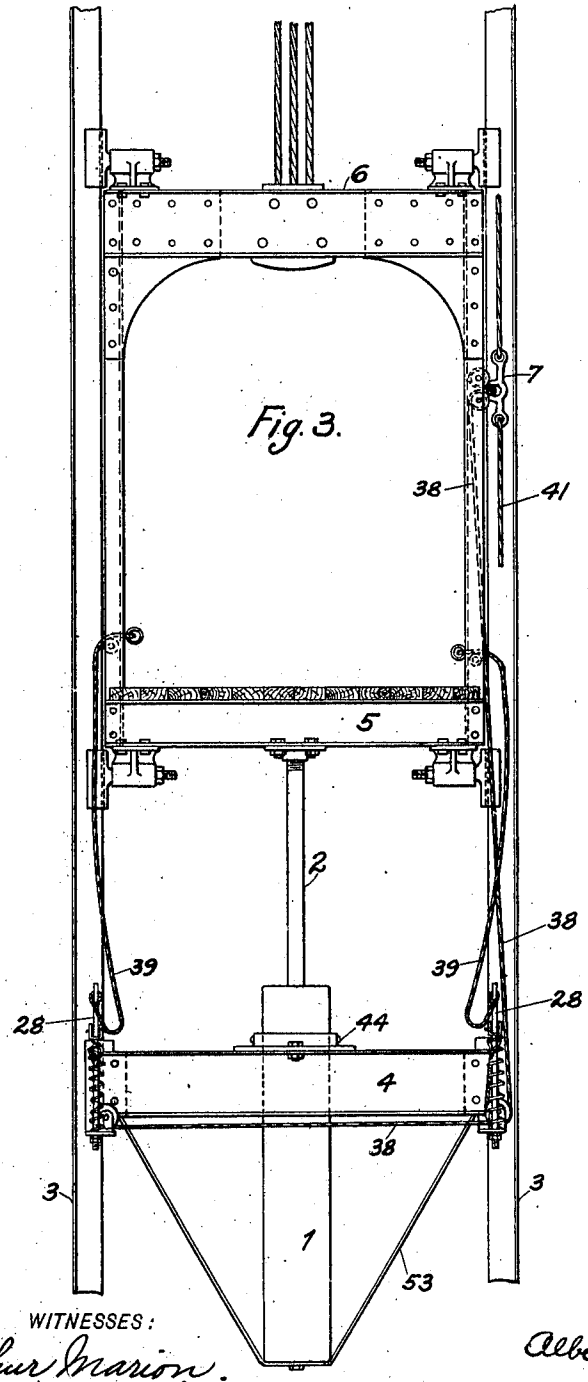

Fig. 3.

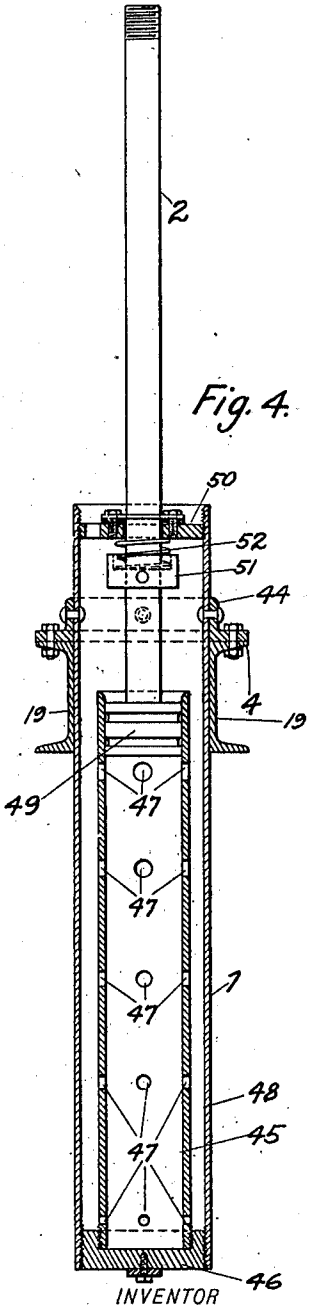

Fig. 4.

WITNESSES:

Arthur Marion.

Herman Gustow.

