(No Model.) 6 Sheets—Sheet 1.

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SAFETY ATTACHMENT FOR STREET CARS.

No. 534,218. Patented Feb. 12, 1895.

Fig. 1.

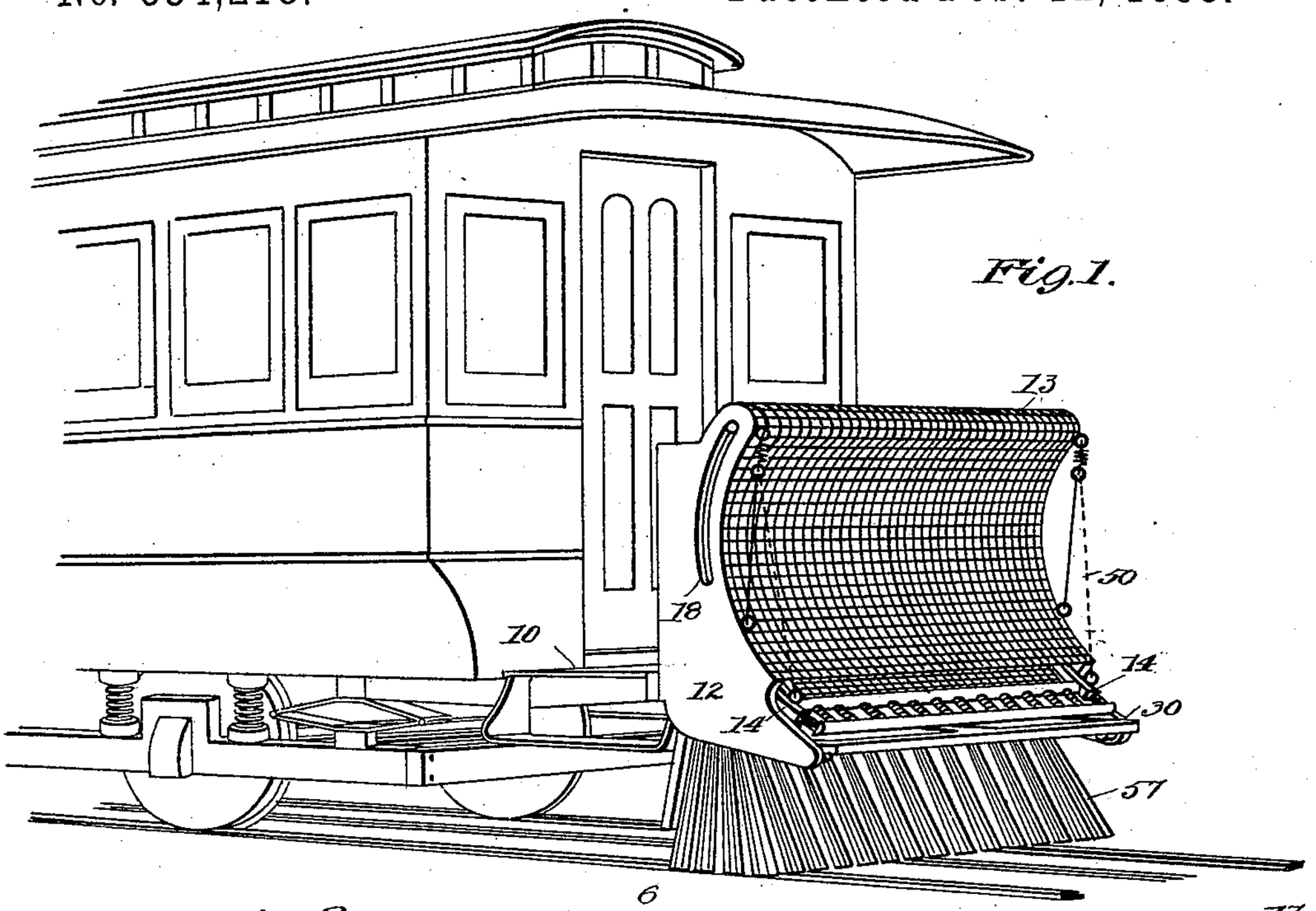

Fig. 2.

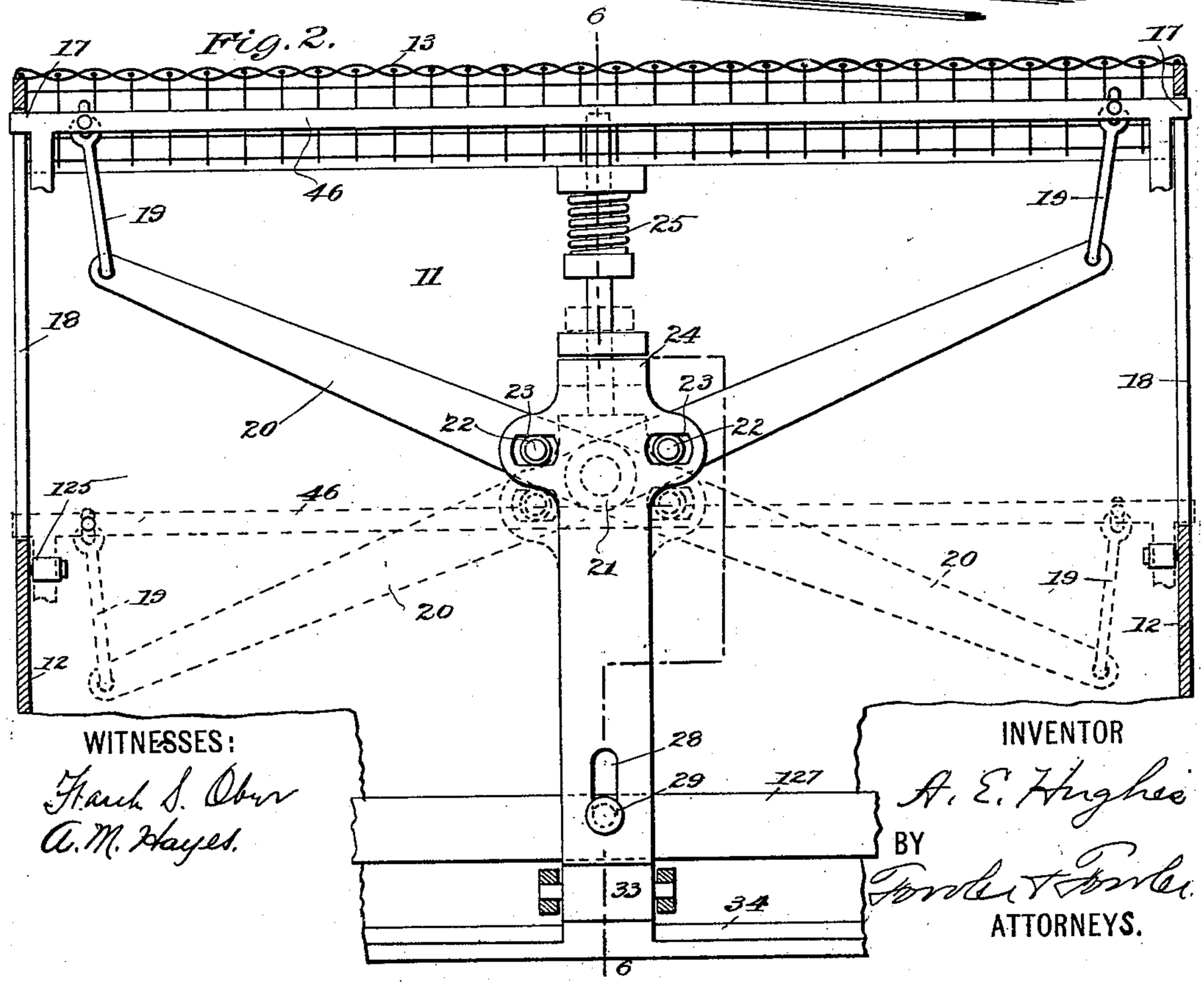

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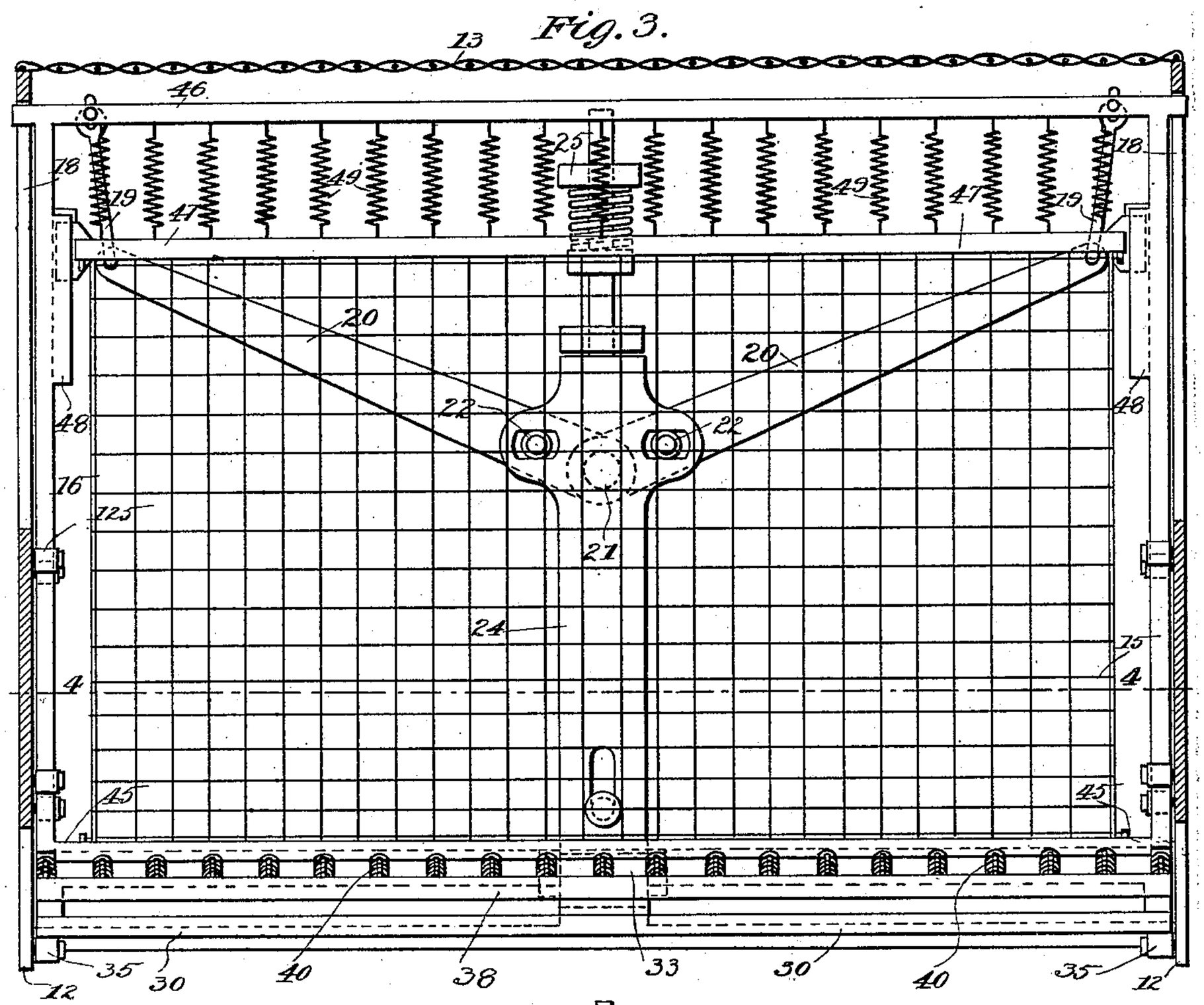
Fig. 3.



