

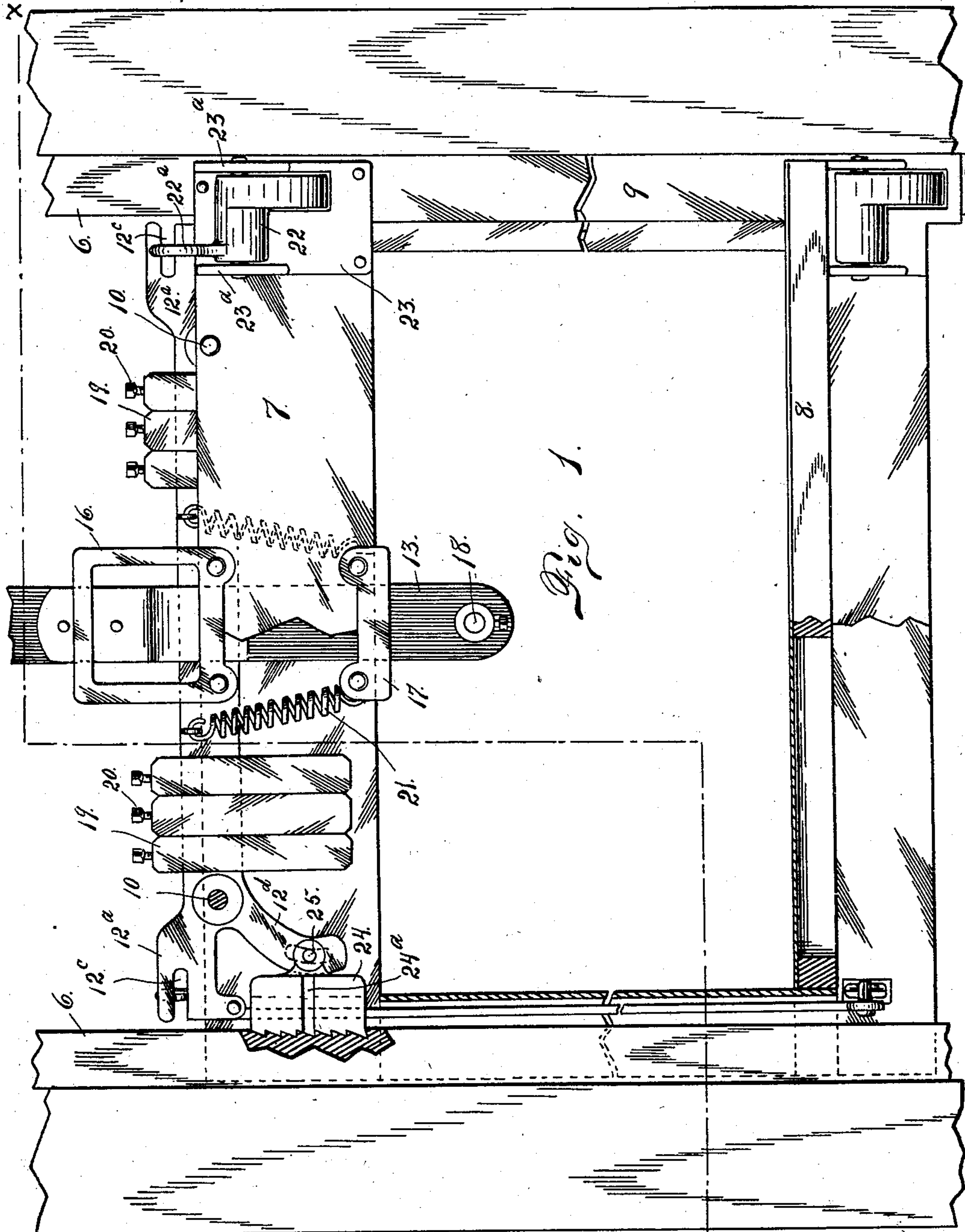
No. 721,816.

PATENTED MAR. 3, 1903.

W. N. MARTIN.  
ELEVATOR SAFETY DEVICE.  
APPLICATION FILED MAR. 10, 1902.

NO MODEL.

4 SHEETS—SHEET 1.



WITNESSES:

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Dena Nelson.

INVENTOR.

