

No. 713,706.

Patented Nov. 18, 1902.

R. C. SMITH.
SAFETY DEVICE FOR ELEVATORS.

(Application filed May 5, 1902.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.

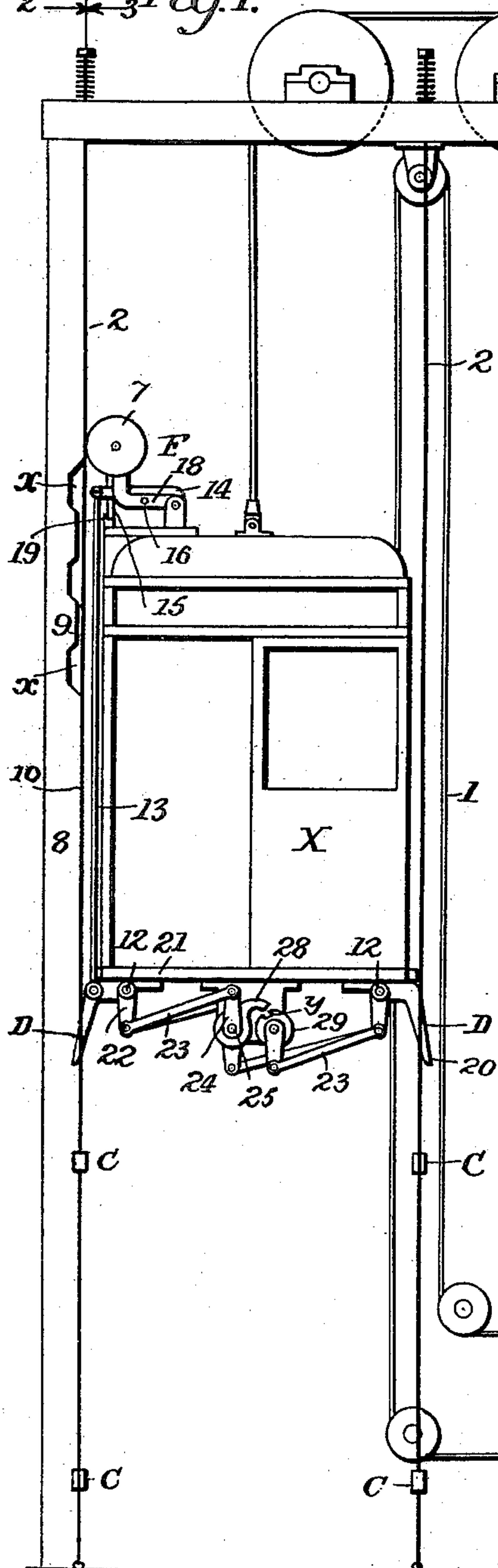
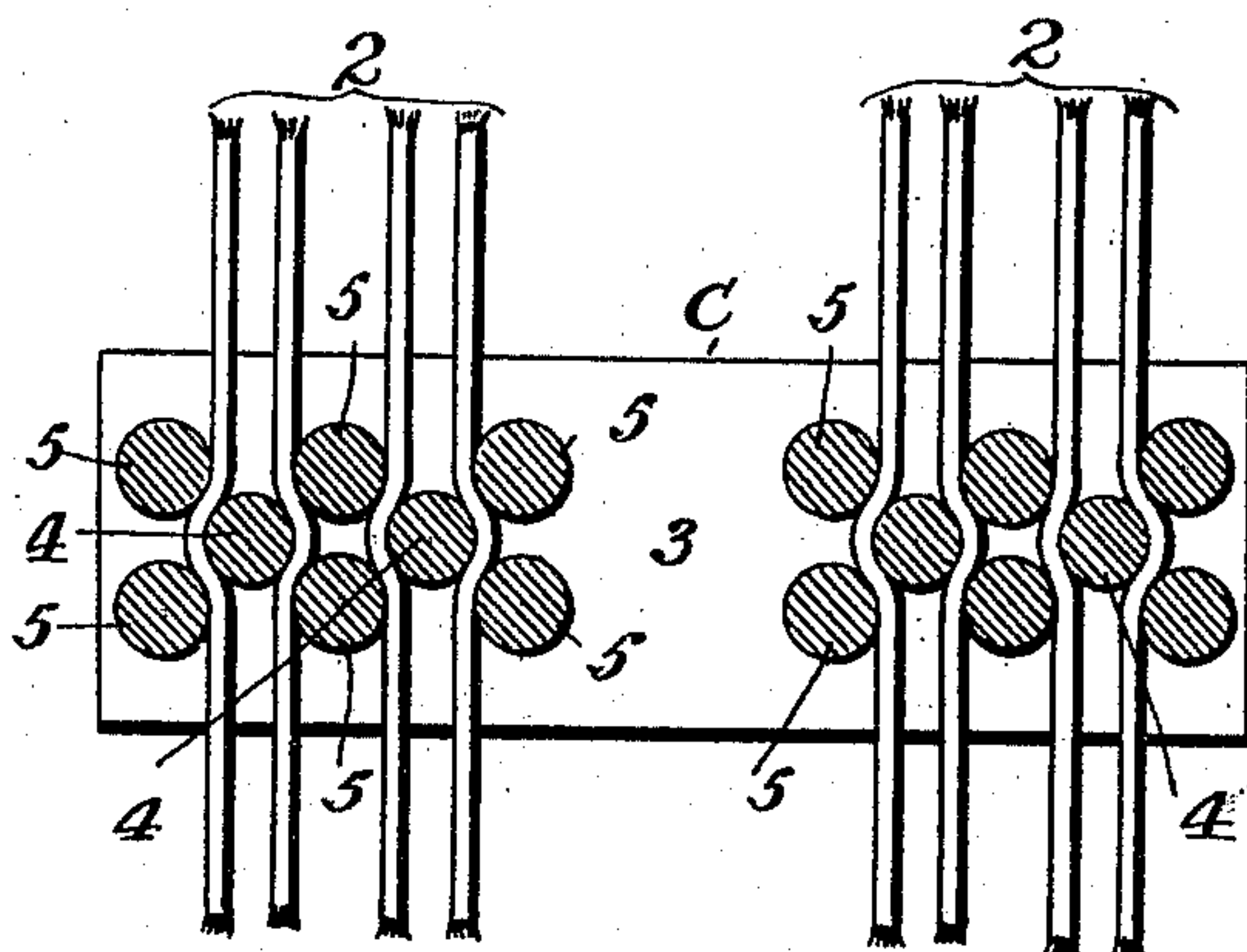