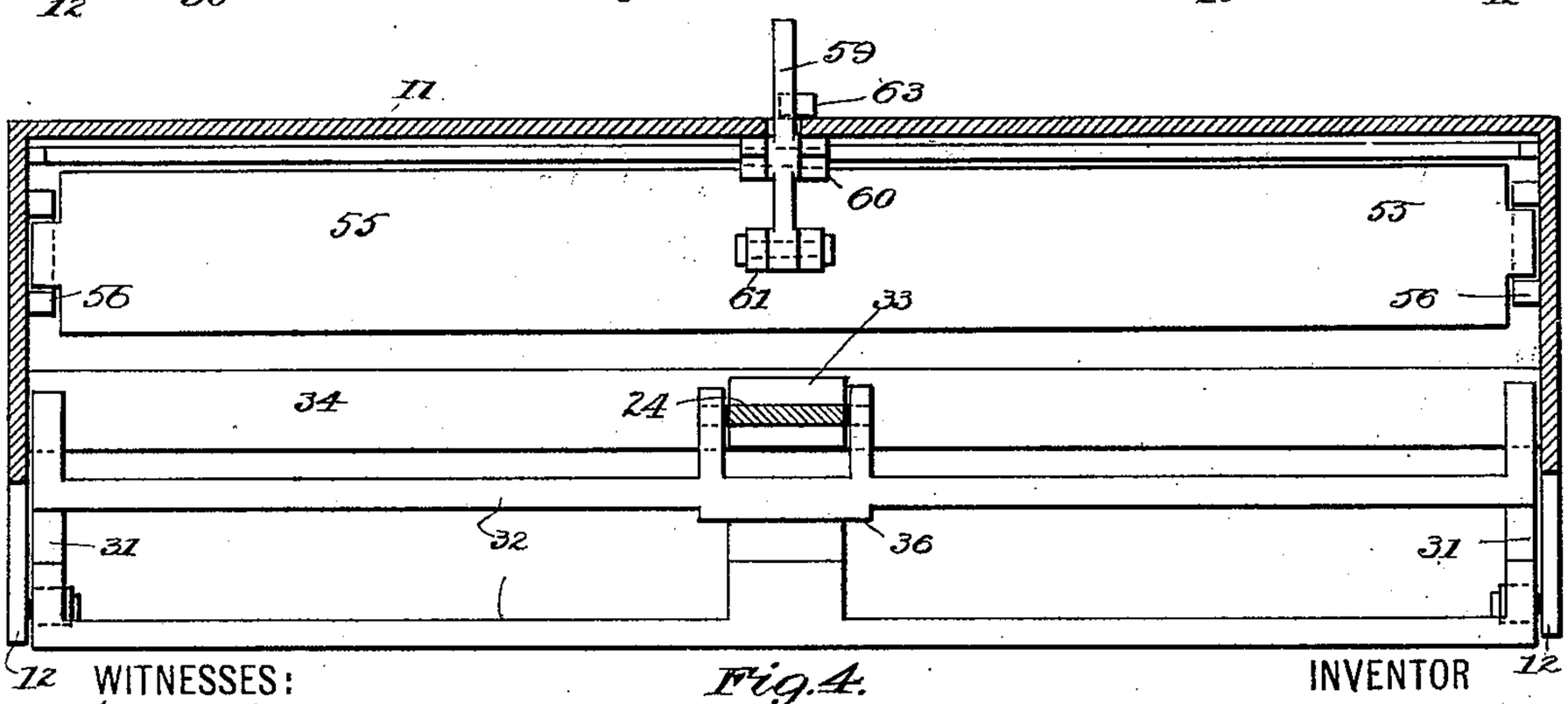


Fig. 4.

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Fig. 5.

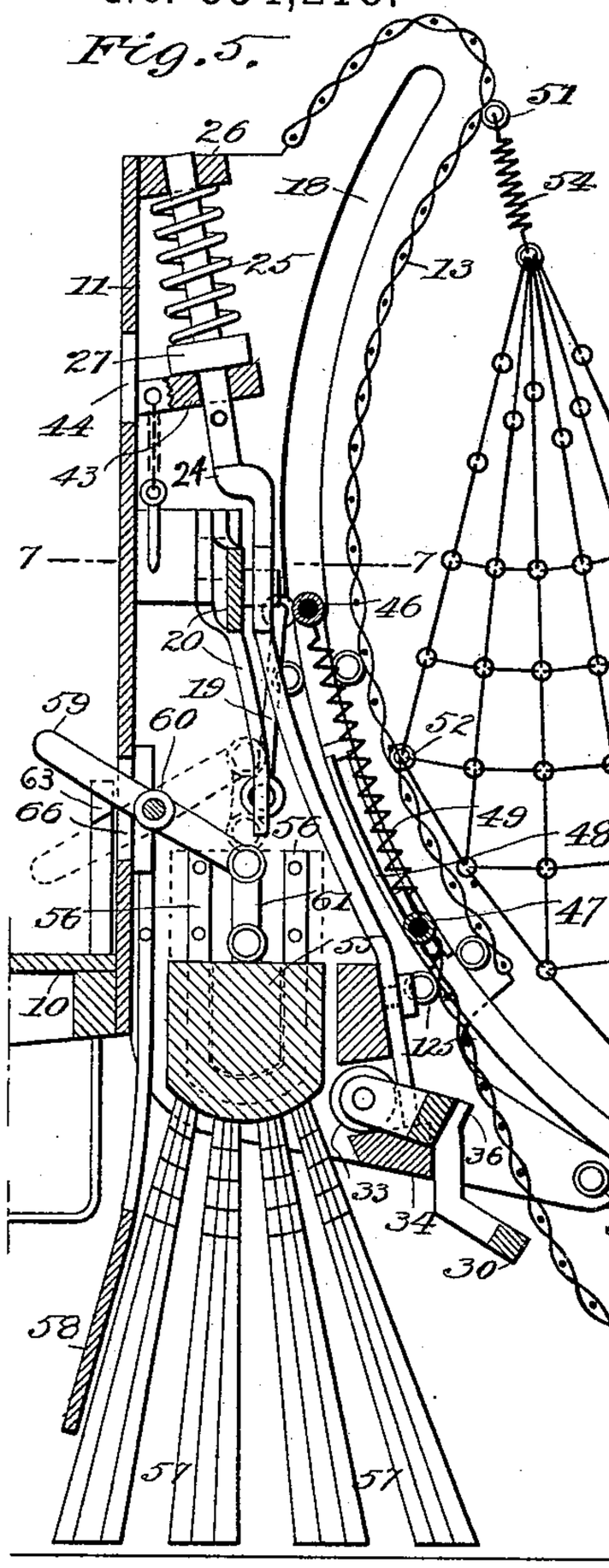

Fig. 6.

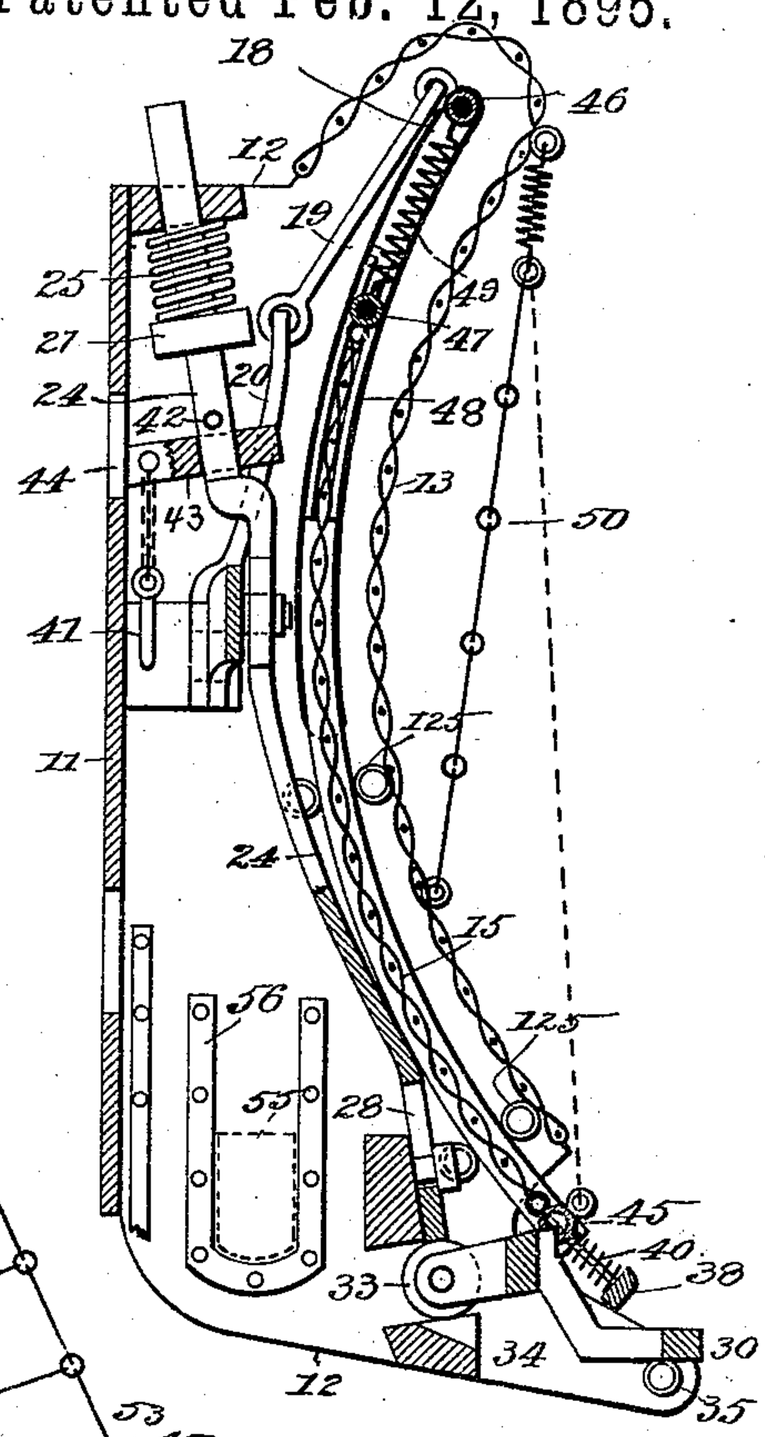

Fig. 7.