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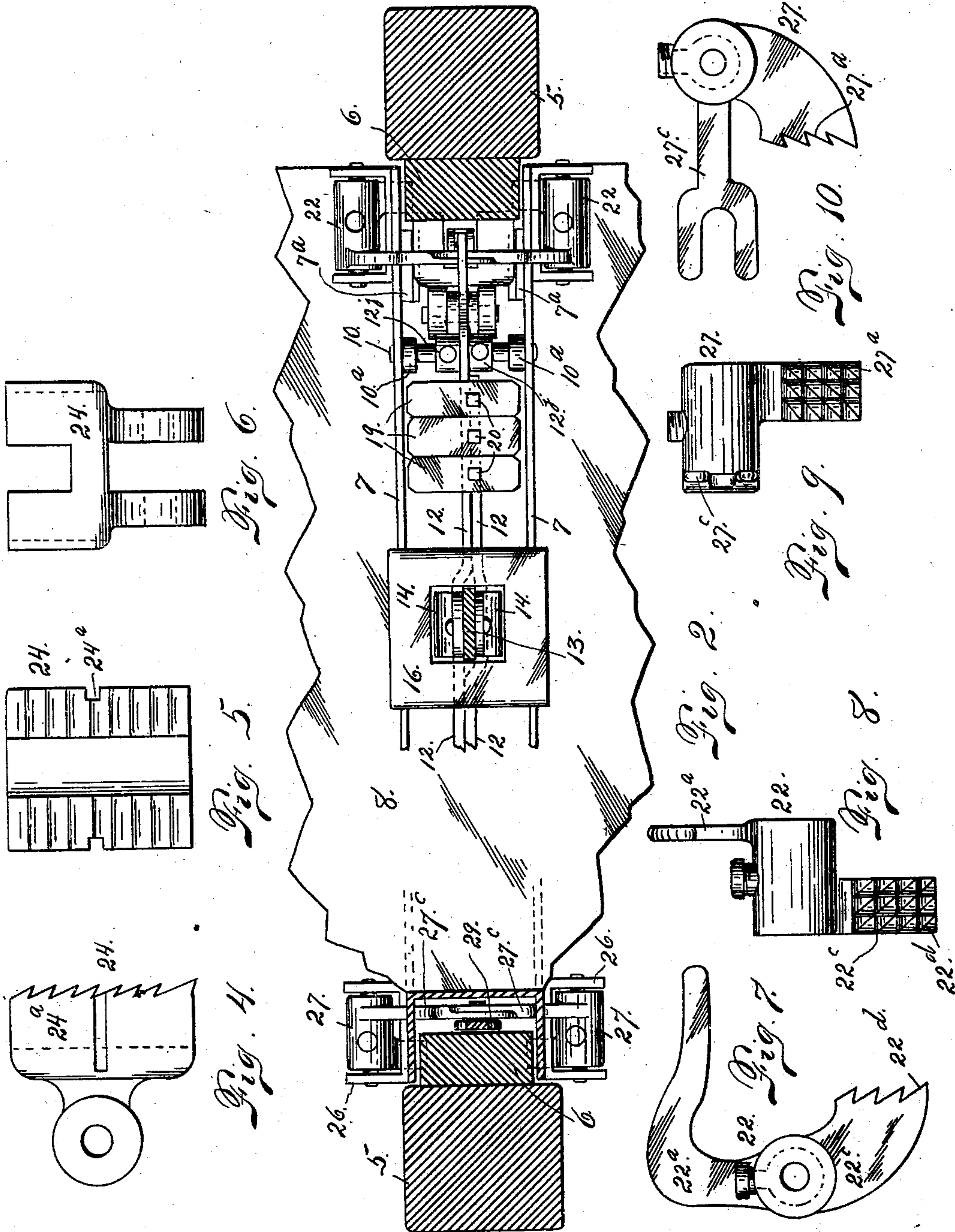
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