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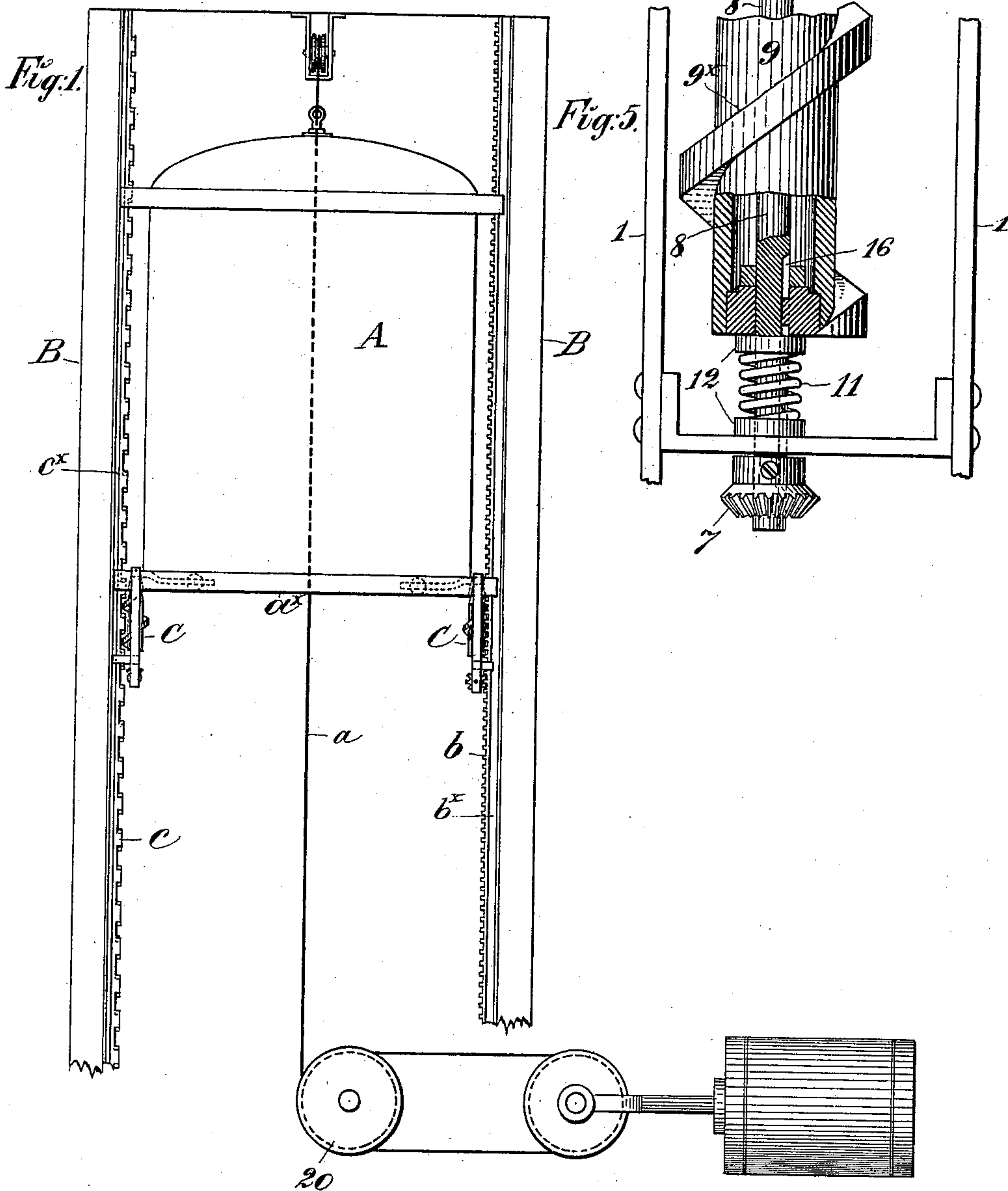
Patented Nov. 22, 1898.