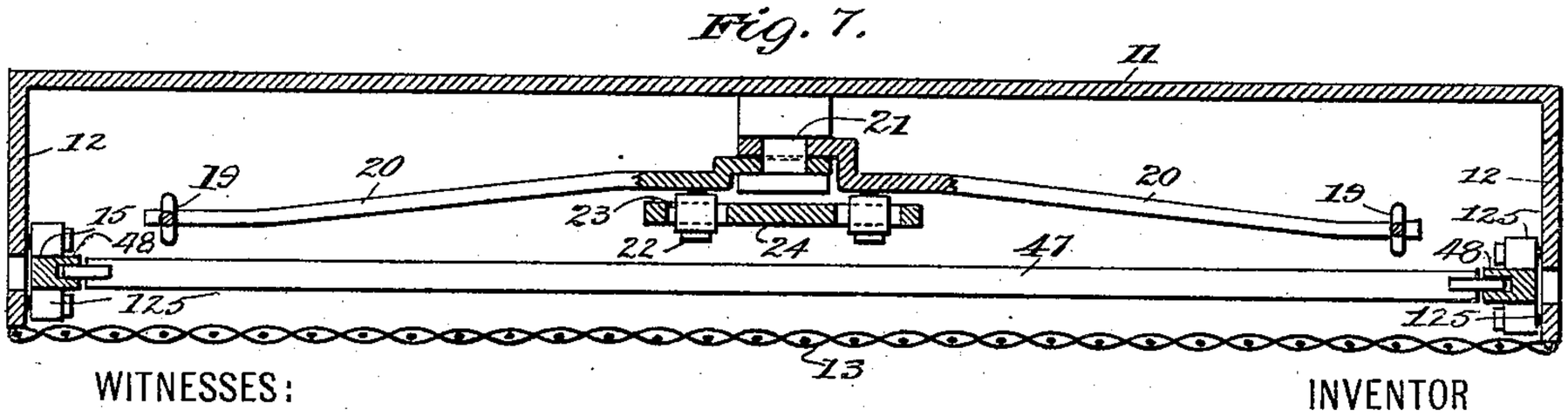

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Fig. 8.

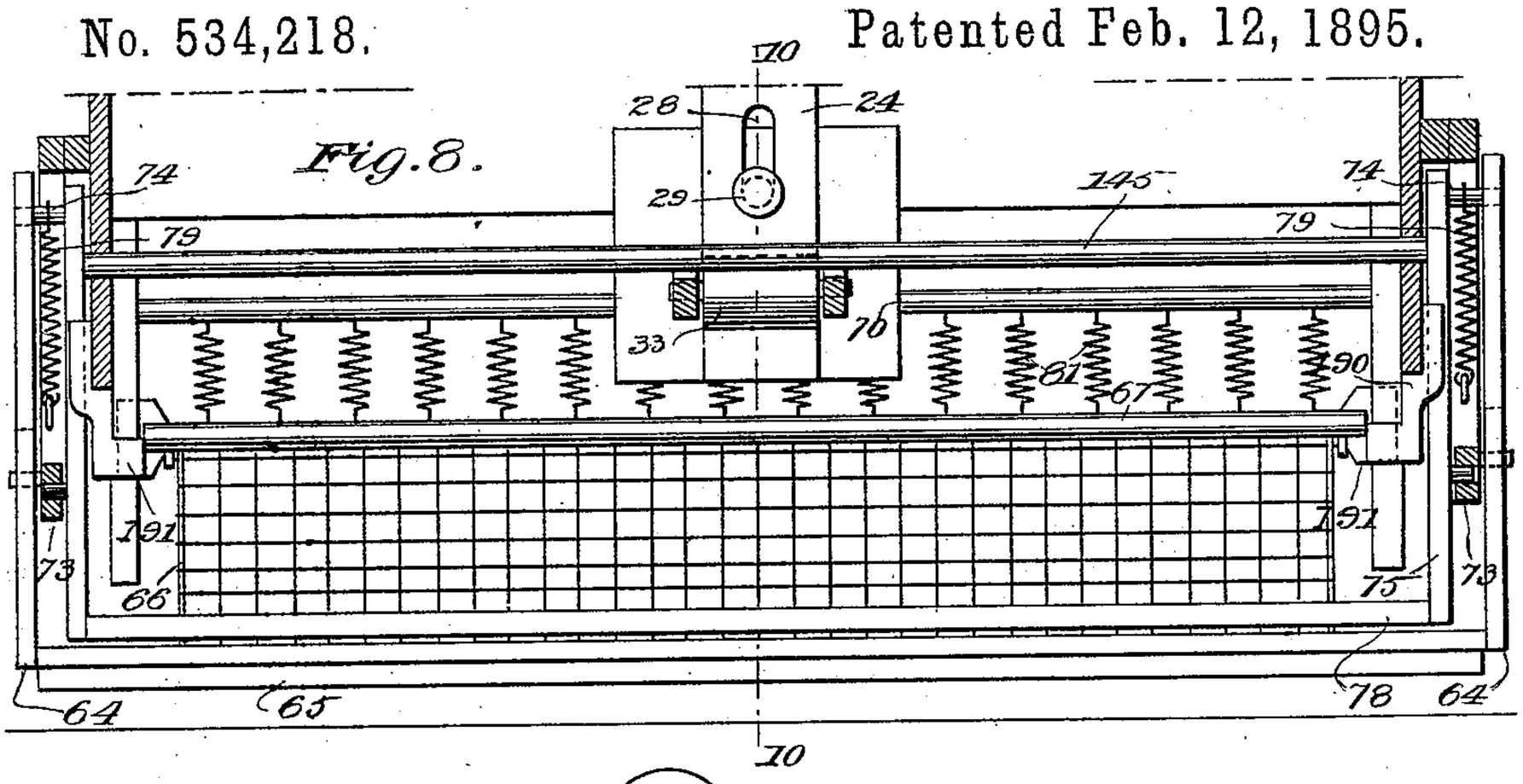


Fig. 9.

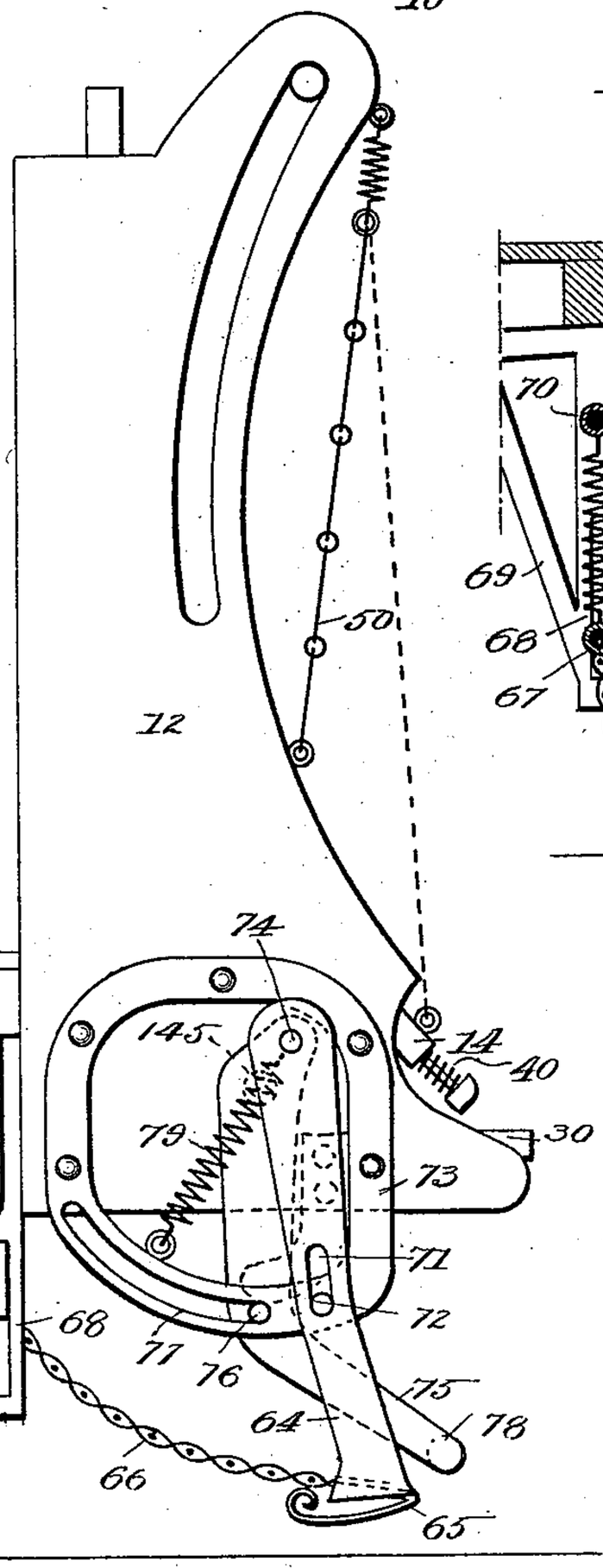
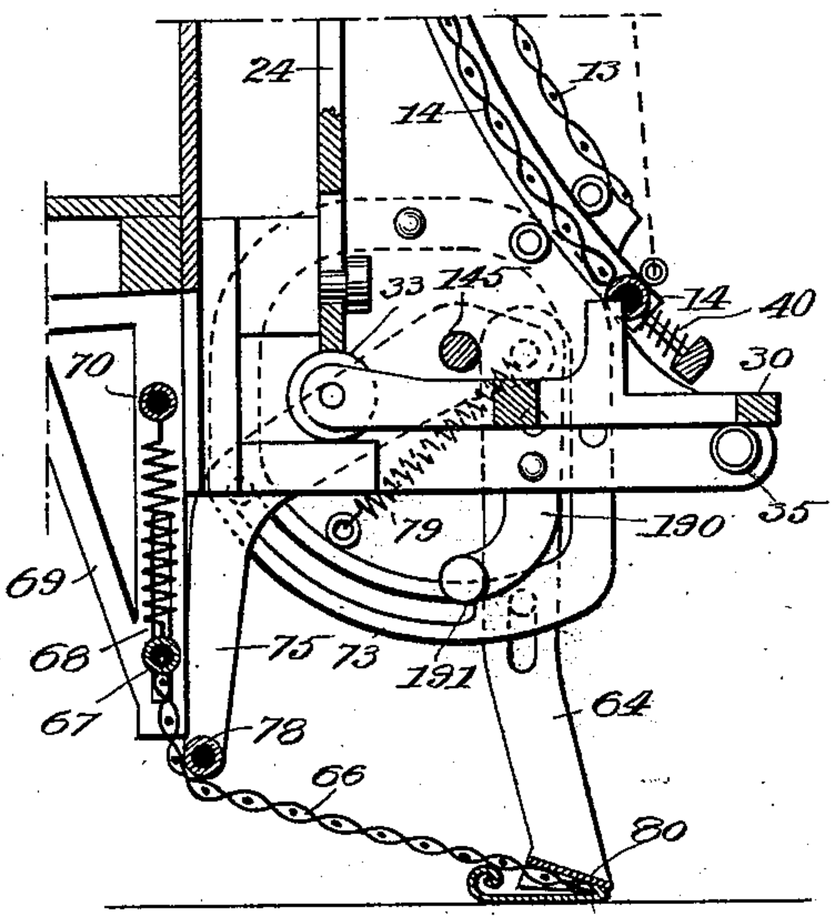