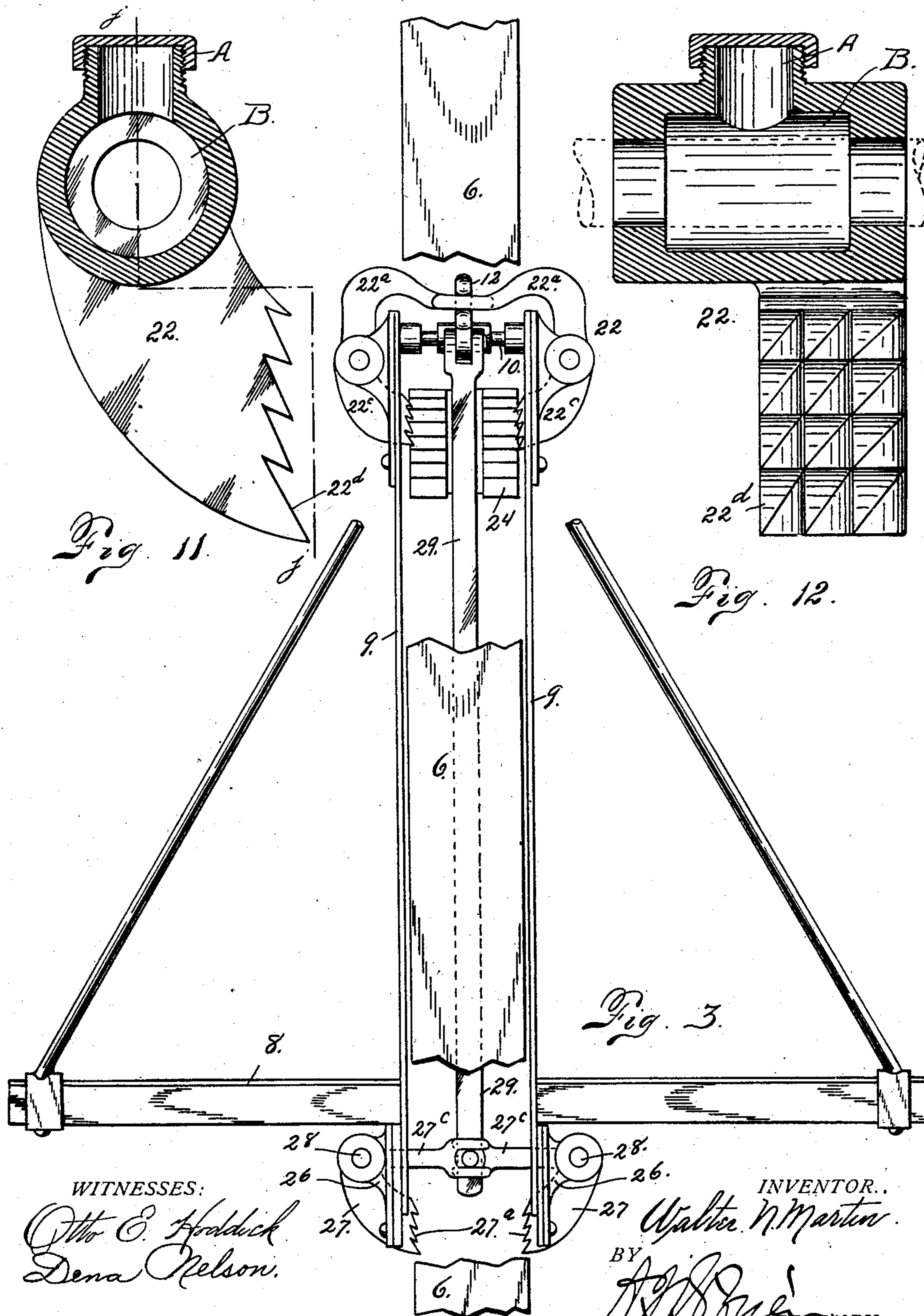
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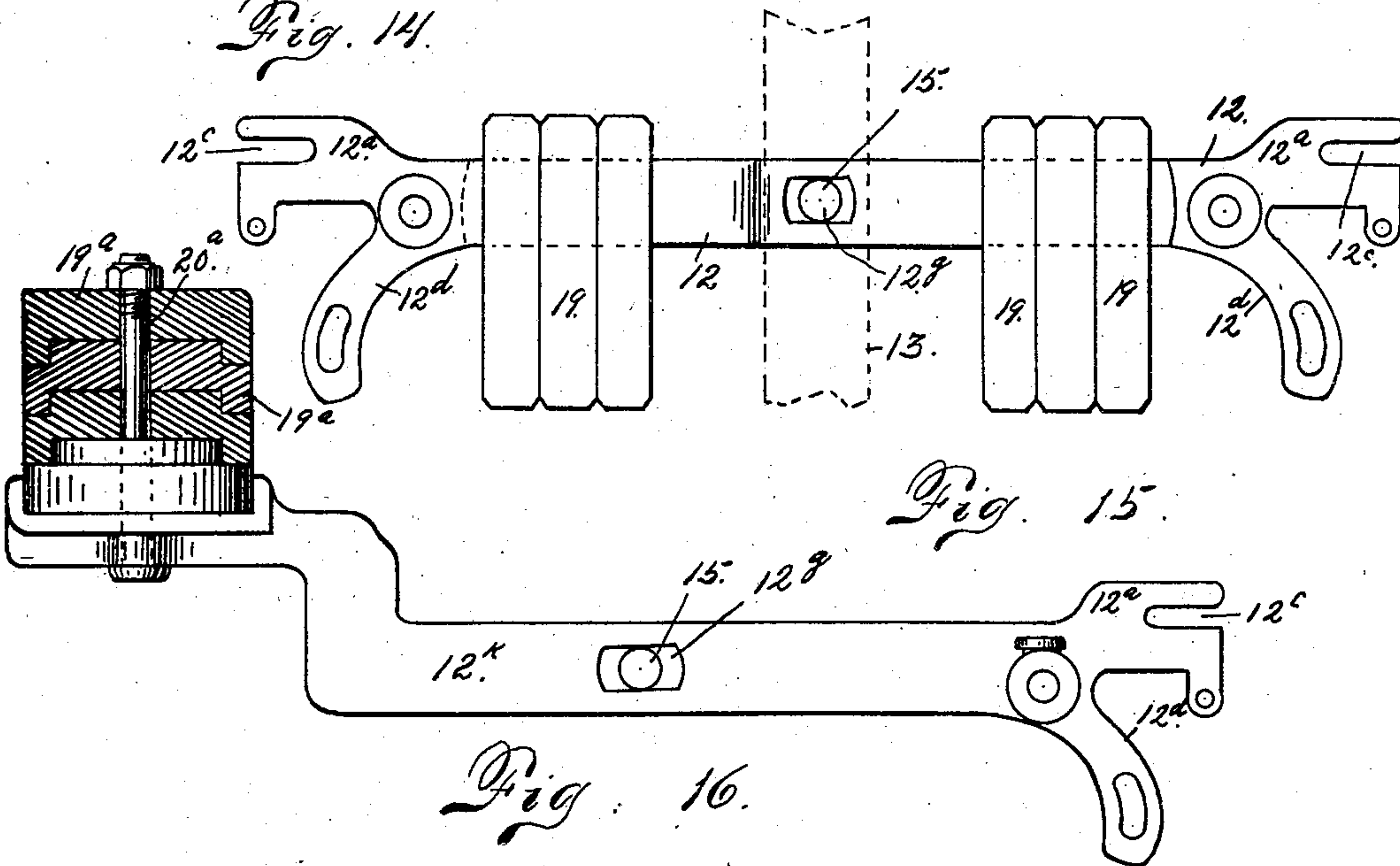