Fig. 6.



Witnesses

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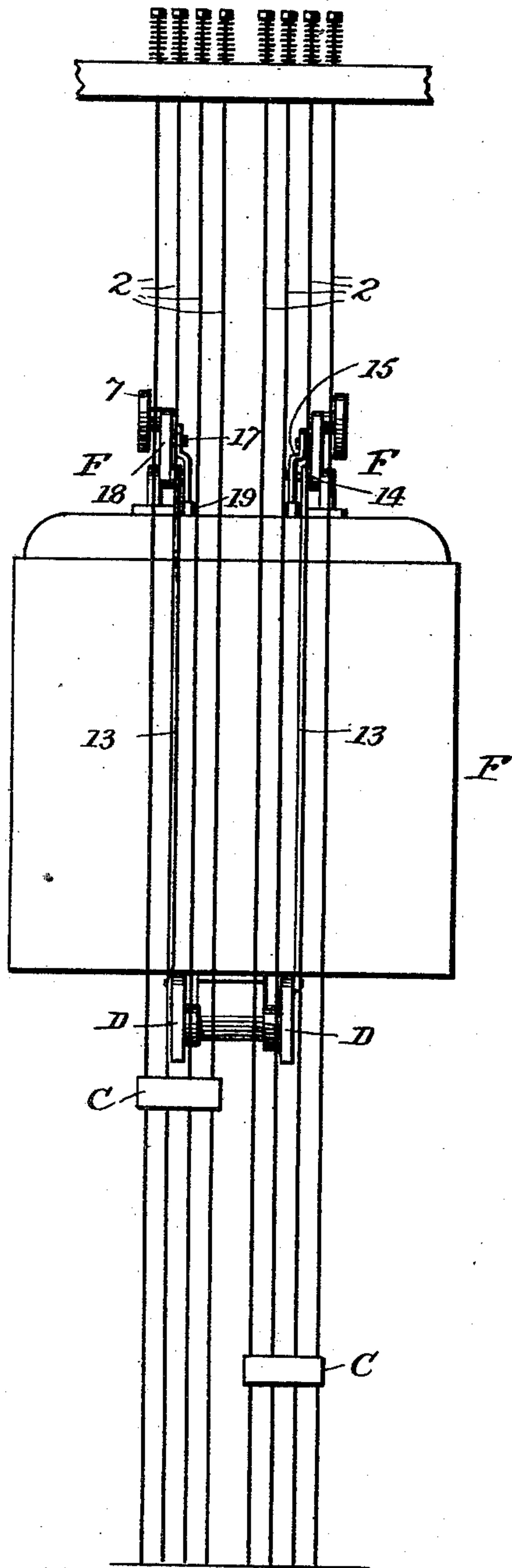
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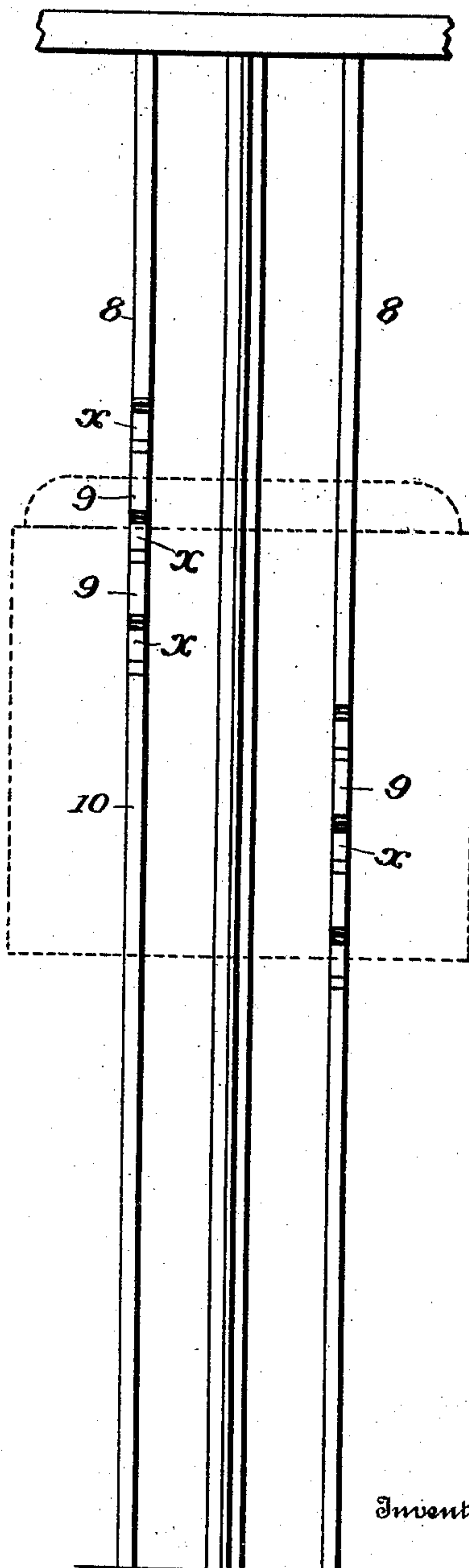
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Fig. 2