Fig 10.



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SAFETY ATTACHMENT FOR STREET CARS.

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Fig. 11.

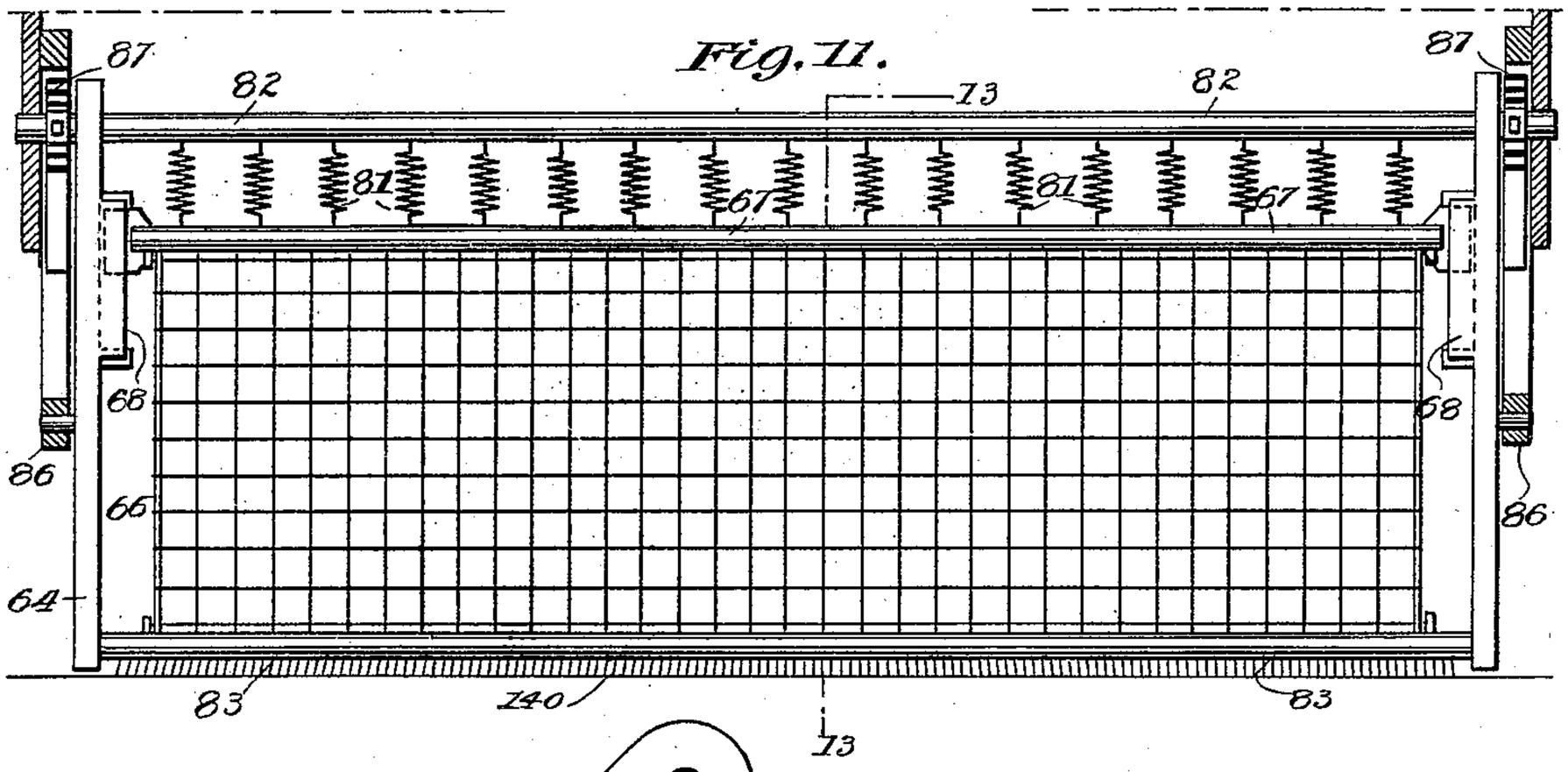


Fig. 12.

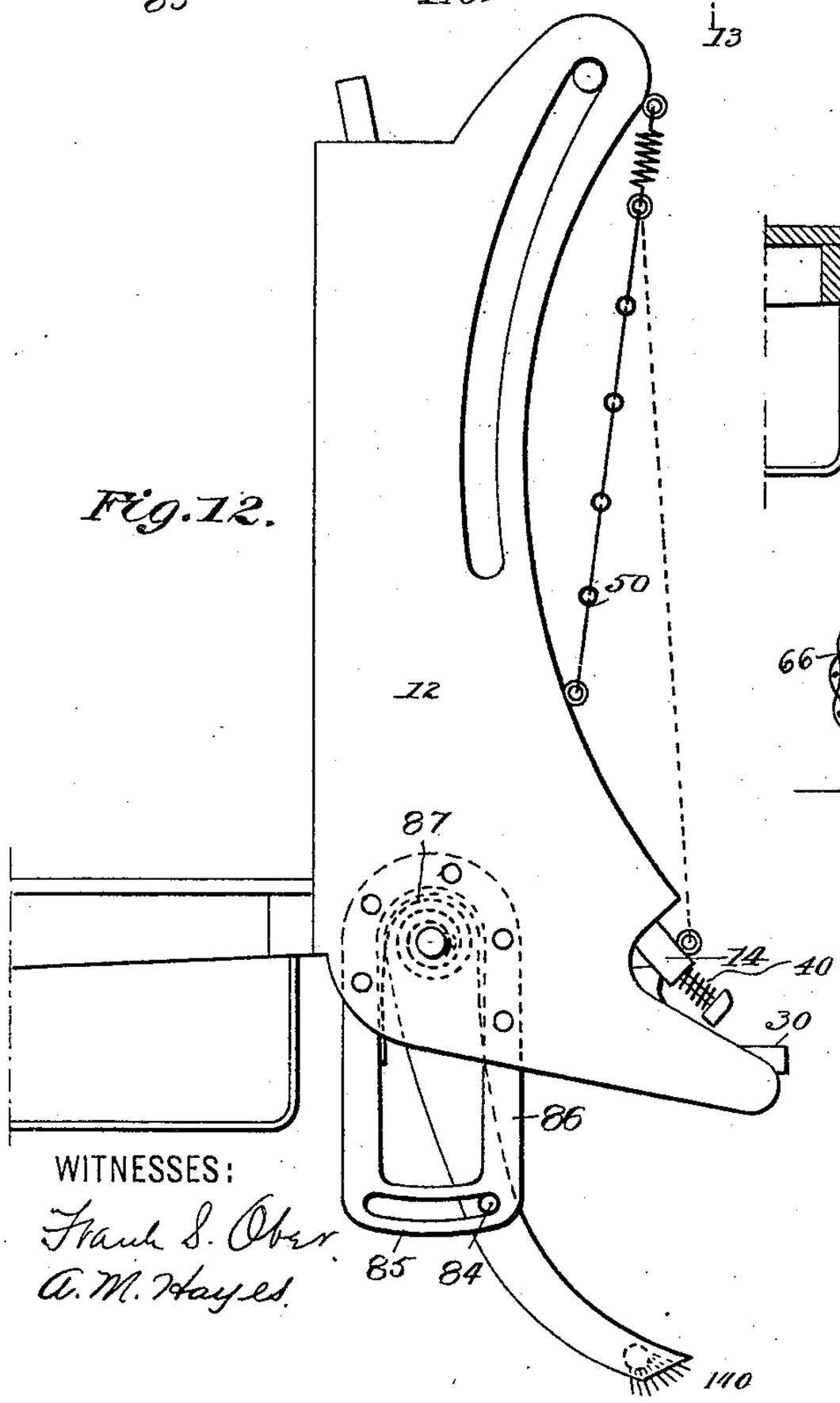


Fig. 13.