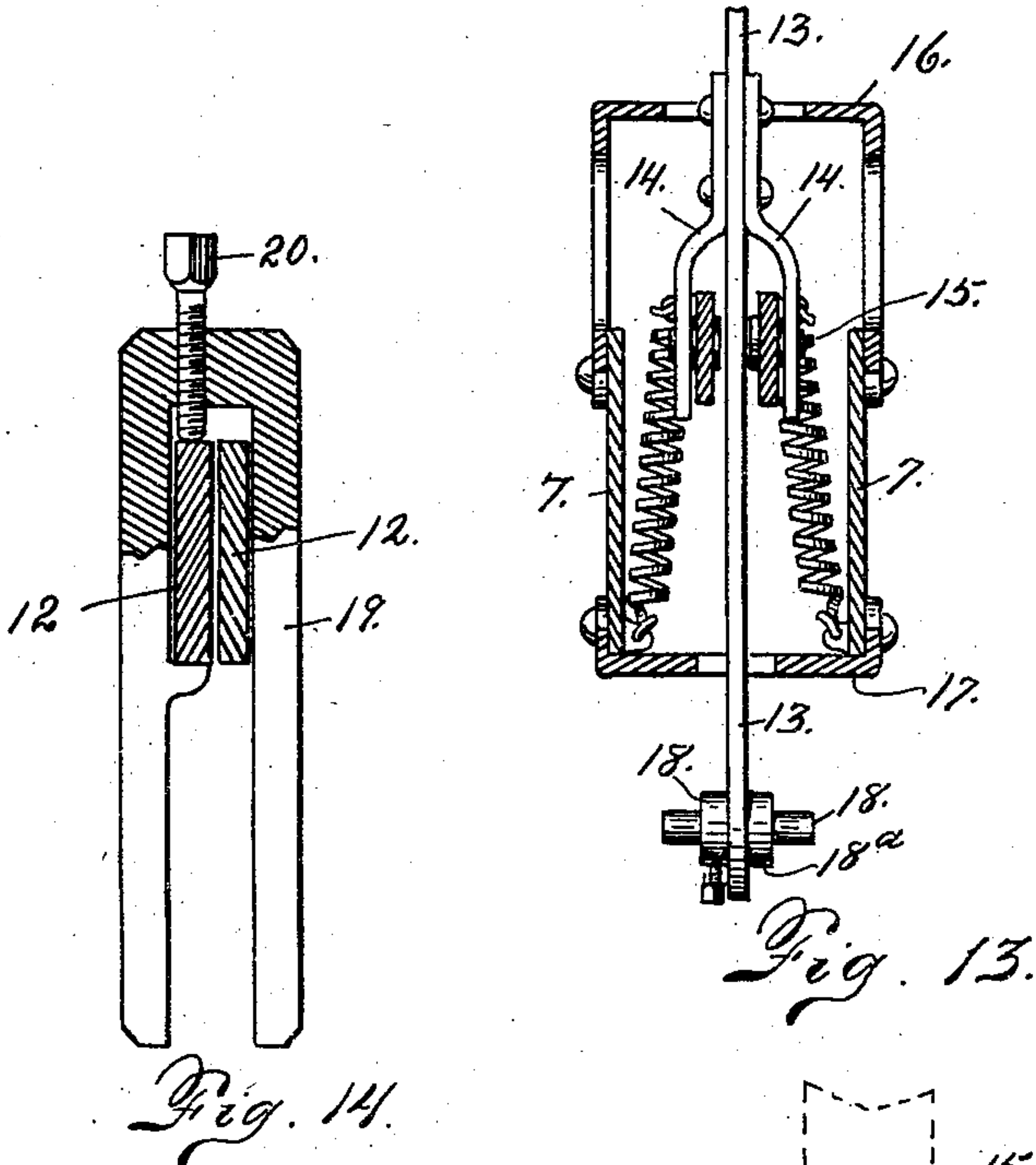
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# UNITED STATES PATENT OFFICE.