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Fig. 3



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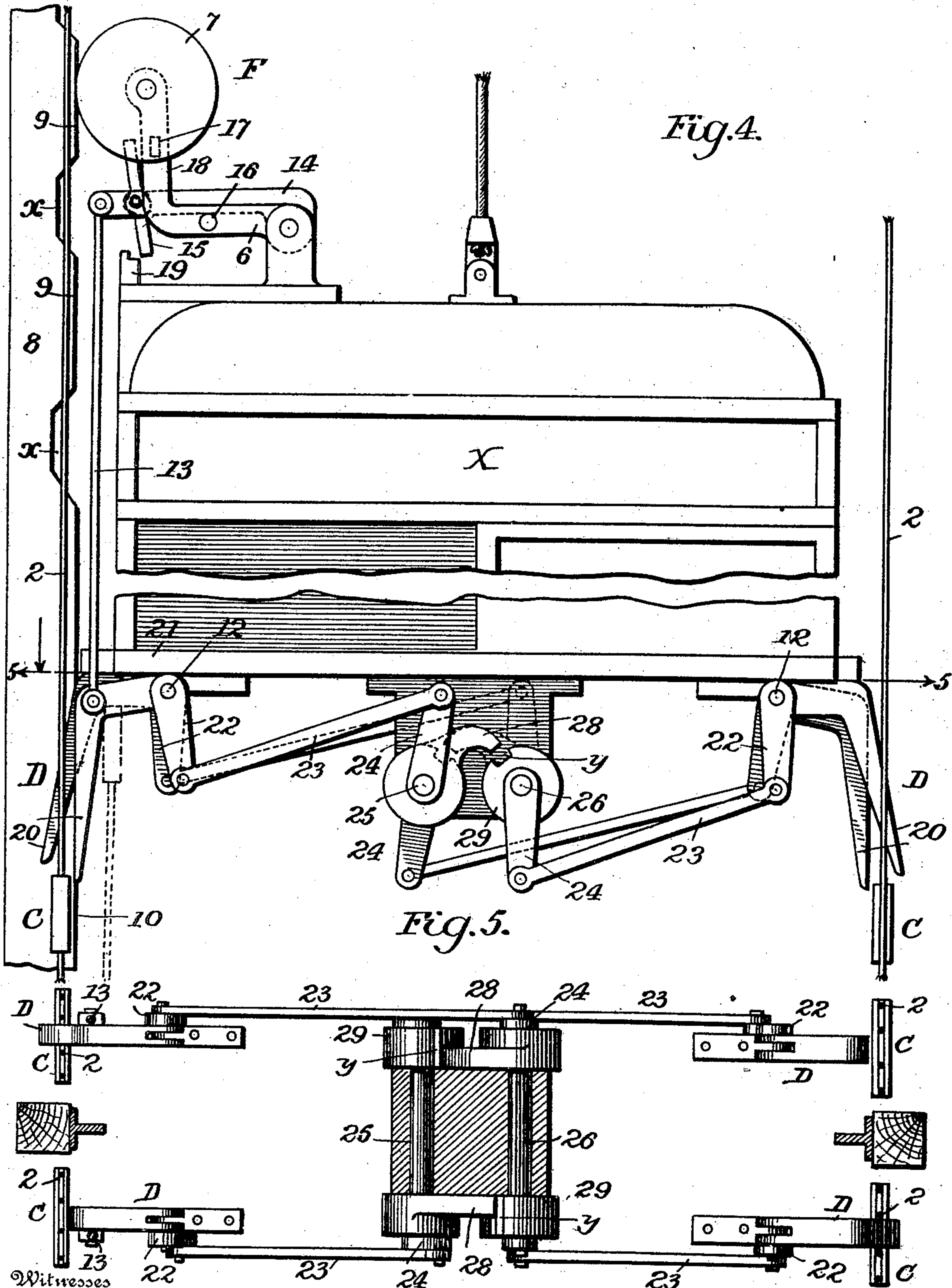
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

RUDOLPH C. SMITH, OF YONKERS, NEW YORK, ASSIGNOR TO OTIS ELEVATOR COMPANY, OF EAST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SAFETY DEVICE FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 713,706, dated November 18, 1902.

Application filed May 5, 1902. Serial No. 106,036. (No model.)

To all whom it may concern:

Be it known that I, RUDOLPH C. SMITH, a citizen of the United States, residing at Yonkers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Safety Devices for Elevators, of which the following is a specification.

My invention relates to elevators, and has for its object to arrest the elevator-engine in case of excessive speed of movement of the car; and my invention consists of one or more blocks or equivalent devices in the well connected with the stopping and starting device and a dog or dogs on the car and controlling means whereby a dog may be caused to make contact with and shift a block in case the car moves at undue speed, as fully set forth hereinafter and as illustrated in the accompanying drawings, in which—

Figure 1 represents in elevation sufficient of an elevator apparatus to illustrate my invention. Fig. 2 is a side view of the parts. Fig. 3 is a side view showing the track. Fig. 4 is an enlarged side view showing the details of construction. Fig. 5 is a horizontal section on the line 5 5, Fig. 4. Fig. 6 is an enlarged sectional view of the retarder.