INVENTOR

Albert C. Mohnike

BY

Chas. C. Gill

ATTORNEY.

A. C. MOHNIKE.

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4 SHEETS—SHEET 3.

Fig. 5.

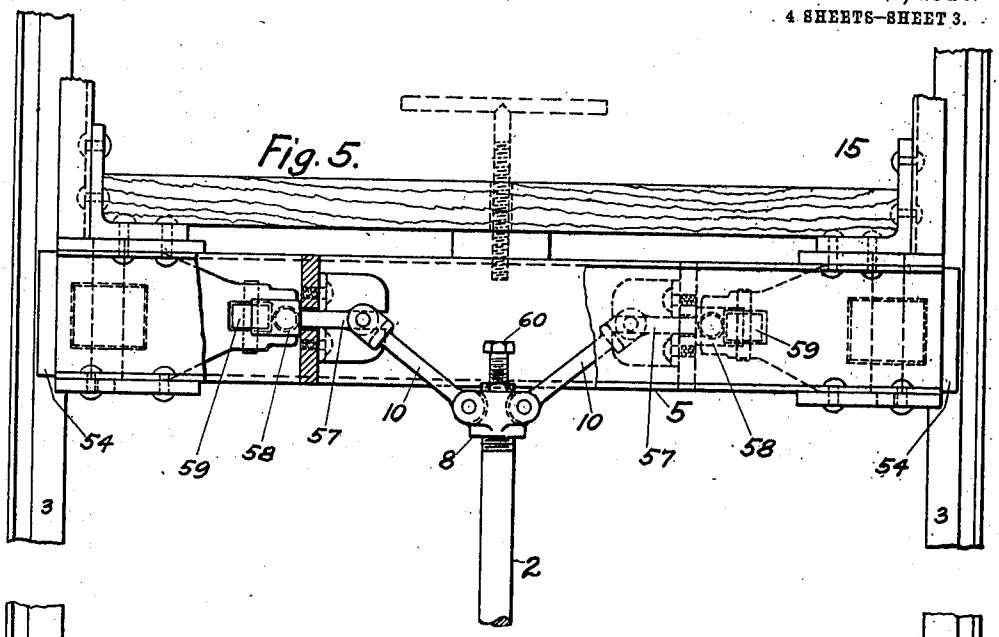


Fig. 6.

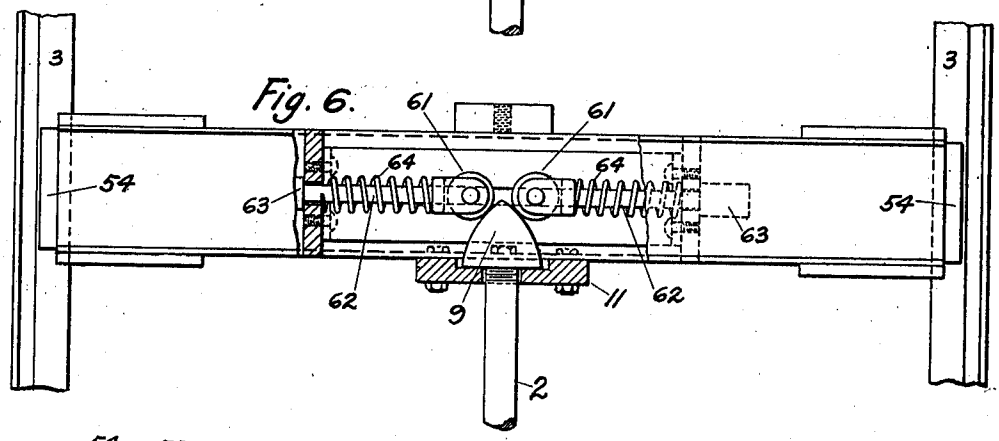
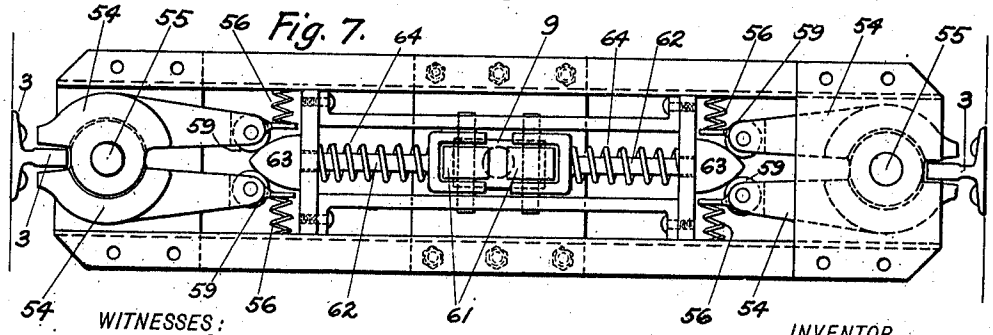