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## ELEVATOR SAFETY DEVICE.

SPECIFICATION forming part of Letters Patent No. 721,816, dated March 3, 1903.

Application filed March 10, 1902. Serial No. 97,625. (No model.)

*To all whom it may concern:*

Be it known that I, WALTER N. MARTIN, a citizen of the United States of America, residing at Cripplecreek, in the county of Teller and State of Colorado, have invented certain new and useful Improvements in Elevator Safety Devices; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in elevator safety devices generically, but will be referred to in this specification more especially as applied to cages for mining-shafts, where accidents frequently occur, resulting in the dropping of the cage to the bottom of the shaft, generally with fatal result to those on the cage and sometimes to others below in the shaft. My object is to prevent accidents of this kind not only in connection with mine-cages, but elevators of all kinds as well. To avoid surplusage and awkwardness of construction, the term "cage" will be used generally in this specification as a generic term for cages and elevators of all kinds, whether used in mining-shafts, building-shafts, or elsewhere.

My improvements embrace features whereby as soon as the cable supporting the cage breaks or the pull thereon is released or for any reason ceases to act or perform its normal function clutch mechanism is automatically and instantly applied to the guides of the shaft with sufficient force to stop the cage.

Having briefly outlined the nature of my improvement, as well as the objects it is designed to attain and the functions it is intended to perform, I will proceed to describe the same in detail, reference being made to the accompanying drawings, in which is illustrated an embodiment thereof.

In the drawings, Figure 1 is a side elevation, partly in section, of a cage equipped with my improvements. Fig. 2 is a section taken on the line *x x*, Fig. 1, looking downward. Fig. 3 is a view of the cage, taken at right angles to Fig. 1, the guide being partly

broken away. Figs. 4, 5, and 6 are side, face, and top views, respectively, of one of the upper dogs, being that which swings outwardly toward the guide. Figs. 7 and 8 are side and top views, respectively, of an upper dog, which acts laterally on the guide or at right angles to the dog shown in Figs. 4, 5, and 6. Figs. 9 and 10 are face and side views, respectively, of a lower dog. Figs. 11 and 12 are enlarged detail views, partly in section, of the dog shown in Figs. 7, 8, and 9, Fig. 12 being a section taken on the line *j j*, Fig. 11. Fig. 13 is a section taken through the parts connected with the draw-bar, which is shown in elevation. Fig. 14 is a section taken through the levers, illustrating one of the weights, which is shown partly in section. Fig. 15 illustrates two levers and their weights, the position of the draw-bar being shown in dotted lines. Fig. 16 illustrates a modified form of lever construction, showing a different construction and arrangement of weights.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate two opposite side timbers of a shaft, to which are attached on the inside the vertical guides 6 for the cross-head, composed of two separated plates 7, whose extremities project on opposite sides of the shaft-guides. The bottom 8 of the cage is connected at the sides with the cross-head by vertical channel-bars 9, which inclose the guides on three sides. At a suitable distance from the opposite extremities of the cross-head are mounted two short shafts or spindles 10, provided with collars 10<sup>a</sup>, engaging the plates 7 of the cross-head on the inside, whereby the two plates are held securely in place against inward movement. On these shafts 10 are fulcrumed two levers 12, whose arms extending inwardly from their fulcrums overlap each other and are pivotally connected with a central vertical draw-bar 13, having plates 14 on opposite sides, to which the lever-arms are respectively connected by studs 15, mounted on the plates and passing through slots 12<sup>b</sup>, formed in the levers. The cage-supporting cable (not shown) is connected with this draw-bar at the top. The upper extremity of this draw-bar passes through an inverted-U-shaped guide-bracket 16, attached



to the plate 7 of the cross-head and having an opening in the top for the bar, which also projects below the cross-head and passes through an opening in a guide-plate 17, attached to  
 5 and connecting the lower edges of the cross-head plates. The extremity of this bar below the plate 17 is provided with a cross-pin 18, passing through an opening formed in the bar and held in place by collars 18<sup>a</sup> on opposite sides. This pin 18 normally engages the  
 10 plate 17 when the cage is suspended by the cable in the ordinary way, the weight of the cage being on the pin 18 rather than on the levers 12. In the arrangement shown in the  
 15 drawings, however, it is taken for granted that the cable is broken, the parts being shown in the position they automatically assume to prevent the cage from falling in case of an accident of this character. In this  
 20 event the draw-bar moves downwardly with the overlapping arms of the levers, so that the pin 18 is considerably below the plate 17 of the cross-head. Each lever is provided with a set of weights 19, mounted on its inner  
 25 arm. The draw-bar is connected with each lever between its fulcrum and the weights which straddle the lever-arms, one set of weights being made fast to one lever and the other set of weights to the other lever by set-  
 30 bolts 20. Each lever is connected with the plate 17 by a coil-spring 21, which is stretched or placed under tension when the cage is suspended by its cable.