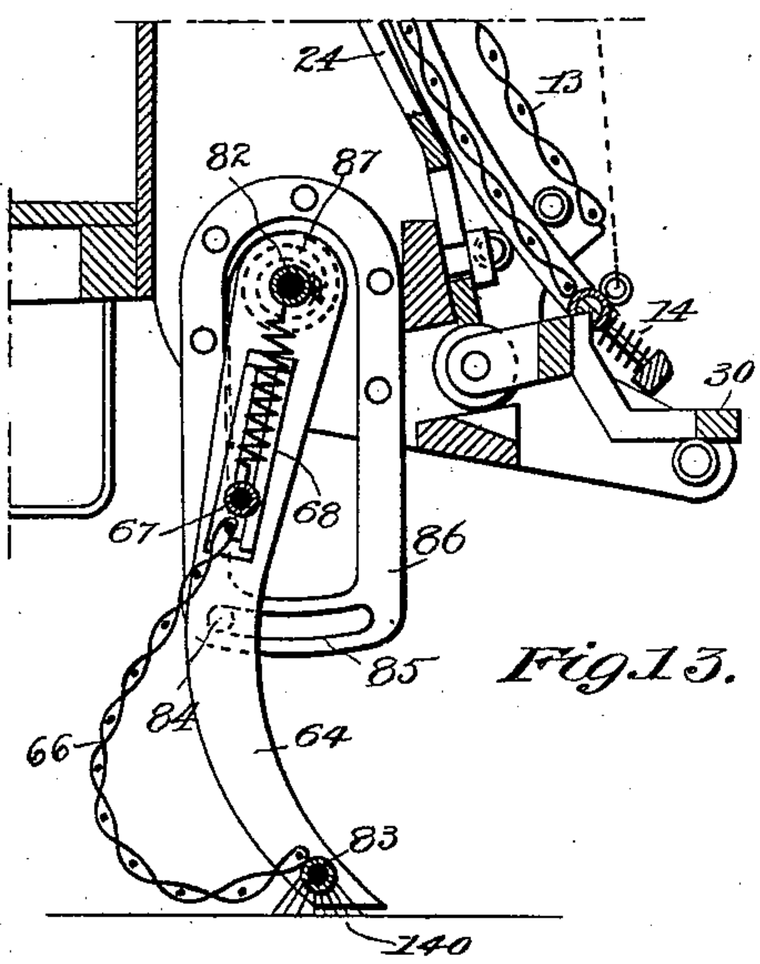
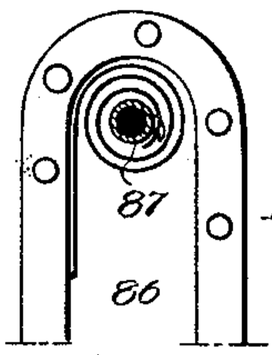


Fig. 14.



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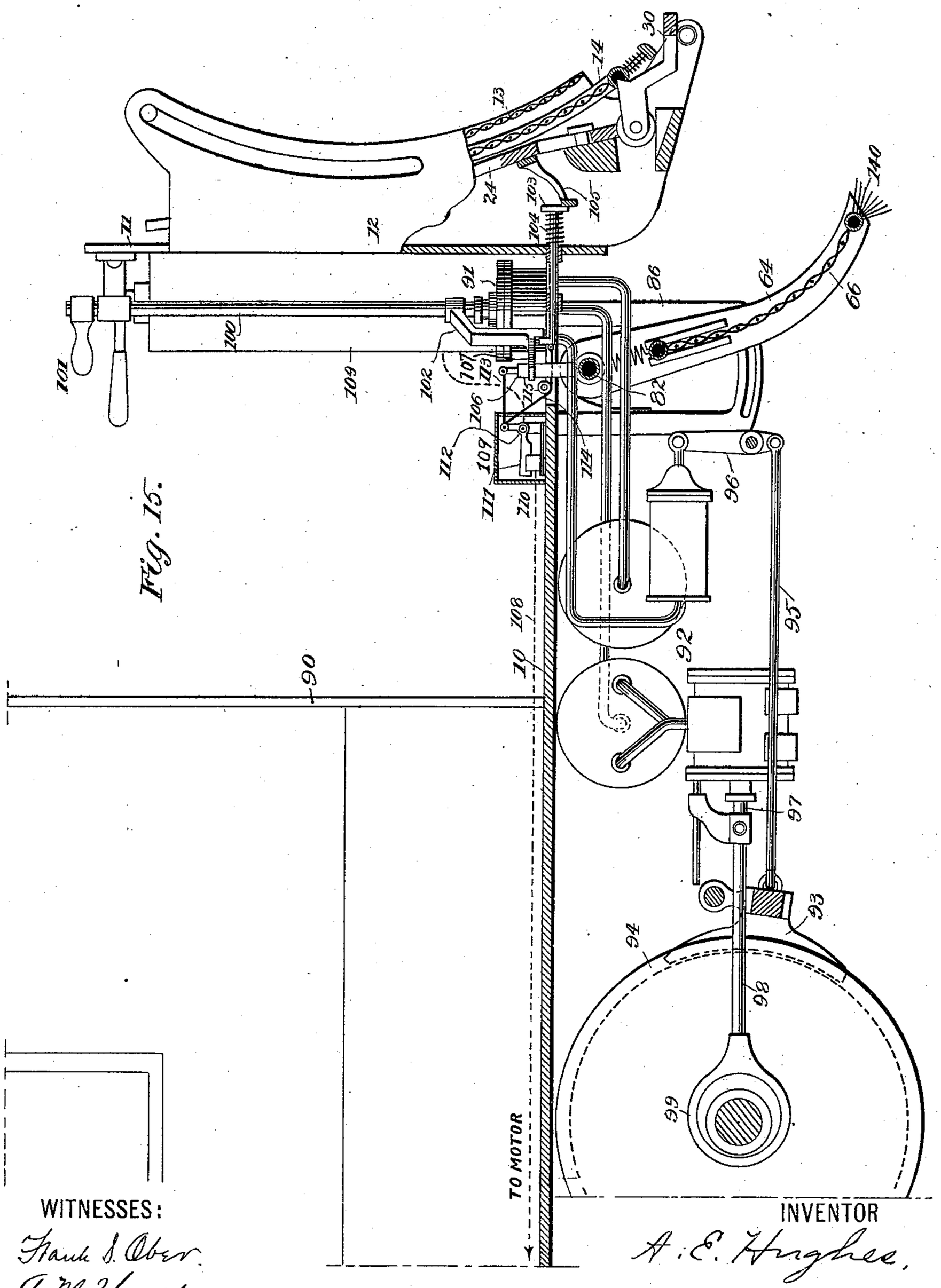

Fig. 15.

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UNITED STATES PATENT OFFICE.

ALBERT E. HUGHES, OF DARIEN, CONNECTICUT.

SAFETY ATTACHMENT FOR STREET-CARS.

SPECIFICATION forming part of Letters Patent No. 534,218, dated February 12, 1895.

Application filed March 2, 1894. Serial No. 502,069. (No model.)

To all whom it may concern:

Be it known that I, ALBERT E. HUGHES, a citizen of the United States, residing at Darien, Fairfield county, State of Connecticut, have invented certain new and useful Improvements in Safety Attachments for Street-Cars, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to devices which are designed to be attached to the forward ends of cable or electric cars for the purpose of preventing a person from being run down by the car or brought into contact with the wheels of the moving car. In many of the known safety devices used for this purpose, the mechanism employed necessarily occupies such a great space lengthwise of the car as to render them practically useless and in a number of the devices used prior to my invention there exists a serious drawback in the fact that no adequate provision is made whereby the mechanism necessarily makes such close and firm contact with the surface of the roadway when brought into service as to render it impossible for a person to pass under the car. In other words, in using them they are quite apt to fail to catch a person and hold him out of all danger of being injured by the car or its wheels.

The principal objects of my invention are to overcome the above-stated objections and to these ends my invention consists in the various novel and peculiar features and arrangements and combinations thereof, as hereinafter fully described and then pointed out in the claims.

In the accompanying drawings wherein I have illustrated a type of my invention together with modifications of features thereof, Figure 1 is a perspective view of the forward end of an ordinary street car that is provided with my improved safety mechanism—the propelling power of the car being, for example, that of an ordinary cable traveling in a conduit extending along the road, the slot of the conduit being shown as extending midway of the rails. In this view, the sliding-screen into which a person may drop is shown in retracted position ready to be shot forwardly in the event of the trip-device striking a person. Fig. 2 is an enlarged view in section taken on a plane parallel with the sliding-screen, with the flexible guard omitted and the upper portion of the frame of the sliding-screen shown in part. Fig. 3 is a view of another section taken on a plane between the sliding-screen and the stationary screen or fender in front of it. Fig. 4 is a horizontal sectional view taken on a plane indicated by line 4—4, Fig. 3. Fig. 5 is a view in section taken on a central vertical plane and shows the relative positions of the parts when the sliding-screen has been projected forwardly. Fig. 6 is a view in section on planes indicated by lines 6—6, Fig. 2— the sliding-screen being held in retracted position ready to be shot forward upon the action of the trip-device. Fig. 7 is a view in horizontal section on a plane indicated by line 7—7, Fig. 5. Fig. 8 is a front view of one form of the yielding-guard. Fig. 9 is a side view of the same, and Fig. 10 is a view thereof in section on a central vertical plane indicated by line 10—10, Fig. 8. Fig. 11 is a front view of another form of the yielding-guard. Fig. 12 is a side view of the same. Fig. 13 is a view of the same in section taken on a plane indicated by line 13—13, Fig. 11; and Fig. 14 is a detailed view showing the arrangement of one of the springs that is coiled about the rock-shaft upon which the guard is mounted, as will be hereinafter described. Fig. 15 is a view, partly in section, on a central longitudinal plane, of the mechanism for putting on the brake and shutting off the propelling power, as will be hereinafter fully described.

Referring to the drawings, in which like numbers of reference designate like parts throughout, 10 is a platform of an ordinary street-car propelled by other power than horses, and provided with the usual dash-board 11, to each end of which is affixed a vertically-arranged plate 12 which projects forwardly and is suitably shaped to receive and house the several parts mounted therein. In front of the dash-board and between the side-plates I mount a stationary-screen or fender 13 which is preferably curved about a horizontal axis extending at right angles to the length of the car and when so curved its curva-

ture should have preferably a slightly shorter radius than the sliding-screen 14, which is arranged to lie normally back of said fender and to shoot from under its lower edge when called into use. This stationary-screen may be formed of any suitable material and if preferred it may be made with a frame that is fastened to the side-plates, though in the construction illustrated I have shown it as consisting merely of a piece of netting formed of wire or cotton and secured tightly to the front edges of the side-plates which are shaped in arcs of the desired curvature.