Fig. 7.



WITNESSES:

Arthur Marcon.

Herman Gustow.

INVENTOR

Albert C. Mohnike,

BY

Chas. C. Gill

ATTORNEY

A. C. MOHNIKE.

SAFETY APPLIANCE FOR ELEVATORS.

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4 SHEETS—SHEET 4.

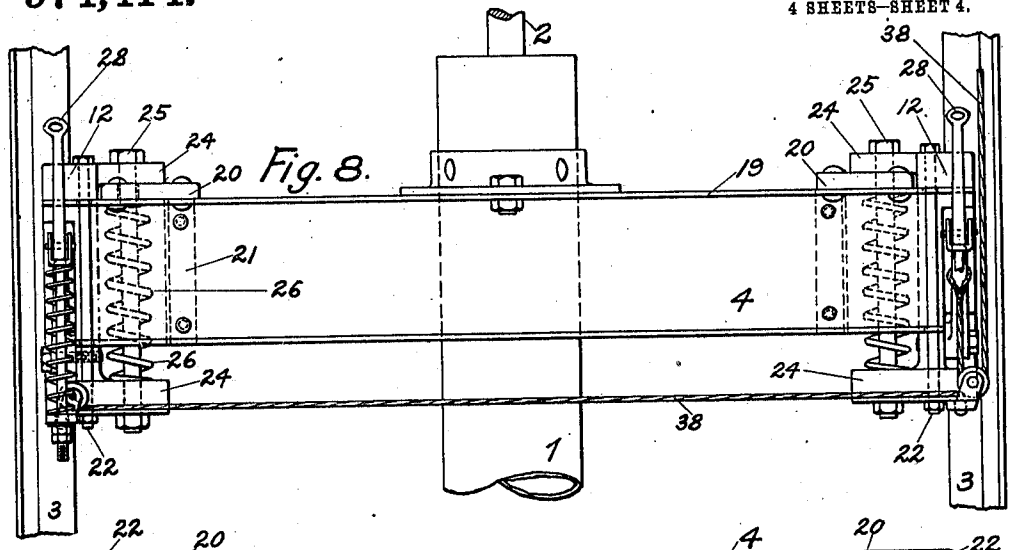

Fig. 8.

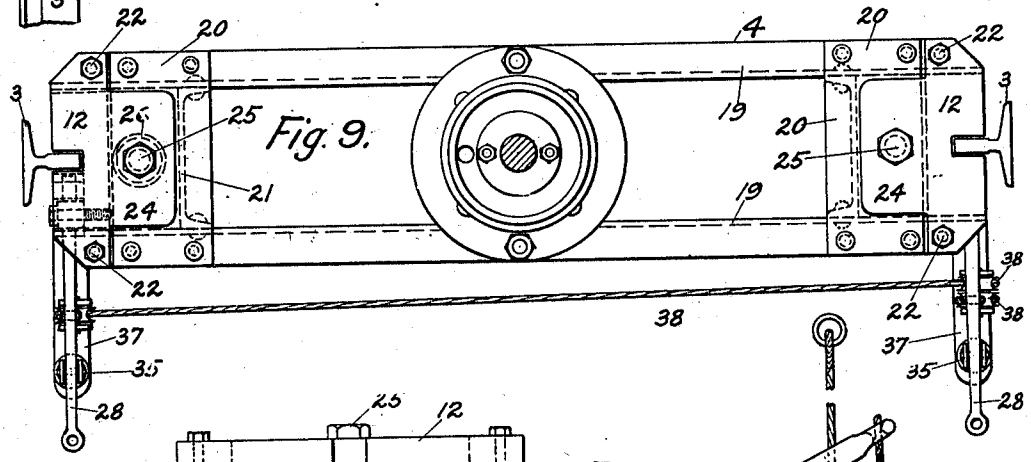

Fig. 9.