The short arm 12<sup>a</sup> of each lever 12 projects  
 35 outwardly beyond the lever-fulcrum to a point near the guide 6 and is slotted, as shown at 12<sup>c</sup>, to receive the upper arms 22<sup>a</sup> of two dogs 22, pivotally mounted on plates 23, secured to the opposite sides of the cross-head  
 40 extremities. As shown in the drawings, each dog is pivoted on lugs 23<sup>a</sup>, formed on its plate 23, and the lever-arm 22<sup>c</sup> below the axis, fulcrum, or pivot of the dog projects through an opening formed in the plate and is provided with teeth which normally or when the  
 45 cage is suspended by the cable are clear of the guides 6, but occupy a position quite close thereto. When, however, the cable breaks, the toothed faces of these dogs are thrown against the opposite sides of the guide  
 50 to stop the cage from falling. To facilitate the action of the dog on the guide, the lowermost tooth 22<sup>d</sup> is slightly longer than the other teeth of the dog. By reason of this construction the dog will take a quicker hold than if  
 55 all the teeth engage simultaneously, and before the entire strain or weight of the cage can act on this tooth the teeth on the entire face of the dog will have engaged the guide.  
 60 It will now be understood that two dogs 22 grasp the guide 6 simultaneously on opposite sides. In order to overcome any tendency of the guide-bar 6 to spring or spread outwardly, owing to the powerful thrust of a pair of inner  
 65 dogs 24, the teeth of the dogs 22 are directed inwardly as well as downwardly. This feature is indicated in Figs. 8, 9, and 12, in

which the teeth on the face of the dog are shown triangular in shape.

Each lever 12 is provided with a depending  
 70 arm 12<sup>d</sup>, located near its outer extremity and slotted to receive a pin 25, upon which the dog 24 is pivoted. This dog 24 is located between the arm 12<sup>d</sup> and the guide 6, and its face or the side adjacent the guide is toothed  
 75 to engage the guide to prevent the cage from falling. The toothed face of the dog 24, however, is normally or when the cage is suspended and held by the cable free from engagement with the guide. In case the cable  
 80 breaks the weights 19 and the springs 21 cooperate to throw the inner lever-arms downwardly, whereby the dogs 24 are thrust with great force outwardly against the guides. The lever-arm 12<sup>d</sup> bears against the back of  
 85 the dog and has a cam action thereon to relieve the pin 25 from strain during the aforesaid action of the lever 12. The dogs 24 are forced powerfully out against the guides 6 simultaneously with the lateral thrust of the dogs  
 90 22. The tendency of the dogs 24 is to thrust the guides outwardly, while the dogs 22, by virtue of the peculiar shape of their teeth already described, whereby they project inwardly, are intended to overcome this tendency.  
 95

Pivotally mounted on brackets 26 and secured to the channel-bars 9 below the bottom of the cage are dogs 27, having toothed faces  
 100 27<sup>a</sup>, projecting inwardly toward the guides 6, which they are arranged to engage on opposite sides to prevent the cage from falling. The lowermost tooth of each of these dogs is somewhat longer than the other teeth, for the purpose above stated, when speaking of  
 105 the dogs 22. This is also true of the lowermost teeth of the dogs 24. The toothed arms of the dogs 27 project below their pivots 28. These dogs are also provided with inwardly-projecting arms 27<sup>c</sup>, whose free extremities  
 110 are bifurcated or forked to straddle the cross-pin mounted on the lower extremity of a rod 29, whose upper extremity is connected with the arm 12<sup>a</sup> of a lever 12 at its outer extremity, whereby as the inner arms of the levers  
 115 12 are lowered and their outer arms raised the rods 29 (there being one on each side of the cage) will be raised sufficiently to throw the dogs 27 to operative engagement with the guides 6 simultaneously with the corresponding  
 120 action of the upper dogs 22 and 24. It is evident that other dogs intermediate the upper and lower dogs, already described, may be mounted on the channel-bars of the cage and connected with the rod 29 to be operated  
 125 thereby in the same manner as the dogs 27.

In this specification it is assumed that the guides 6 are composed of wood, which is the fact in mining-shafts. Hence the teeth of the metal dogs readily enter the wood to perform  
 130 their required function. It is evident, however, that the guides may be equipped with metal ratchet-bars arranged to cooperate with the dogs carried by the cage.