The sliding-screen 14 is arranged intermediate the dash-board and the stationary-screen with which it telescopes and it preferably comprises a rectangular frame having curved side bars 15, 15, and end bars 45, 46, within which is secured a netting 16, that is preferably flexible. The sides of the frame are provided with guide-projections or lugs 17 (see Fig. 2) which travel in arc-shaped guide-slots 18 formed in the side-plates 12, upon which are also mounted guide-rollers 125. This sliding-screen is formed of a length sufficient to afford the necessary area or surface for receiving a person when the screen is projected forwardly as shown in Fig. 5. The curvature of the screen may be made on any desired arc though obviously it should not be formed on a curvature having a very short radius.

The upper part of the sliding-screen is connected by means of links 19, 19, with the free ends of a pair of swinging-arms 20, 20, respectively, which are mounted at their inner ends upon a pivot 21. (See Fig. 7.) The pivot 21, is mounted in fixed position and the arms turning thereon are designed to have a long range of movement at their free ends in order to properly throw or project the sliding-screen the necessary distance ahead of the car. Each of the arms 20, is provided near its pivoted end with a fixed-stud 22 which travels in a horizontal slot 23 that is formed in a vertically-moving slide 24 which is acted upon in a downward direction by a spring 25, interposed between a fixture 26 on the dash-board and a collar 27 that is made fast on the slide. The slide is provided near its lower end with a guide-slot 28 which travels over a fixed-pin 29 set on a cross-beam 127 and normally the slide is held at its upward limit of movement by means of a tripping-device 30 that is designed to extend across the width of the car and in advance of the sliding-screen, as well as the stationary-screen or fender and the side-pieces 12. This trip-device is of novel construction and consists in a horizontally-sliding framework made up of side-pieces 31, 31 (see Figs. 3 and 4), with cross-bars 32, 32, the inner one of which carries at its center of length a wheel or roller 33 which may be adjusted beneath the foot of the slide so as to sustain it in its uppermost position. The inner ends of the side-bars 31, 31, rest upon a cross-piece 34 which is secured between the side-plates 12, 12, while the side-bars 31 near their outer ends travel on anti-friction rollers 35 in order to make the device move with but little friction when it collides with a person. When the wheel 33 of the trip-device is adjusted under the foot of the slide, the sliding-screen 14, is held retracted by means of the arms 20 and their links 19, but as a further precaution for holding this screen retracted I lock the lower end thereof with a projection 36 on the tripping-device, as shown in Figs. 4, 5, and 6—the projection 36 taking into a notch 37 conveniently located on the under side of the lower bar of the sliding-screen.

In Figs. 8, 9 and 10, the tripping-device is slightly modified in form in that the side-bars thereof are straight and the cross-bars arranged in the same plane with each other and with the axle of the wheel 33. As the frame is considerably longer in this form, I provide a stop for preventing its dropping down too low after it has been pushed inwardly by contact with a person. This stop consists in an arm 190 depending from each of the side-plates 12 and each provided with an inwardly projecting-stud 191 upon which the frame rests when it drops downwardly after being forced in. By virtue of having the spring-actuated slide held against the action of its spring by resting on the periphery or rim of a wheel so as to utilize the dead-center thereof, I am enabled to provide a very sensitive trip-device that requires but a slight impact with a person in order to at once project the sliding-screen into proper position to receive the person thereon.

The lower end of the sliding-screen, which is apt to strike a person when projected, is provided along its lower edge with a spring-cushion comprising a rod 38 having guide-pins 39, each of which is surrounded by a spring 40, interposed between the rod 38 and the bar 45 at the lower end of the sliding-screen. (See Figs. 3 and 5.) These springs normally keep the rod 38 at its outward limit of movement so that when the screen is projected and such rod comes forcibly in contact with a person it will readily yield and thereby avoid injuring such person as would be the case in the absence of the cushion.

In cases where the car is provided at each end with one of my improved attachments the one at the rear end is locked in closed position with the sliding-screen held retracted and against accidental operation by the action of the trip-device, by means of a locking pin 41 which may be placed through a hole 42 formed in the slide 24 so as to take against the upper face of a fixed bracket 43 that is secured to the dash-board of the platform, as will be fully understood from Figs. 5 and 6. This pin may be readily manipulated through the hand-hole 44 formed in the dash-board.

The netting 16 of the sliding-screen 14 is so mounted therein that it may readily sag, as shown in Fig. 5, whenever a person is thrown upon it. This is designed to firmly lodge or

nest therein a person when precipitated upon the net and is an important feature of my invention. This sagging should be great enough to provide a hollow or pit-like place that is amply sufficient to receive a person, its limit in fact being determined only by the elevation it must have in order to clear the ground and not to drag thereon when a person is lying in the net. There are many ways in which this peculiar feature may be provided though I have shown but one way which is as follows: The frame across which the net is stretched is composed of the side-bars 15, 15, a lower end-bar 45 and an upper-end bar 46, all of which are secured together. In the upper end of the frame is mounted a sliding-bar 47, the ends of which travel in guides 48, 48, in the side-bars 15. This sliding-bar 47 is attached to the end 46 of the frame by a number of springs 49 which are to be made of sufficient length to produce the necessary sagging of the net when a person falls upon the latter and the springs are stretched or strained. The net itself has its lower end made fast to the bar 45 at the lower end of the frame and its upper end is likewise made fast to the sliding-bar 47, so that when a person falls upon the net the bar 47 will slide downwardly in its guides, at the same time being held by its series of attached springs 49, which act to at once draw the bar back and hold the net taut upon the removal of the person from the net.

At each side of the attachment is arranged a folding net 50 that is secured at suitable points 51, and 52 to the front edge of the side-plate 12 and is attached by its lower end to a point 53 on the sliding screen 14, so that when the latter is in retracted position the side net is compactly folded up out of the way. When the sliding-screen is projected forwardly each side-net is unfolded as shown in Fig. 5 and affords ample means for preventing a person that may be thrown into the sliding-screen from falling out sidewise. These folding side-nets 50 may also be provided with a spring 54 at their upper ends to hold them taut.

The lower and forward end of the sliding-screen is preferably arranged a suitable distance above the ground in order that it may strike a person at or a little below the knees and serve to knock him off his feet. This action precipitates the victim into the net which sags to such an extent that it securely pockets him and thus he is held out of danger of being in any way injured by the car or its wheels even though the car continues to move. It will be noted that the lower limit of the sweep of the sliding-net is at a sufficiently high point of elevation above the ground to permit it to clear a person that may be lying on the ground. Should the person after being struck by the trip-device fail to be precipitated into the net or held therein after being precipitated into it, the lower end of the net will clear him should he then fall upon the ground, and the continued movement of the car will then bring the yielding-guard into play and the latter will catch up the person and hold him in safety.

To the rear of the sliding-screen I arrange a yielding-guard which extends entirely across the track and just clears the ground for the purpose of catching and holding a person who may be lying upon the ground, in which event the sliding-screen will clear the victim without injury and allow the guard to pick him up. This guard which may be termed an emergency-guard should the sliding-screen fail to catch and hold the victim, is placed forwardly of the car-wheels and preferably in advance of the dash-board as shown in the drawings, so that in the event of the sliding-screen failing to catch the person in danger of being run down by the car, the guard may serve to prevent the person from coming in contact with the wheels. I have shown in the drawings three forms of this emergency-guard, the form illustrated in Figs. 1 and 5 consisting in a broom-like device having a shaft or head 55 mounted horizontally across the side-plates 12 in brackets 56, 56, which are secured upon the inner sides of the said plates. From the under side of the shaft 55 project yielding-fingers or blades 57 which are arranged in bunches placed close together. The fingers or blades that lie forwardly of the vertical plane (containing the axis of the shaft on which they are mounted) project downwardly and in a forward position with their lower ends a slight distance above the ground while the blades which are disposed to the rear of such vertical plane are inclined downwardly toward the rear. If now this yielding-guard should come in contact with a person lying across the track, the blades or fingers which project forwardly would at once be forced into contact with the ground at their ends, after which the continued pressure thereon will cause them to bend or bow and thus carry the person along in front of them until the car may be stopped. The fingers or blades that lie to the back of the guard prevent the forward blades from bending or bowing to such a degree as to allow the person to be forced through and under the forward blades—the pressure exerted between the guard and the person being transmitted from one row of the blades to the other as they are crowded against each other and finally transmitted to a rigid back-piece 58 depending from the platform and extending across the back row of the blades.

The shaft 55 of the guard is loosely mounted in the brackets 56, 56, so that it may be raised in order to lift the guard a considerable distance above the ground when it is not desired to have it in position for use. The guard is raised by means of a foot-lever 59 which is pivoted to a fixed-point 60 and connected by means of a link 61 to the upper-side of the shaft 55. The inner end of this foot-lever extends through an opening in the dash-board and it is provided with a snap or spring-latch 63 for locking with it when its inner end is de-

pressed. (See Fig. 4 and 5.) By forcing down the inner end of the foot-lever the guard will be lifted up—the shaft, the link and the lever assuming the dotted line position shown in Fig. 5, in which position the parts are locked automatically by the spring-latch, and they may be so retained until the snap or latch is released by hand.