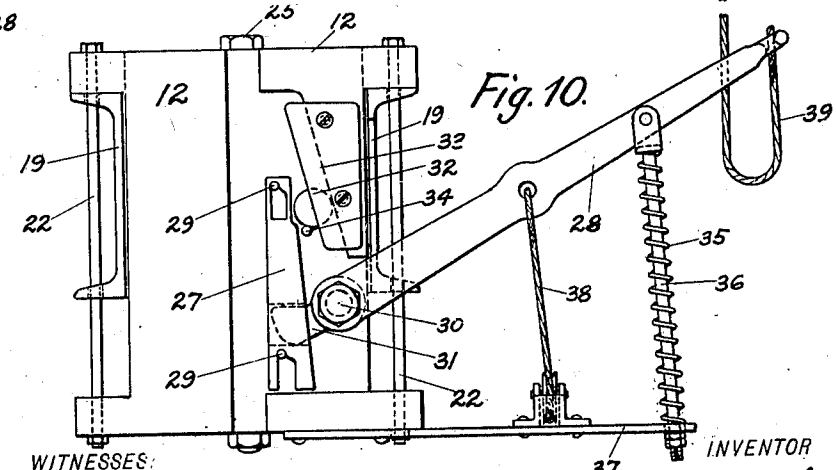

Fig. 10.

WITNESSES:

Arthur Marion

Herman Gustow.

INVENTOR

Albert C. Mohnike;

BY

Chas. C. Gill

ATTORNEY

UNITED STATES PATENT OFFICE.

ALBERT C. MOHNIKE, OF YONKERS, NEW YORK.

SAFETY APPLIANCE FOR ELEVATORS.

974,414. Specification of Letters Patent. Patented Nov. 1, 1910.

Application filed November 14, 1908, Serial No. 462,560. Renewed September 7, 1910. Serial No. 580,925.

To all whom it may concern:

Be it known that I, ALBERT C. MOHNIKE, a subject of Germany, and a resident of Yonkers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Safety Appliances for Elevators, of which the following is a specification.

The invention relates to improvements in safety appliances for elevators, and it consists in the novel features, arrangements and combinations of parts hereinafter described and particularly pointed out in the claims.

The object of the invention is a provide an efficient means for arresting an elevator car at any point in an elevator shaft in such manner that shock to the car and passengers is avoided.

To this end my invention comprises a safety-plank carried by and below the car by means which will permit, when said plank is arrested, the movement of the car toward it, suitable means being provided whereby the movement of the car toward the safety-plank will be against a cushion, and whereby, also, in the preferred construction, the movement of the car toward the safety-plank will cause additional clamping devices to engage the elevator guides for aiding in stopping the car. I also preferably construct the safety plank with a spring-supported portion so that said portion may become cushioned against the thrust of the cushioning devices supported by it and acted on by the descending car.

The invention will be fully understood from the detailed description hereinafter presented, reference being had to the accompanying drawings, in which:

Figure 1 is a front elevation, partly broken away and partly in section, of an elevator shaft, an elevator car therein and a safety-plank connected therewith, the car and safety plank being constructed and equipped with the mechanism embodying my invention; Fig. 2 is an enlarged elevation, partly broken away, of a cable and governor mechanism with which my invention is employed and which is of well-known construction; Fig. 3 is a view corresponding with Fig. 1 but illustrating a modified construction of a portion of my invention; Fig. 4 is an enlarged central vertical section through the safety plank and cushioning device supported thereby for the car; Fig. 5 is an enlarged side elevation, partly broken away and partly in section, of a portion of the elevator guides and car, this figure corresponding with the construction shown in Fig. 1 but being on a larger scale; Fig. 6 is a view corresponding with Fig. 5 but illustrating a modification of some of the details thereof; Fig. 7 is a top view of Fig. 6 and is presented to illustrate more clearly the clamping devices connected with the car for engaging, in case of necessity, the elevator guides; Fig. 8 is an enlarged side elevation of the safety plank shown in Fig. 1; Fig. 9 is a top view, partly in section, of the same; and Fig. 10 is an enlarged detached end view of the same, taken from the left hand end of Fig. 9.