C. M. DISSOSWAY.  
SAFETY DEVICE FOR ELEVATORS OR HOISTS.

(Application filed May 4, 1898.)

(No Model.)

3 Sheets—Sheet 1.



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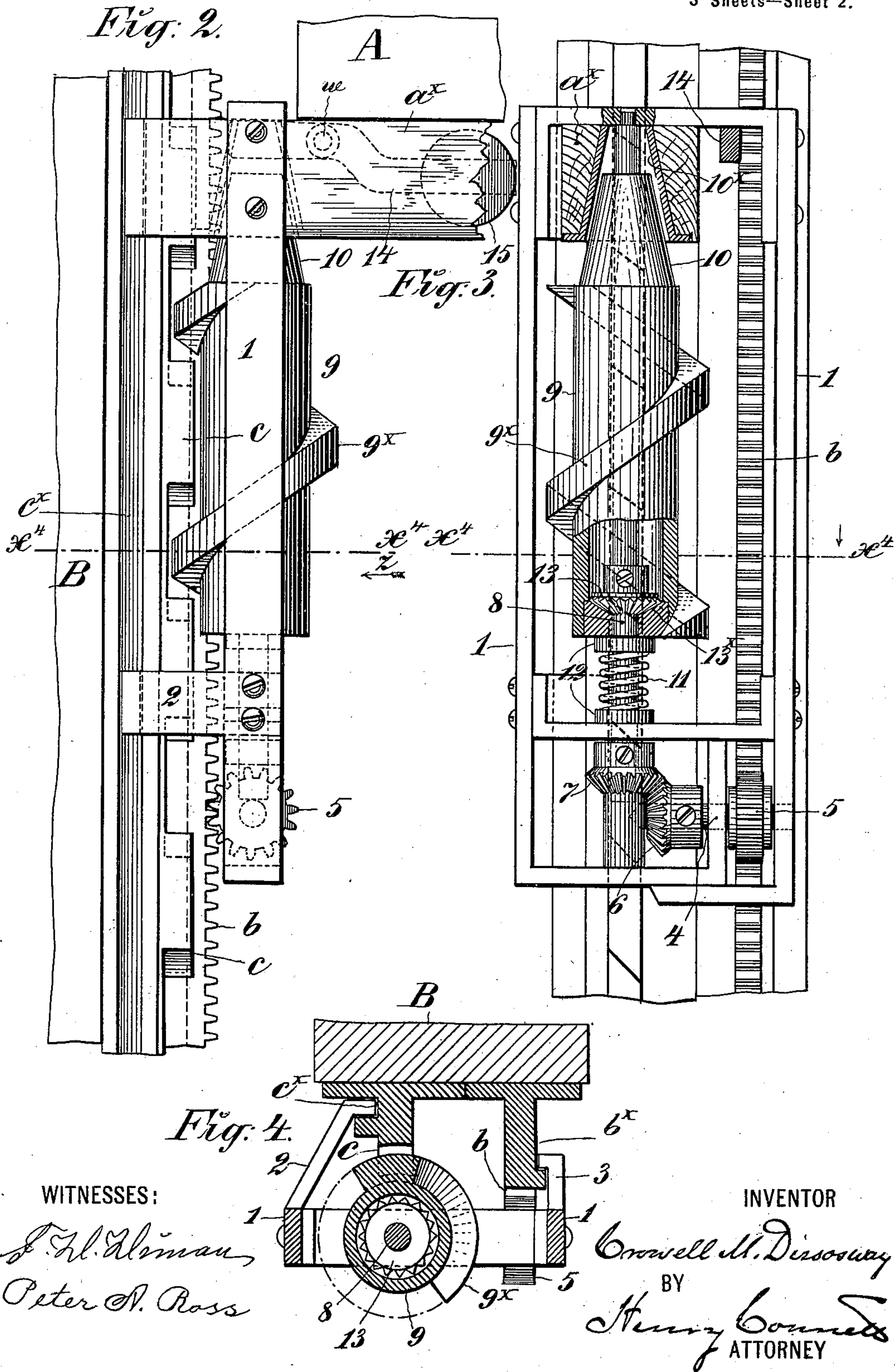
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Fig. 6.