In the modification of the yielding-guard shown in Figs. 8, 9 and 10, it substantially comprises a swinging arm 64 depending from each side-plate 12, and connected at their lower ends by a spring-shoe 65 from which extends rearwardly a flexible net 66 that is attached to the vertically-sliding rod 67 moving in guide-slots 68 formed by the brackets 69. This sliding-rod 67 is attached to a fixed bar 70, arranged above it in the bracket, by a number of springs 81, 81, which normally hold the sliding-bar up. The design and the operation of this bagging-net is the same as that described with reference to the net 16 of the telescoping or sliding-screen. Each of the arms 64 is formed with a vertical-slot 71 that travels over a pin 72 fixed upon a bracket 73 secured to the outside of the side-plates 12. The upper end of each arm is pivoted at 74 to the head of another arm 75 which carries a pin 76 working in an arc-shaped slot 77 formed in the bracket 73. The curved slots and pins serve to determine both the forward and backward limit of movement of the trip-device as well as the guard The arms 75 are slightly bent upon themselves so as to throw the lower and front ends ahead of the frame carrying the net and they are connected at their upper ends by a rod 145 and at their lower ends by a bar 78 which forms a trip-bar extending in front of the spring-shoe 65 of the yielding-guard. A spring 79 is connected between a suitable fixed point and the pin 74, which unites each side-arm 64 of the guard with the side-pieces of the tripping-device, and the parts are so adjusted that in normal position, wherein the trip-bar 78 is held in advance of spring-shoe 65, the pin 76 and the slot 77 hold the parts locked as shown in Fig. 9. When now the trip-bar 78 strikes against anything and is thrown inwardly, the pin 76 is carried backward through the slot 77 until the dead-center, on which the spring 79 is normally drawing, is passed, whereupon the spring snaps the tripping-device in a backward direction and carries it into the position shown in Fig. 10. This same movement also forces downwardly the spring-guard and carries the spring-shoe 65 into contact with the ground with such force as to cause the shoe to press tightly against the ground under spring tension—the shoe itself being bent or compressed from the form shown in Fig. 9 to that represented in Fig. 10. The upper part 80 of the spring-shoe is inclined downwardly and being made of thin spring metal it will scrape along the surface of the ground, as the car advances, and acting like a shovel it will readily scoop up a person encountered by it so that the person will roll or move backwardly on to the net which will sag sufficiently to receive and hold the victim out of all danger of being injured by the wheels. The sagging of the net extending backwardly from the spring-shoe is further insured by the positive action thereon of the tripping-bar 78 which after collision with a person is forced backwardly until the dead-center upon which the spring 79 normally exerts its force is overcome whereupon the spring then throws the tripping-device to its rearmost position as shown in Fig. 10. In moving into this latter position the trip-bar 78 passes along the upper surface of the net and in doing so continues to depress it and draw out the springs 81, as shown in Fig. 10.

In the form of the yielding-guard shown in Figs. 11 to 14 inclusive, the guard comprises the two side-arms 64, 64, which are fixed upon a rock-shaft 82 mounted across the lower ends of the side-plates 12, 12. The arms are curved slightly forward and connected across at their lower ends by a rod 83. A net 66 is secured by its lower end along the rod 83 while its upper end is attached to a sliding-bar 67 moving in guides 68 located upon the upper portions of the arms 64. A set of springs 81, 81, are connected between the sliding-bar 67 and the rock-shaft 82 and normally they are free to act so as to hold the bar 67 to its upper limit of movement and thereby keep the net taut. These arms are each provided with a laterally-projecting guide-pin 84, which moves in the curved-slot 85 formed in a bracket 86 which depends from the adjacent side-plates 12. This pin and slot affords a sliding bearing for the guard intermediate its upper and lower ends and steadies it in its swinging movements as well as serving to limit the length of vibration of the guard on its center of motion. The guard is normally held at its outward limit of movement and well above the ground by means of springs 87 which are coiled about the rock-shaft 82. With this form of guard it will be readily understood that when in its normal position, (shown in Fig. 12) it strikes against a fallen person it will at once be forced backwardly into the position shown in Fig. 13 in which movement the springs 87 are put under tension. As the car continues to move the person is rolled onto the net which sags by virtue of its connected springs, so as to form a pit into which the person is received and nested safely against dislodgment by the further movement of the car. The lower edge of this guard is provided with spring-fingers 140, which are secured upon the rod 83 (see Figs. 13 and 15) and they are designed by their spring-movement when forced into contact with the surface of the roadway, to prevent the garments of the victim from getting wedged in between the guard and the ground which occurrence would tend to keep the person on the ground and prevent the forward movement of the car from rolling

him into the pocketing net of the guard. It will be readily seen that these yielding-fingers 140 will have a brush-like action and scraping along the ground with a spring action they will be sure to gather up a garment even though it be made of thin and flimsy material, so that in using such fingers there will be no likelihood of the guard pinching or catching the garment of a victim between itself and the ground and thereby accidentally binding him to the ground in a dangerous manner.

If preferred a tripping-device may be used in conjunction with the form of swinging-guard just described in order to fully insure the movement of the guard toward the ground before it encounters the fallen person and for such purpose a tripping-device similar to that shown in Figs. 8, 9 and 10 may be adopted.

From the foregoing description the operation of the sliding and shooting-net for throwing and catching a person as well as the operations of the yielding-guards, will be readily understood without further explanation.

My invention is not limited to the constructions herewith illustrated and described, as the principles upon which the different features work may be embodied in other forms without making a material departure from the spirit of my invention.

While I have shown the sliding-screen and the yielding-guard, as used in conjunction with each other, they need not necessarily be so used, for it is obvious that either device may be used without the other as is contemplated by the claims herein. However, it will doubtless be found safer to use the yielding-guard in conjunction with the sliding-screen in order to catch the victim when lying upon the ground and when the sliding-screen is not thrown into operation, because of the trip-device clearing the fallen person, or to use it as an emergency safety device, in the event of the screen failing to catch and hold the victim when the sliding-screen is operated.

Another feature of my invention is the provision of means whereby the brakes of the car may be automatically put on or thrown into action, by the mere impact with a person of a suitable part of the safety attachment, whether the trip-device of the sliding-screen, or the guard mechanism.

Still another feature of my invention is the provision of means for automatically cutting off the propelling power of the car by impact of a suitable part of the apparatus with the person. These automatic devices may be arranged to act together in order to simultaneously shut off the power and put on the brakes, or they may be used independently of each other, or one of them may be used without the presence of the other. It is manifestly preferable to have that part of the apparatus which extends farthest in advance of the car, connected with and controlling the automatic braking-device or the power-cutting-off device, or both, in order to stop the car as quickly as possible when such part touches a person that is in danger of being run down by the car. The invention, therefore, contemplates the automatic operation of the brakes, or the automatic cutting-off of the propelling power, or both, by means of a trip-device projecting well ahead of the car.

There are many ways which will readily suggest themselves to those skilled in the art of carrying out this broad idea and while I have shown but one way of doing so, I wish to be understood as not limiting myself to such particular way.

The construction referred to is shown in Fig. 15 wherein 90 indicates the body of an ordinary street-car provided with platform 10 having dash-board 11 in front of which is mounted the telescoping-screen 14 with its trip-device 30, as shown in detail in Figs. 1 to 7 inclusive. Beneath the platform is arranged the form of swinging-guard shown in Figs. 11 to 14 inclusive, both the sliding-screen and the yielding-guard being independently connected with the operating-valve 91 of an ordinary form of air-brake 92, which when thrown into operation forces the brake-shoe 93, against the car-wheels 94 through means of the brake-rod 95 and a pivoted-lever 96. The compression of the air for the brake apparatus is effected through means of the piston-rod 97 which is connected with the rod 98 driven by the eccentric 99 on the axle of the car-wheel. The rotary valve-rod 100 of the controlling-valve 91 carries at its upper end a handle 101 by which the rod may be turned by the motorman in order to operate the brake by hand in the well known way, when it may be so desired. This valve rod 100 carries a depending arm 102 which is engaged by an endwise sliding-rod 103 provided with a spring 104 which tends normally to thrust the rod forwardly in such a way as to move the depending-arm 102 and thus turn the valve-rod 100 through part of a revolution and thereby actuate the controlling-valve of the air-brake. This sliding rod 103 is normally held with its spring compressed, when the sliding-screen 14 is retracted, by means of a stop 105 located upon the vertically-moving slide 24, so that in the event of the tripping-device 30 striking a person the stop will move away from the rod 103 and thus cause the air-brakes to be put on.

The swinging-guard 64 is also arranged to control the operating-valve 91, through means of a finger or push-piece 106 secured fast upon the rock-shaft 82 and engaging with its free end a projection 107 extending outwardly from the depending-arm 102 of the valve rod. When now the yielding-guard strikes against a person lying across the track the shaft 82 will be rocked and thus move forwardly the finger 106 against the projection

107, which will thereby be moved sufficiently to turn the valve-rod and operate the valve so as to put on the air-brake.

At a suitable point in the electric-circuit 108, which leads from the electric motor (which is not shown) into the box 109 containing the usual electric switch and resistance mechanism, I locate an ordinary electric switch 110 having a movable switch-arm 111 pivoted at 112 and connected by one cord 113 to the finger 106 of the yielding-guard, and connected by another cord 114 to the sliding-rod 103—the latter cord passing around a pulley 115. If now the tripping-device 30 strikes against a person the slide 24 will be forced downwardly so as to carry the stop 105 out of the way of the sliding-rod 103 which will then shoot forwardly and drawing upon the cord 114 will raise the switch-arm 111 so as to break the motor circuit and cause the motor to be brought to rest, at the same time serving to put on the brake as above described. The yielding-guard also serves, when it collides with a person, to open the switch through means of the finger 106 and connected-cord 113 and thus cause the motor to stop, at the same time putting on the air-brake as previously described. By virtue of controlling the propelling power or motor and the brake by the movement of the tripping-device which projects ahead of all other mechanism and likewise controlling the same devices by the yielding-guard, it will be seen that as soon as either the tripping-device or the yielding-guard collides with the victim, the brake is automatically put on and the power for propelling the car is simultaneously disconnected or rendered inoperative so that it will not continue to drive the car. It will thus be seen that I provide a most effective way of preventing a person from being run down or injured by a cable or trolley car.

When the apparatus shown in Fig. 15, is applied to a cable car, instead of an electric car, the connections are made between the grip-releasing device and the yielding-guard and trip-device, so that upon the operation of either of the latter, the grip may be caused to let go of the propelling cable in order to stop the propulsion of the car.

In the present specification no claim is made to the specific form of yielding guard shown in Figs. 1 and 5, but I wish to be understood as not abandoning such invention.

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

1. The combination of a car, a stationary fender mounted across the forward end of the car, in front of the dash-board a sliding-screen normally disposed intermediate the fender and dash-board and adapted to be projected or thrust in advance of said fender, means for sliding or projecting the screen and a trip-device normally extending in advance of said fender and screen for locking and releasing said projecting means.

2. The combination of a car, a stationary fender curved on an arc about a horizontal axis and arranged across the front end of the car, a similarly curved sliding-screen mounted in guides to the rear of said fender and describing an arc in its sliding movements about a horizontal axis, said screen normally held retracted back of said fender and adapted to be projected or thrust forwardly of the fender from beneath the same, a trip-device for said screen and means for forcibly projecting it when released.