In the drawings, 15 designates an elevator car, 3 the usual elevator guides, 4 the safety plank, 5 a transverse frame carried by the lower end of the car, 1 a vertical cylinder supported on and carried by the safety plank 4, and 2 a piston-rod carrying at its inner end a piston within the said cylinder.

At the upper end of the elevator car 15 is a transverse frame 6 to which the cables 16 are secured and which frame carries at its ends the customary shoes 17 which engage the guides 3. At the lower sides of the ends of the transverse frame 5 are also provided customary guiding shoes 18 which engage and travel on the guides 3. The transverse frame 5 shown in Fig. 3, is of usual construction and arrangement, and the shoes 18 carried thereby are illustrated in their customary position. In the preferred embodiment of the invention, however, it is my purpose to add to the frame 5 means for clamping the guides 3, and these means I have illustrated in Figs. 1, 5, 6 and 7 as operable from the piston-rod 2, it being intended that when the safety-plank 4 becomes arrested and the car 15 settles downwardly on and with the rod 2, the resistance of the latter shall set said clamping means.

The ends of the safety plank 4 are provided with means for clamping the guides 3, and said plank is preferably formed of two parallel separated channel sections 19 connected together at the ends of their upper sides by plates 20 and at their inner sides by vertical channels 21, as indicated by the dotted lines at the left hand portions of Figs. 8 and 9. The extreme outer ends of the channels 19 are mounted on the vertical bolt-rods 22, which are of greater depth than the channels and held at their

upper and lower ends in laterally extending or side portions of the castings 12 which are adapted to the guides 3 and at their upper and lower ends have inwardly extending arms 24 which are one above the other, the upper arms 24 being extended over the plates 20 and the lower arms 24 being normally a suitable distance below the lower plane of the channels 19. The arms 24 are connected together at the ends of the safety-plank by the central bolts 25 which pass through the plates 20 and have upon them between the said plates and lower arms 24, the coiled cushioning springs 26. The springs 26 at the ends of the safety plank normally support the channels 19 above the lower arms 24 of the castings 12 and afford a yielding resistance against the downward movement of said channels. At its end portions the safety-plank is provided with means for gripping the guides 3 and these means, as more clearly illustrated in Fig. 10, comprise, at each casting 12, a vertically movable bar 27 operable by means of a lever 28 and normally supported on pins 29 free of the guides 3. When the lever 28, which is pivoted at 30, is turned downwardly at its outer end, the toe 31 at the inner end thereof turns upwardly for the purpose of elevating the bar 27 and to effect the binding action of said bar against the guide 3. The bar 27 has an inclined or wedge-like outer edge and when moved upwardly rides against a ball 32 confined in a runway 33 which has an inclined surface. When the bar 27 moves upwardly it causes the ball 32 to ride upwardly against the inclined surface of its runway and thereby the bar 27 is compelled to move laterally against the guide 3. The ball 32 is normally supported in its lower position on a pin 34, as shown in Fig. 10. The lever 28 during the usual or safe travel of the elevator-car and safety-plank is maintained in its inoperative position by means of the coiled spring 35 arranged on the rod 36 which is pivoted to said lever 28 and thence extends downwardly through an aperture in a bar 37 secured to the lower end of the casting 12 and projecting outwardly therefrom at a right angle to the guide 3. The lever 28 is connected with a cable 38 of usual character for effecting its downward movement at the proper time, and said lever is also connected with a normally slack resetting cable 39 by which, when desired, said lever may be moved to its initial position by the occupant of the elevator car 15, said cable, as shown in Fig. 1, having its upper end projected into the car. There are two cables 38, one for the lever 28 at the left hand end of the safety-plank and one for the lever 28 at the right hand end of said plank, and these two cables pass over pulleys arranged side by side on the right hand bar 37 (Fig. 9) and thence pass upwardly along the side of the car (Fig. 1) and between pulleys 40 on the car to the bar 7 carried by the endless cable 41 which travels with the car as usual, said cables 38 being secured to said bar 7 so that they may be pulled by the cable 41 upon the necessity arising for the levers 28 to be turned downwardly to set the clamp-bars 27 against the guides 3 for arresting the safety-plank.