The car X is connected by flexible suspensions or otherwise with the elevating-engine A, which, as shown, is an electric winding-engine, although any suitable motor-power may be employed, the engine being provided with the usual stopping and starting device, which, as illustrated, is a switch within a switch-box B, controlled by a standing cable 1 or by any other suitable hand-control device operated from within the car.

Within the well are vertical supports, which may be in the form of rails, bars, cables, or otherwise, but which, as shown, are suspended rods or wires 2, and in connection with these parts, hereinafter termed "rods," I make use of what I term "retarders" C, of which there may be one or more at each side of the well. When the rods are in the form of rods or heavy wires, I depend upon the bending of the wires through the action of the retarder to secure a resistance to the movement of the car when the latter is temporarily connected

with the retarder, as set forth in Letters Patent No. 618,141, issued to me January 24, 1899. If cables are used in connection with other means of resistance, the retarders may be connected with the cables, and, as set forth in my said Letters Patent, I make use of a control device and dogs upon the car, the position of which is controlled by said control device, so as to carry the dogs into and out of contact with the retarders. All of these features as regards their general arrangement and operation are set forth in my said Letters Patent.

The special character of retarder which I prefer to use is one which slides upon the suspended rods 2, arranged in pairs, there being one or any more desired number of pairs, and each retarder consists of a plate 3, provided with a pin 4 intermediate the rods of each pair and with two side pins 5 5 above and below the pin 4, so arranged as to bend the two rods partially around the pin 4 and carry them toward each other. As a result the plate 3 of the retarder cannot be pushed in either direction without each rod being first bent outward and then inward along successive portions as the retarder moves, the energy thus absorbed in bending and straightening the rods constituting a resistance to the movement of the car when the latter is connected with the retarder by means of the dogs or otherwise. In practice there is a sufficient number of rods or the retarding devices are otherwise so constructed that when a car moving at undue speed is brought into connection with the retarders, or retarder, if but one is used, the resistance to the movement of the retarder will gradually result in the arrest of the car.

There may be one or more dogs and there is a retarder or series of retarders to each dog, and the dogs D are suitably constructed and supported in any suitable position on the car to each engage a retarder when required and to be moved automatically out of engaging position, so as to normally pass the retarders, and preferably the retarders at one side are arranged at different heights or alternate with those at the opposite side, so that if the retarder or retarders at one side

of the car are not engaged by the dog or dogs of that side a dog at the opposite side will engage a retarder at that side. With the retarders are combined a controller F, whereby
 5 at normal speeds of the car each dog as it approaches a retarder will be prevented from contact therewith, but will be shifted to or held in position for contacting with the retarder in case the speed of the car is excessive. As in the construction of my Letters
 10 Patent No. 618,141, the controller is provided with a frame 6, connected with the dog, and with a wheel 7, which travels upon a track 8, in which there are breaks or depressions, the
 15 wheel entering these depressions at the normal speed of the car, and thereby retracting the dog as the latter approaches each retarder; but when the speed of the car is excessive the inertia of the parts will prevent
 20 the wheel from entering the depression before the dog is brought to the retarder which will then be engaged by the dog.

I make use of the same general features of operation in my present construction; but in
 25 order to prevent the contact of the dog with the retarder when it is in an intermediate position between its extreme positions or during its movement from one position to the other I place in each break or depression a
 30 supplemental track section or bearing 9, which is out of line with the main bearing-face 10 of the track, and this section 9 is so arranged and proportioned that the roller 7 will be so controlled thereby that if it fails to properly
 35 shift the dog before meeting said bearing 9 the latter will prevent any shifting of the dog during the contact of the roller therewith, which will be during the time the dog is in immediate proximity to the retarder—that is,
 40 just before, just after, and during the movement opposite the retarder.