As shown in the drawings, the hubs of the dogs 22 and 27 are equipped with grease-cups A and are interiorly enlarged, as shown at B, to form a receptacle for packing material, as waste saturated with lubricant.

From the foregoing description the use and operation of a cage equipped with my improved safety devices will be readily understood. When the cage is in use in the ordinary way, these devices perform no function, the inner arms of the levers 12 being raised by the draw-bar, which is drawn upwardly by the cable, so that the cage-supporting pin 18 shall engage the guide-plate 17 at the bottom of the cross-head. The outer extremities of the levers are then in position to hold all the dogs, both upper, lower, and intermediate, (if the latter are employed,) away from the guides 6, so that the cage is allowed to move freely in the shaft in the same manner as if the safety equipment were absent. If, however, the cable breaks or any other accident occurs which ordinarily would allow the cage to drop, the weights 19 and the springs 21 throw the inner arms of the levers 12 quickly downward, whereby all the dogs are forced against the guides 6 with great force, whereby their biting action is instantaneous, causing the cage to stop, its movement being arrested before it has time to acquire a rapid rate of speed.

Each lever is provided with a hub 12<sup>j</sup>, engaging the shaft 10 on opposite sides of the lever. The hubs, as shown in the drawings, are equipped with grease-cups and may be interiorly recessed to receive packing material, the same as the dogs heretofore described.

The sides of the dogs 24 are grooved, as shown at 24<sup>a</sup>, to engage horizontal tongues of guides 7<sup>a</sup>, interiorly mounted on the opposite plates of the cross-head 7.

In the construction shown in Fig. 16 a modified form of lever is shown and designated 12<sup>k</sup>. One extremity of this lever is arranged to hold weights 19<sup>a</sup>, held in place by a bolt 20<sup>a</sup>, suitably secured by a nut at the top.

Having thus described my invention, what I claim is—

1. In safety mechanism for cages or elevators, the combination with the shaft-guides, of a cage cross-head composed of two separated plates, and having parts embracing the shaft-guides, spindles mounted on the cross-head between the said plates and provided with collars engaging the two plates on the inside to keep them suitably spaced, levers located between the two cross-head plates and fulcrumed on the said spindles, a dog pivotally mounted on the cross-head on each side of each shaft-guide, the guide-embracing parts being cut away to allow the dogs to bite the guides, a suitable operative connection between the outer arm of each lever and the said dogs, a draw-bar vertically movable on the cross-head and connected with the inner arms of the levers, guides mounted on the cross-head through which the bar passes, a

stop on the lower extremity of the draw-bar to engage the cross-head when the cage is suspended by the draw-bar, the latter having sufficient movement in the cross-head to actuate the levers to throw the dogs out of engagement with the shaft-guides when the cage is suspended, weights mounted on the inner arm of each lever, and coil-springs connecting the inner arm of each lever with the cross-head whereby as the lifting pull on the draw-bar ceases to act, the levers are actuated to cause the dogs to bite the shaft-guides, substantially as described.

2. In mechanism of the class described, the combination with shaft-guides, of a cage cross-head composed of two separated parts, spindles mounted on the cross-head plates, levers fulcrumed on the spindles between the plates, a draw-bar connected with the inner extremities of the levers and having a stop at its lower extremity, said stop engaging the cross-head when the cage is suspended from the draw-bar, the outer extremities of the cross-head having parts embracing the shaft-guides, dogs pivotally mounted on said parts which are cut away to allow the dogs to engage said guides, the outer arms of the levers being slotted, the dogs having arms projecting above their pivots and entering the slots of the levers, the draw-bar having sufficient movement in the cross-head, to throw the dogs into or out of engagement with the shaft-guides, and coil-springs connected at one extremity with the inner arms of the levers and at their opposite extremities with the cross-head, the springs being placed under tension when the cage is suspended by the cross-head.

3. In safety mechanism for cages or elevators, the combination with the shaft-guides, of a cage cross-head composed of two separated plates, two levers fulcrumed between the plates, a cage draw-bar connected with the inner arms of the levers, the outer arms of the levers being slotted, the cross-head having parts engaging the shaft-guides on opposite sides, a dog pivotally mounted on each of said parts which is cut away to allow the dogs to bite the guides, the dog on each end of the cross-head having arms projecting through the slot of the adjacent lever, and springs connected with the inner arms of the levers and placed under tension when the cage is suspended by the draw-bar.