The cables 38, bar 7 and cable 41 are known features in this art and are not separately claimed herein. The cable 41 is employed in connection with a centrifugal governor 42 and clamping eccentrics 43 operable thereby, as customary.

It is not broadly new to provide an elevator car with a safety plank having clamping devices at its ends, but a safety plank of the special construction presented herein is believed to be new.

In the example of my invention illustrated in the drawings the safety-plank is connected with the car so as to allow the car to descend to a limited extent after said plank may become arrested, by the car cushioning devices comprising the cylinder 1 and rod 2, the upper end of the latter being connected with the frame 5 at the bottom of the car and the cylinder being secured to the safety-plank. In the construction presented herein the cylinder 1 extends downwardly between the channel-sections 19 and is secured thereto by means of a collar 44.

The upper end of the piston-rod 2 may be rigidly secured to the frame 5, as shown in Fig. 3, or have a limited yielding connection with the car so as to operate safety-clamps at the ends of the frame 5, as shown in Figs. 1, 5, 6 and 7, should the safety-plank 4 become arrested and the car descend toward it. In either construction the cylinder 1 will perform its duty of cushioning the car, and hence while I prefer to employ the clamps at the ends of the frame 5, I do not confine my invention in every instance thereto.

The cushioning cylinder is illustrated, as to its details of construction, in Fig. 4, and said cylinder comprises an outer shell and an inner cylinder 45 which is fastened to the lower head 46 of the main cylinder and formed with numerous perforations 47 which decrease in size from the upper to the lower end of said cylinder 45. Between the outer shell or main cylinder and the outer wall of the inner cylinder 45 is formed an annular chamber 48 which is in communication through all of the apertures 47 with the interior of the cylinder 45. The piston rod 2 carries at its lower end a suitable piston 49 adapted to the inner cylinder 45, and said rod 2 passes through the upper

head 50 of the main cylinder and is provided below said head with a stop collar 51 so positioned as to prevent the escape of the piston 49 from the upper end of the inner cylinder 45. A coiled spring 52 is interposed between the collar 51 and head 50 to cushion the rod 2 at the termination of its up-stroke. I prefer to use oil in the cushioning cylinder as the checking medium for the piston 49. When the piston 49 is in its upper position the oil will fill the cylinder 45 and chamber 48 up to about the lower end of the piston. In the event of the safety plank being arrested with the car 15 in motion, the cushioning cylinder being carried by said plank will become arrested and the car will drive the piston rod 2 and piston 49 downwardly into the inner cylinder 45, said piston moving against the oil and driving the same outwardly through the apertures 47 into the chamber 48 through which the oil will rise and flow into the open upper end of said cylinder 45. The apertures 47 decrease in diameter toward the lower end of the cylinder 45 so that a gradually decreasing flow of oil may take place from the cylinder 45 during the descent of the piston 49, the purpose of this being to effect a gradual retardation of said piston and the elevator car connected with it. The cushioning effect of the oil in the cylinder 45 is augmented by the cushioning effect created by the springs 26 supporting the movable portion of the safety plank to which the cushioning cylinder is secured. On the upstroke of the piston 49 the oil which flowed into the cylinder 45 above it will be crowded out from the said cylinder through the apertures 47 and the open upper end of said cylinder, the outflowing oil passing into the chamber 48 and through the apertures 47 below the piston 49 into the cylinder 45.

I do not limit myself to the special construction of cushioning cylinder shown in Fig. 4, since various forms of cushioning cylinders are well known, but I consider the construction presented in Fig. 4 as novel and the most desirable one for the purpose known to me. If preferred, the cylinder in addition to being secured to the safety-plank by the collar 44, may be connected at its lower end with a strap 53 (Fig. 3) connected at its ends to the channel section members of the safety plank.