In the construction shown each dog D is L-shaped, pivoted at the inner end to a rock-shaft 12, and connected by a rod 13 with a lever 14, which is provided with a detent 15,
 45 so pivoted to the lever that its lower end will bear upon a rest 19 on the top of the cage to support the lever and dog in position for the dog to make full contact with the retarder.
 50 The frame 6, supporting the wheel 7 of the control device, is provided with a lug 16, extending beneath the lever 14, and with another lug 17 in position to make contact with the upper end of the dog 15. When the wheel
 55 7 is in contact with the main bearing of the track, the frame 6 is lifted and the lug 16 makes contact with the lever 14, lifts the latter, and carries the dog to its engaging position. When the wheel 7 is brought opposite
 60 one of the depressions or breaks in the main track, the frame 6 will descend and the lug 17 will make contact with the upper end of the detent 15, swing the latter from the stop 19, and release the lever 14, which can thus
 6 descend, carrying the dog to its retracted position. If there was a direct connection between the wheel 7 and the dog and the speed

of the cage was such that the wheel 7 would only partially enter the break or depression in the track, the end of the dog would make
 70 contact with the top edge of the plate of the retarder. This result is prevented by the construction shown, for unless the wheel 7 fully enters the break or depression the detent 15 will not be shifted, and by arranging
 75 the track section or bearing 9 so as to prevent the wheel from moving farther outward in such case I prevent the release of the dog, which is thus maintained in its full engaging position.
 80

The finger 20 of each dog occupies an inclined position extending outward between the rods 2 when the dog is in engaging position, so that in such case as the car descends the retarder C will be engaged by the inner
 85 edge of the dog and owing to the flexibility of the wires will be drawn inward until the retarder makes contact with the lower edge of the horizontal portion of the dog, as shown in dotted lines, Fig. 4. In order that the
 90 dogs may be made light in weight, I provide that they shall not be depended upon to support the strain of the retarder by arranging above each dog a part of a cross bar or plate
 95 21, extending outward to afford an abutment or support against which the upper edge of the horizontal portion of the dog may bear, thus sustaining the strain, it being merely sufficient to make the dogs strong enough for
 100 the horizontal portion thereof to resist the crushing pressure of the retarder.

Where there is a plurality of dogs at each side of the cage—as, for instance, two—I prefer to so support and operate the same that one
 105 of the said dogs will always be in engaging position when the other is out of engaging position, thus reducing the chances of failure to make contact with the retarder in case of any defect in the devices for controlling one or other of the dogs. As shown, the rock-
 110 shaft 12 of each dog is provided with an arm 22, connected by a connecting-rod 23 with an arm 24 on one or other of two rock-shafts 25 26, supported in bearings on the cage, and preferably the connecting-rods 23 of the dogs,
 115 which are diagonally opposite, are connected with the arms 24 on the same shaft, but projecting in opposite directions, whereby both of the said diagonally-arranged dogs are simultaneously moved outward or inward. In
 120 this case there are two tracks with depressions arranged alternately and two controllers F.

As the retarders C at one side of the well are alternately at different heights in respect
 125 to those of the other side, I provide that when a dog at one side of the car is retracted to pass the retarder at that side the dog at the opposite side, which occupies an engaging position, shall be locked in this position, so that if
 130 through the breaking of the parts the retracted dog should fail to be carried out to engaging position the opposite dog thus locked in place will engage the next retarder. It will of

course be understood that when there are two dogs at each side of the car and arranged so that one will be in engaging position when the other is retracted there will be a retarder opposite each dog, and in the movement of the car at normal speed each dog will be momentarily carried inward and then moved outward as it is carried past a retarder.

The locking devices may be used in connection with either one dog at each side or with two dogs at each side of the car. As shown, each rock-shaft 25 26 carries a hook 28, adapted to engage a notch γ in a hub or disk 29 on the opposite shaft whenever either shaft is rocked to carry one of the dogs inward. As soon as such dog passes the retarder and the shaft is rocked and carried outward it is unlocked from the other shaft.

It will be understood that there may be only a single dog and one retarder at one side of the well or a plurality of retarders at one side, or they may be at both sides of the well, that any number of rods may be used in connection with a single retarder, and the particular form of dog-controller shown may be used in connection with any number or arrangement of retarders, and the special construction and arrangement of dogs may be used in connection with different forms of controllers, and there may be different arrangements of tracks or other bearings for operating the controllers, and that there may be but one retarder in a well or a retarder may be arranged in connection with each floor, as circumstances may dictate.