4. In safety mechanism for cages or elevators, the combination with the shaft-guides, of a cage or elevator cross-head composed of two separated plates having parts embracing the shaft-guides on opposite sides, a draw-bar mounted on the cross-head and having a limited vertical movement therein, levers fulcrumed between the cross-head parts, three dogs mounted on the shaft-guide-engaging parts at each extremity of the cross-head, the said parts being cut away to allow the dogs to bite the guides, the three dogs being connected with the outer arm of the adjacent lever, whereby as said arm is moved upwardly,



the dogs are caused to bite the guide, and means connected with the inner arms of the levers for throwing the latter downwardly as soon as the pull on the draw-bar ceases to act.

5 5. In safety mechanism for elevators or cages, the combination with the shaft-guides, of a cross-head composed of two separated plates having parts at their extremities en-  
10 gaging the shaft-guides on three sides, a dog slidable horizontally in each extremity of the cross-head, the guide-embracing part on the inside being cut away to allow the dog to en-  
15 gage the guide, two levers fulcrumed between the cross-head plates, springs connecting the levers with the cross-head, a draw-bar con-  
20 nected with the inner arms of the levers and slidable vertically in the cross-head, whereby when the cage is suspended by the draw-bar the springs are placed under tension, the outer  
25 arm of each lever being connected with the dog to actuate the latter as the inner arms of the levers are operated by the recoil of the springs when the pull on the draw-bar ceases to act.

25 6. In safety mechanism for elevators or cages, the combination with the shaft-guides, of a cross-head composed of two separated plates whose extremities embrace the shaft-  
30 guides, a draw-bar, upper and lower guides mounted on the cross-head and through which the draw-bar passes and in which it has a limited vertical movement, a plate attached to each side of the draw-bar, levers fulcrumed on the cross-head and whose inner arms are  
35 pivotally connected with the said plates, springs connecting the inner arms of the levers with the cross-head and placed under tension when the cage is suspended by the cross-head, and dogs mounted on the cross-  
40 head and connected with the outer arms of the levers whereby the dogs are actuated to grip the shaft-guides when the levers are operated by the recoil of the springs.

45 7. In safety mechanism for elevators or cages, the combination with the shaft-guides, of a cross-head composed of two separated plates having upper and lower guides mount-  
50 ed on the cross-head, a draw-bar passing through said latter guides and having a limited movement therein, levers fulcrumed between the plates of the cross-head, dogs mounted on the cross-head extremities and connected with the outer arms of the levers to grip the shaft-guides when the inner arms  
55 of the levers are forced downwardly, the inner arms of the levers being connected with the draw-bar, and weights mounted on the inner arm of each lever, substantially as described.

60 8. In safety mechanism for elevators or cages, the combination with the shaft-guides, of a cross-head composed of two separated plates whose extremities engage the shaft-guides, dogs mounted on the cross-head ex-

65 tremities, levers fulcrumed on the cross-head and whose outer arms are connected in op-  
erative relation with the dogs, a draw-bar having limited vertical movement in the cross-head and connected with the inner arms  
70 of the levers, springs connecting the inner arms of the levers with the cross-head, dogs mounted on the cage below the cross-head and adjacent the shaft-guides, and rods connecting the outer arms of the levers with the  
75 dogs in operative relation, substantially as described.

9. In safety mechanism for elevators or cages, the combination with the shaft-guides, of a cross-head, a guide mounted on the cross-  
80 head, a draw-bar passing through said guide and having a limited movement therein, levers fulcrumed on the cross-head, dogs mounted on the cross-head extremities and connected with the outer arms of the levers  
85 to grip the shaft-guides when the inner arms of the levers are forced downwardly, the inner arms of the levers being connected with the draw-bar, and weights mounted on the inner arm of each lever, the connection be-  
90 tween the lever and draw-bar being between the lever-fulcrum and the weights.

10. In safety mechanism for cages or elevators, the combination with the shaft-guides, of a cage or elevator cross-head having parts embracing the shaft-guides on opposite sides,  
95 a draw-bar mounted on the cross-head, and having limited vertical movement therein, levers fulcrumed on the cross-head, three dogs mounted on the shaft-engaging parts at each extremity of the cross-head, the said parts  
100 being cut away to allow the dogs to bite the guides, the three dogs being connected with the outer arm of the adjacent lever, whereby as the said arm is moved upwardly the dogs  
105 are caused to bite the guide, and means connected with the inner arms of the levers for throwing the latter downwardly as soon as the pull on the draw-bar ceases to act.

11. In safety apparatus for elevators or cages provided with a top cross-head, of dogs  
110 mounted thereon in proximity to the shaft-guides, there being one dog adjacent the inner surface of the guide and two dogs located adjacent the respective side surfaces of the  
115 guide, the dogs having teeth arranged to bite the guides as described, the teeth of the side dogs projecting inwardly to prevent the spreading of the guides, levers fulcrumed on the cross-head and connected with the dogs to operate the latter, and a draw-bar slidable  
120 on the cross-head and connected with the levers, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WALTER N. MARTIN.

Witnesses:

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J. D. PUTMAN.