In Figs. 1, 5, 6 and 7, I illustrate the frame 5 carried at the bottom of the car as provided with clamping jaws 54 for engaging the guides 3 on the descent of the car toward the safety plank after the latter has become arrested. The jaws 54 are mounted on the vertical pivots 55 and formed with inwardly extending members which, when spread outwardly, close the outer ends of said jaws against the guides 3, as may be readily understood on reference to Fig. 7. The clamping jaws 54 will be provided with springs 56 for normally retaining said jaws free of the guides 3, and intermediate the upper end of the piston rod 2 and the inner ends of the clamping jaws 54 will be provided suitable means whereby on the descent of the car toward the safety plank, the inner members of said jaws will be forced outwardly in a direction from each other so as to effect the binding of the outer ends of said jaws against the guides 3. In Figs. 1 and 5 I illustrate the upper end of the piston rod 2 as equipped with a collar 8 to which the lower ends of links 10 are pivoted and which links at their upper ends are pivoted to rods 57 carrying at their outer ends wedge heads 58 entered slightly between rollers 59 carried by the inner ends of the jaw members. When the car descends toward the safety plank, the piston rod 2 will be resisted by the oil in the cushioning cylinder or such other cushion as may be employed, and this resistance, gradually exerted, will cause the car to descend a little more rapidly through a limited space than the piston rod, and thereby the links 10 will take a more nearly horizontal position than that they normally have and drive the rods 57 and wedges 58 outwardly in opposite directions, said wedges at such time moving between the rollers 59 of the clamping jaws and compelling the outer ends of said jaws to close against the guides 3.

It might be desirable, if the elevator car became arrested between the floors of the building, for the occupant of the car to be able to release the clamping jaws 54 from the guides 3, and to this end I provide a threaded hole in the floor of the car, as shown in Fig. 5, to receive a long screw which may be screwed downwardly through said floor against the upper end of the rod 2 or the head 60 thereon, for driving said rod downwardly and effecting through such downward movement the resetting of the links 10, rods 57 and wedges 58 to their normal or initial position, said wedges then withdrawing from between the rollers 59 of the clamping jaws and permitting the springs 56 to turn said jaws free of the guides 3.

In the event that it should not be desired to employ the links 10 connected with the upper end of the piston rod, said rod may, as shown in Fig. 6, be provided at its upper end with a wedge-shaped head 9 adapted on the descent of the car to enter between rollers 61 carried at the inner adjacent ends of rods 62 having wedge heads 63 on their outer ends for actuating the clamping jaws 54. When the car descends against the head 9 on the rod 2, the rods 62 will be driven outwardly and the wedges 63 will set the clamps 54 against the guides 3. In the nor-

mal condition of the car and its parts the rods 62 will be held at their inner positions by means of springs 64 thereon.

Figs. 6 and 7 show an alternative construction of mechanism for enabling the upper end of the piston rod 2 to set the clamps 54 against the guides 3, and it is obvious that the connection of the clamps 54 with the piston rod may be varied in many ways not required to be specified.

My invention comprises in its broader scope the car and safety-plank with cushioning means carried thereby for permitting the car to descend to a limited extent after the safety plank has become arrested, and in carrying out my invention I prefer the use of a checking cylinder carried by the plank and having its piston rod connected with the car. I do not desire, however, to limit the invention to the special cushioning devices shown, except as said devices may be specified in the claims.

My invention also comprises the safety plank having its clamping members and connected to the car by means which will permit the car to lower to a limited extent after the safety plank has become arrested, in connection with clamping devices carried by the lower end of the car for engaging the guides with a gradually increasing pressure during the descent of the car toward the safety plank.

My invention also embraces the novel construction of safety plank hereinbefore described.

What I claim as my invention and desire to secure by Letters-Patent, is:

1. In safety appliances for elevator cars, the car, a safety-plank suspended below the car and extending parallel with the same across the elevator-shaft, guide rails for the car and the ends of said plank, clamp mechanisms carried at the ends of said plank for engaging said guide-rails when the car attains an undue speed, for arresting said plank, a traveling-cable speed-control mechanism operable by the car, connections operatively connecting said clamp mechanisms with said traveling-cable for enabling said cable by a pull on said connnections to set the clamp mechanisms against said guides when the car attains an undue speed, and cushioning means for gradually arresting the car on its descent toward said plank comprising a liquid-cylinder secured to said plank, a piston-rod connected with the car, and a piston carried by said rod to be cushioned by the liquid in said cylinder; substantially as set forth.