Without limiting myself to the precise construction and arrangement of parts set forth, I claim—

1. In an elevator safety apparatus having a rod, a retarder thereon, a movable dog carried by the car, a track having a depression controlling the engagement of the dog and retarder according to the speed of travel of the car, and means for preventing the dog from engaging a retarder when only partially shifted, substantially as set forth.

2. The combination with the rod, retarder and track having a depression, and dog upon the car for engaging the retarder, of a movable frame carrying a wheel engaging the track, and devices connected with the dog, and engaged by said frame to control the position of the dog by the movements of the frame, substantially as set forth.

3. The combination with the safety-dog of an elevator-car, of a movable governor-frame, a detent and devices for supporting the dog in one position, and contacts whereby the detent is shifted on the movement of the frame, to release the dog, substantially as set forth.

4. The combination with an elevator-car, and a rod and retarder thereon, of a dog on the car to engage the retarder, dog-controlling devices, and a track controlling the position of the said devices having a track-section arranged to prevent any movement of the dog-controlling devices while the dog is

in immediate proximity to the retarder, substantially as set forth.

5. The combination with the car, safety-dog, rod, retarder thereon, and track having a depression, of dog-supporting devices consisting of a detent and connections for holding the dog in one position, a governor engaging the track, and a contact whereby the detent is shifted when the governor enters the depression, substantially as set forth.

6. The combination with the safety-dog, of a lever connected with the dog, a detent for supporting the lever, and a governor movable independently of the lever and provided with a lug for contacting with the detent, substantially as set forth.

7. The combination with the safety-dog, of a lever connected with the dog, a detent for supporting the lever, a governor movable independently of the lever and provided with a lug for contacting with the detent, and a track engaged by the governor and provided with depressions and an intermediate section out of line with the main sections of the track, substantially as set forth.

8. The combination of an elevator-car, dog and controlling devices for the dog, a rod, retarder thereon adapted to be engaged by the dog, and a track for controlling the positions of the controlling devices provided with a section arranged to prevent the shifting of the dog when in immediate proximity to the retarder, substantially as set forth.

9. The combination with the rod, retarder, and controlling-track of an elevator safety device, of a car, a dog pivoted below the car, a lever pivoted above the car and connected to the dog, a detent arranged to support the lever, and a governor having a pivoted frame and wheel bearing on the track, a lug for engaging the lever to lift the same, and a lug for engaging the detent, substantially as set forth.

10. The combination with the car, its dog, and controlling device, of a rod, retarder thereon, a track engaged by the controlling device and provided with two depressions, and intermediate section below the level of the main track, substantially as set forth.

11. The combination with the car, its dog and control devices, of a plurality of flexible rods and a retarder having a pin between two adjacent rods and pins outside the rods arranged to bend the opposite rods toward each other upon said intermediate pin, substantially as set forth.

12. The combination with the car, of retarding devices in the well, a plurality of dogs on the car for engaging said devices, and means whereby some of the dogs are carried into position to engage the retarding devices when others are out of engaging position, whereby some of the dogs are always in engaging position, substantially as set forth.

13. The combination with the car, of retarding devices in the well, a plurality of dogs on the car for engaging said devices, means

whereby some of the dogs are carried into position to engage the retarding devices when others are out of engaging position, whereby some of the dogs are always in engaging position, and means whereby when one set of dogs is in non-engaging position those in engaging position are locked in place, substantially as set forth.

14. The combination with a car provided with two connected dogs on opposite sides, of retarding devices in the well arranged alternately so that when a dog on one side of the cage is in position to engage the retarder at that side the connected dog on the other side will be in position to engage the succeeding retarder on the same side, substantially as set forth.

15. The combination with retarding devices in a well, of a car carrying two sets of dogs, one set at each side, and controlling devices for shifting the dogs into and out of position to engage the retarders, with connections whereby dogs of each set are moved outward as dogs of the other set are moved inward, substantially as described.