3. The combination of a car, a sliding-screen arranged across the front end of the car and adapted to be projected forwardly and downwardly, a spring-actuated slide connected with said screen for forcibly projecting it, a trip-device provided with a wheel having its periphery normally engaging the slide and holding it against the action of the spring and thereby keeping said screen retracted under spring tension.

4. The combination of a car, a sliding screen arranged across the front end of the car and adapted to be projected forwardly and downwardly therefrom, a pair of arms each pivoted at one end to a fixed point so that their free ends have a wide range of movement, said free ends being connected with said screen, a spring-actuated slide connected with and actuating said arms, and a trip-device engaging said slide and normally holding it against the action of its spring.

5. The combination of a car, a sliding-screen adapted to be projected forwardly of the car and comprising a sliding frame having a net made fast at its lower end to said frame and free at its sides, and springs for acting upon the upper end of the net and normally holding it taut but permitting it to sag under the weight of a person caught therein.

6. The combination of a car, a forwardly sliding screen adapted to be projected forwardly of the front end of the car and comprising a frame curved on an arc about a horizontal axis and having a sliding movement about such axis, a net mounted within said frame and movable independently thereof, and springs for normally holding the net taut but permitting it to sag under the weight of a person.

7. The combination of a car, a forwardly sliding frame mounted across the front end of the car, and adapted to be slid in advance thereof, means for sliding the frame forward, a sliding-bar mounted so as to move at right angles to its length, a series of springs secured between fixed points and the sliding bar, and a net secured between the lower end of the frame and the sliding-bar, and movable independently of said frame said net being normally held taut by said springs.

8. The combination of a car, a frame mounted across the front end thereof, a sliding-bar mounted therein so as to move at right angles to its length, a series of springs secured between fixed points and the sliding-bar, and

a net attached between the lower end of said frame and the sliding-bar, said net being normally held taut by said springs.

9. The combination of a car, a sliding-frame mounted across the front thereof and provided with means for projecting it forwardly, a sliding-bar mounted therein so as to move laterally in the plane of the frame, a series of springs secured between the upper end of the frame and the sliding-bar, and a net secured between the sliding-bar and the lower end of said frame.

10. The combination of a car, a forwardly sliding frame mounted across the forward end of the car and having its lower end provided with a horizontally-arranged bar or edge, a net arranged in said frame and movable independently thereof and having its lower end secured to said bar, and springs for normally holding the net taut but permitting it to sag below the level of said bar so as to form a pocket therewith under the weight of a person.

11. The combination of a car having a forwardly-sliding screen arranged across the front of the dash-board, means for projecting the screen forwardly, and a stationary fender secured in front of said screen and dash-board so as to cover substantially the entire mechanism for housing and protecting it, as well as preventing a person from falling against said mechanism.

12. The combination of a car, a vertically-sliding swinging-guard depending across the forward end of the car in front of the wheels and inclined downwardly and forwardly, means for forcing the guard downwardly in contact with the ground, and a trip-device for normally holding it from contact with the ground, and extending in advance thereof to collide with a person on the track.

13. The combination of a car, a sliding-screen curved on an arc about a horizontal axis and mounted in guides across the forward end of the car and adapted to be projected downwardly and forwardly in the arc of its curvature to give it a scoop-like action, springs tending normally to project the screen and means for holding the screen retracted and against the action of the springs, said means being adapted to be thrown into operation upon colliding with a person, whereby the screen may be projected by the springs so as to strike a person and precipitate him into the screen.

14. The combination of a car, a sliding-screen mounted across the forward end of the car in advance of the dash-board and adapted to be projected forwardly thereof and means for projecting it, said screen being curved on an arc about a horizontal axis lying at right angles to the length of the car and having a prescribed range of movement about said axis as a center whereby a person may be struck by the lower edge of the screen as it is projected forwardly and thereby thrown into the screen, a trip-device normally holding said screen retracted and extending ahead thereof so as to strike a person before being reached by the screen.

15. The combination of a car, a vertically-sliding swinging guard depending across the forward end of the car in front of the wheels and provided with a spring-shoe or lip extending continuously across it for making close contact with the ground when the guard is forced downwardly, means for forcing the guard downwardly in contact with the ground, and a trip-device for normally holding it out of contact with the ground, and projecting in advance thereof.

16. The combination of a car, a swinging guard depending across the forward end of the car in front of the wheels and extending into contact with the ground or nearly so, a net secured by its lower end to the lower end of the guard and movable independently of said guard and a set of springs connected with the net at or near its upper end and normally holding it taut but permitting the net to sag under the weight of a person thereon.

17. The combination of a car, a swinging guard depending across the forward end of the car in front of the wheels and adapted to be swung downwardly and backwardly into contact with the ground or nearly so, a spring for normally holding the guard elevated from the ground, said guard provided with a net attached by its lower end to the lower end of the guard, and springs for normally holding the net taut but permitting it to sag sufficiently to receive a person therein.

18. The combination of a car, a vertically-moving guard depending across the forward end of the car in front of the wheels, a spring tending to force the guard downwardly into contact with the ground, a tripping-device provided with pins moving in arc-shaped slots and pivoted at its upper end to said guard with its lower end projecting normally ahead of the guard, said tripping device being adjusted normally to lock the guard against the action of its spring and to leave it free to the action of said spring after the tripping-device has been given its initial movement by impact with a person.

19. The combination of a car, a swinging-guard depending across the forward end of the car in front of the wheels, said guard swinging about a horizontal axis and normally carried at its forward limit of movement in a downwardly inclined position so as to swing backwardly upon meeting an obstruction, a net secured by its lower end to the lower end of the guard, a series of springs connected between the upper end of the guard and the net for normally holding the net taut but permitting it to sag upon receiving thereon a person.

20. The combination of a car, a sliding-net adapted to be projected forwardly from the front end of the car, means for projecting the net and a tripping-device for normally holding the net retracted, a yielding-guard depending across the car between said net and the wheels and reaching nearly to the ground

so that the impact of the guard against a person will cause the guard to yield and move into contact with the ground and thereby obstruct the passage of the person under the car.

21. The combination of a car, a sliding-screen adapted to be projected forwardly from the front end of the car, means for projecting the screen and a tripping-device for normally holding the screen retracted, a yielding-guard depending across the car between said screen and the wheels and reaching to the ground or nearly so, said guard provided with a net attached by its lower end to the lower end of the guard and having a series of springs for normally drawing the net taut while permitting it to sag under the weight of a person thereon.

22. The combination of a car, a sliding-screen adapted to be projected forwardly from the front end of the car, means for projecting the screen and a tripping-device for normally holding the screen retracted, said screen comprising a rectangular frame having a net secured by its lower end to the lower end of the frame and a series of springs connected between the upper end of the net and the upper end of the frame for normally holding the net taut in the frame, a yielding guard depending across the car between said screen and the wheels and reaching to the ground or nearly so, said guard provided with a net attached by its lower end to the lower end of the guard and having a series of springs for normally drawing the net taut while permitting it to sag under the weight of a person thereon.

23. The combination of a car, a sliding-screen mounted across the forward end of the car and provided with means for projecting it forwardly to receive a person thereon, said screen being provided at each side with vertically-arranged folding nets connected thereto and to fixed points adjacent to the screen, whereby the said nets may be unfolded when the screen is projected, substantially as and for the purpose set forth.

24. The combination of a car, a swinging-guard mounted across the forward end of the car and adapted to be forced into contact with the ground upon colliding with a person, springs normally tending to force the guard against the ground, and a spring shoe extending continuously across the lower edge of the guard for making close contact with the ground, whereby said shoe may act upwardly against the action of said spring.

25. The combination of a car provided with means for propelling it, a spring-actuated sliding-screen normally held retracted and adapted when released to be projected forwardly, a trip-device for holding the screen in retracted position, and mechanism for rendering said propelling means inoperative upon the forward movement of said screen.

26. The combination of a car provided with a brake, a spring-actuated sliding-screen normally held retracted and adapted when released to be projected forwardly, a trip-device for holding the screen in retracted position, and connections whereby the brake may be put on upon the forward movement of said screen.

27. The combination of a car provided with a brake operated by fluid pressure, a spring-actuated sliding-screen normally held retracted and adapted when released to be projected forwardly, a trip-device for holding the screen in retracted position, and mechanism intermediate said screen and the controlling valve of said fluid pressure brake, whereby the brake may be applied upon the forward movement of the screen.

28. The combination of a car, a sliding-screen mounted across the forward end of the car and adapted to be projected forwardly thereof and means for projecting it, said screen having a prescribed range of movement the lower limit of which is a sufficient distance above the level of the tracks to pass over a prostrate person, and a swinging or yielding guard disposed to the rear of said screen and filling the space between the lower limit of movement of the screen and the level of the tracks, whereby upon failure of the screen to catch and hold a person the same may pass thereunder and be received by the swinging-guard.

29. The combination of a car, a curved sliding-screen mounted across the forward end of the car and adapted to be projected downwardly and forwardly in the arc of its curvature to give it a scoop-like action and means for so projecting it, said screen having a prescribed range of movement the lower limit of which is a sufficient distance above the level of the tracks to pass over a prostrate person, and a swinging or yielding guard disposed to the rear of said screen and filling the space between the lower limit of movement of the screen and the level of the tracks, whereby upon failure of the screen to catch and hold a person the same may pass thereunder and be received by the swinging-guard.

30. The combination of a car, a sliding-screen curved on an arc about a horizontal axis and mounted in guides across the forward end of the car and adapted to be projected downwardly and forwardly in the arc of its curvature to give it a scoop-like action, springs tending normally to project the screen and means for holding the screen retracted and against the action of the springs, said means being adapted to be thrown into operation upon colliding with a person, said screen having a prescribed range of movement, the lower limit of which is a sufficient distance above the level of the tracks to pass over a person upon failure of the screen to precipitate him into it.

31. The combination of a car, a movable screen adapted to receive a person thereon, said screen being mounted across the forward end of the car and having a prescribed range of movement the lower limit of which is at a

sufficient distance above the level of the tracks to clear a prostrate person, and a wheel-guard disposed forwardly of the wheels and extending below the lower limit of movement of said screen, and reaching to the ground or nearly so for receiving a person passed over by the screen.

In testimony whereof I have hereunto set my hand, this 28th day of February, 1894, in the presence of the two subscribing witnesses,

ALBERT E. HUGHES.

Witnesses:
A. M. HAYES,
WILLIS FOWLER.