2. In safety appliances for elevator cars, the car, a safety-plank connected therewith, means for arresting said plank when the car attains an undue speed, cushioning means for gradually arresting the car on its descent toward said plank, safety-clamps carried by the car, and means operable from the cushioning means for setting said clamps on the descent of the car toward said plank; substantially as set forth.

3. In safety appliances for elevator cars, the car, a safety-plank connected therewith, means for arresting said plank when the car attains an undue speed, and cushioning means for gradually arresting the car on its descent toward said plank, said plank having a cushioned section supporting said cushioning means; substantially as set forth.

4. In safety appliances for elevator cars, the car, a safety-plank suspended below the car and extending parallel with the same across the elevator-shaft, guide rails for the car and the ends of said plank, clamp mechanisms carried at the ends of said plank for engaging said guide-rails when the car attains an undue speed, for arresting said plank, a traveling-cable speed-control mechanism operable by the car, connections operatively connecting said clamp mechanisms with said traveling cable for enabling said cable by a pull on said connections to set the clamp mechanisms against said guides when the car attains an undue speed, and cushioning means for gradually arresting the car on its descent toward said plank comprising a cushioning cylinder secured to said plank below the car and having its piston rod projected upwardly to be driven downwardly by the car when the latter descends toward said plank, thereby cushioning the car; substantially as set forth.

5. In safety appliances for elevator cars, the car, a safety-plank connected therewith, means for arresting said plank when the car attains an undue speed, and a cushioning cylinder carried by said plank and having its piston rod projected upwardly to be driven downwardly by the car when the latter descends toward said plank, said plank having a cushioned section supporting said cylinder; substantially as set forth.

6. In safety appliances for elevator cars, the car, a safety-plank suspended below the car and extending parallel with the same across the elevator-shaft, guide rails for the car and the ends of said plank, clamp mechanisms carried at the ends of said plank for engaging said guide-rails when the car attains an undue speed, for arresting said plank, a traveling-cable speed-control mechanism operable by the car, connections operatively connecting said clamp mechanisms with said traveling-cable for enabling said cable by a pull on said connections to set the clamp mechanisms against said guides when the car attains an undue speed, and cushioning means for gradually arresting the car on its descent toward said plank comprising a liquid-cylinder secured to said plank, a piston-rod connected with the car, and a piston carried by said rod to be

cushioned by the liquid in said cylinder, combined with releasing means connected with said clamp mechanisms and extending into the car for enabling an occupant of the car to release said clamp mechanisms from said guide-rails; substantially as set forth.

7. In safety appliances for elevator cars, the car, a safety-plank connected therewith, means for arresting said plank when the car attains an undue speed, a cushioning cylinder carried by said plank and having its piston-rod projected upwardly to be driven downwardly by the car when the latter descends toward said plank, safety-clamps carried by the car, and means intermediate said clamps and said rod for setting said clamps on said descent of the car; substantially as set forth.

8. In safety appliances for elevator cars, the car, a safety-plank connected therewith, means for arresting said plank when the car attains an undue speed, a cushioning cylinder carried by said plank and having its piston-rod projected upwardly to be driven downwardly by the car when the latter descends toward said plank, pairs of pivotally mounted safety clamps carried by the car, wedges to be driven between the inner ends of said clamps for setting the latter against the elevator guides on said descent of the car, and means connected with said rod for actuating said wedges when the car descends toward said plank; substantially as set forth.

9. In safety appliances for elevator cars, the car, a safety-plank connected therewith, means for arresting said plank when the car attains an undue speed, a cushioning cylinder carried by said plank and having its piston-rod projected upwardly to be driven downwardly by the car when the latter descends toward said plank, pairs of pivotally mounted safety clamps carried by the car, wedges to be driven between the inner ends of said clamps for setting the latter against the elevator guides on said descent of the car, rods connected with said wedges and extending toward each other therefrom, and links connecting the inner ends of said wedge-rods with said piston-rod, whereby when the car descends toward said plank said links will actuate said wedges; substantially as set forth.

Signed at New York city, in the county of New York, and State of New York, this 13th day of November A. D. 1908.

ALBERT C. MOHNIKE.

Witnesses:

ARTHUR MARION,

CHAS. C. GILL.