16. The combination with retarding devices in a well, of a car carrying two sets of dogs, one set at each side, controlling devices for shifting the dogs into and out of position to engage the retarders, and recessed tracks in the well cooperating with the controlling devices to move some of the dogs of the two sets outward and others inward at the same time, substantially as set forth.

17. The combination with retarding devices in a well, of a car carrying two sets of dogs, one set at each side, controlling devices for shifting the dogs into and out of position to engage the retarders, and recessed tracks cooperating with the control devices to move the dogs out of engaging position with the retarders at the normal speed of the cage, but to leave them in engaging position if the speed becomes excessive, substantially as set forth.

18. The combination with retarding devices in a well, of a car carrying two sets of dogs, one set at each side, controlling devices for shifting the dogs into and out of position to engage the retarders, and recessed tracks cooperating with the control devices to move the dogs out of engaging position with the retarders at the normal speed of the cage, but to leave them in engaging position if the speed becomes excessive, the retarders at opposite sides of the well being arranged alternately, substantially as described.

19. The combination with retarding devices in the well of a car carrying two dogs at each side for engaging the retarding devices, means for connecting the diagonally opposite dogs to move in and out together, and means for insuring that at all times one or other set of dogs shall be in engaging position, substantially as set forth.

20. The combination with retarding devices in the well of a car carrying two dogs at

each side for engaging the retarding devices, means for connecting the diagonally opposite dogs to move in and out together, and means for moving the two sets of dogs alternately into and out of engaging position, substantially as set forth.

21. The combination with retarding devices in the well of a car carrying two dogs at each side for engaging the retarding devices, means for connecting the diagonally opposite dogs to move in and out together, means for moving the two sets of dogs alternately into and out of engaging position, and means for locking in place the dogs in engaging position as long as the others are in non-engaging position, substantially as set forth.

22. The combination with the car of an elevator and with retarding devices in the well, of two sets of dogs on the car for engaging said retarding devices and two controlling devices on the car, one connected to actuate each set of dogs, and controlling-tracks in the well engaged by said controllers the controlling parts of one track alternating with those of the other, substantially as set forth.

23. The combination with an elevator-car, of two sets of dogs at opposite sides, two controlling devices, one for actuating each set of dogs, and two rock-shafts with arms and connecting-rods for connecting the diagonally opposite dogs, substantially as set forth.

24. The combination with an elevator-car, of two sets of dogs at opposite sides, two controlling devices, one for actuating each set of dogs, two rock-shafts with arms and connecting-rods for connecting the diagonally opposite dogs, and a finger on each rock-shaft arranged to engage a recess in a part carried by the other shaft, substantially as set forth.

25. The combination with a car carrying two sets of dogs and controlling devices, of two sets of rods at each side of the well each set of rods carrying a retarding device movable on the same, substantially as set forth.

26. The combination with a suspended flexible rod and retarder sliding thereon, of a car carrying a dog having a finger arranged at an angle to engage the outer edge of the retarder and draw it inward, and a fixed abutment against which the dog bears under the upward pressure of the retarder, substantially as set forth.

27. The combination with retarders alternately arranged at opposite sides of the well of an elevator, of a car, dogs carried thereby, means for retaining the dogs normally in position to engage the retarders, and means whereby at normal speed of the car, each dog is retracted as it is brought in proximity to a retarder and restored to position after passing the retarder, but is maintained in engaging position if the car speed is excessive, substantially as set forth.

28. The combination of two pairs of retarders at opposite sides of an elevator-well, a car carrying two pairs of dogs arranged at the opposite sides to engage said retarders,

each dog normally in position to engage the retarders, and means whereby each dog as it approaches a retarder is normally shifted to non-engaging position and restored to normal position after leaving the retarder and whereby it is left in engaging position, if the car exceeds its proper speed, substantially as described.

29. The combination of two pairs of retarders, alternately arranged at opposite sides of an elevator-well, a car carrying two pairs of dogs arranged at the opposite sides to engage said retarders each dog normally in position to engage the retarders, and means where-

by each dog as it approaches a retarder is normally shifted to non-engaging position and restored to normal position after leaving the retarder and whereby it is left in engaging position, if the car exceeds its proper speed, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

RUDOLPH C. SMITH.

Witnesses:

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W. H. BRADY.