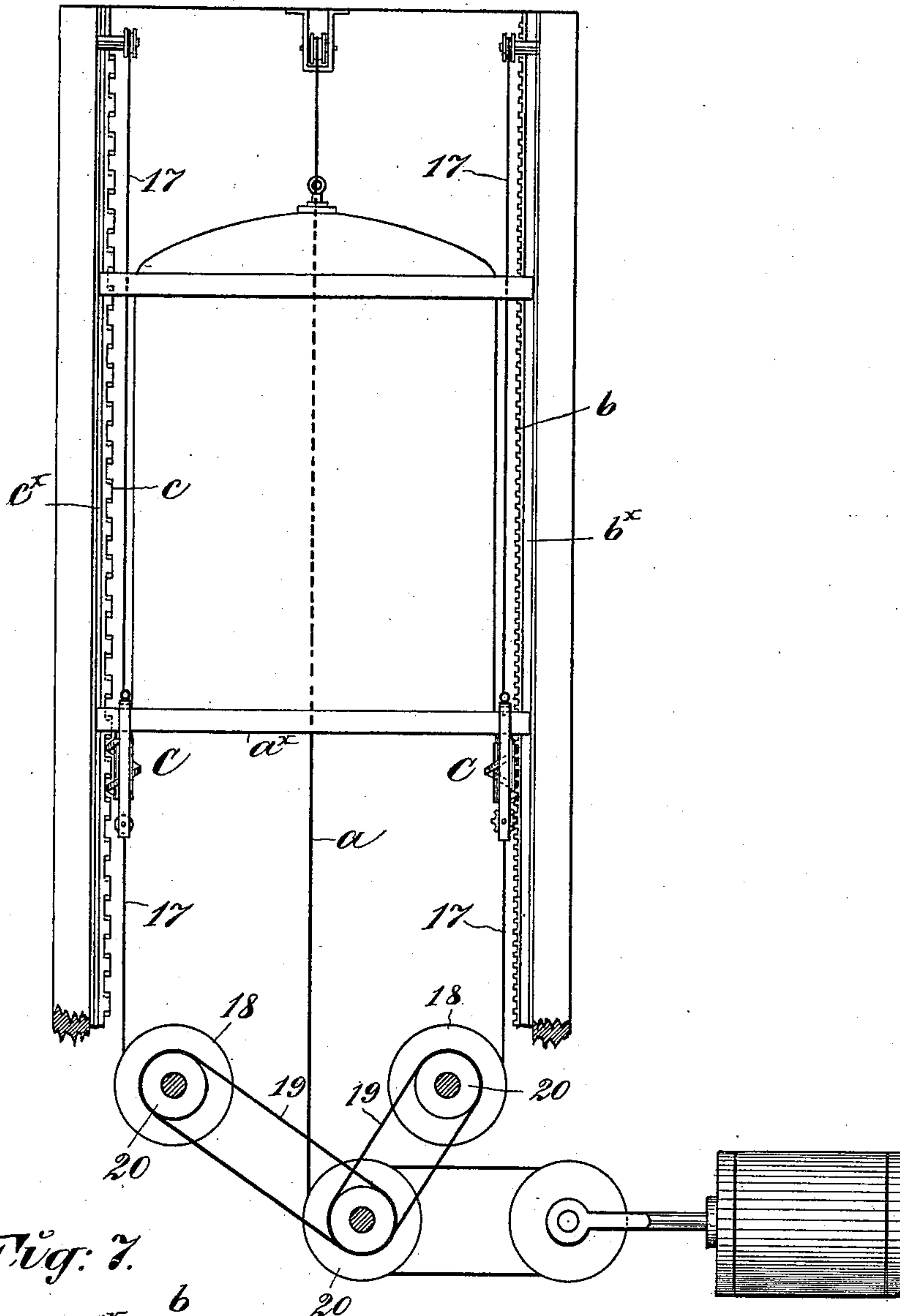
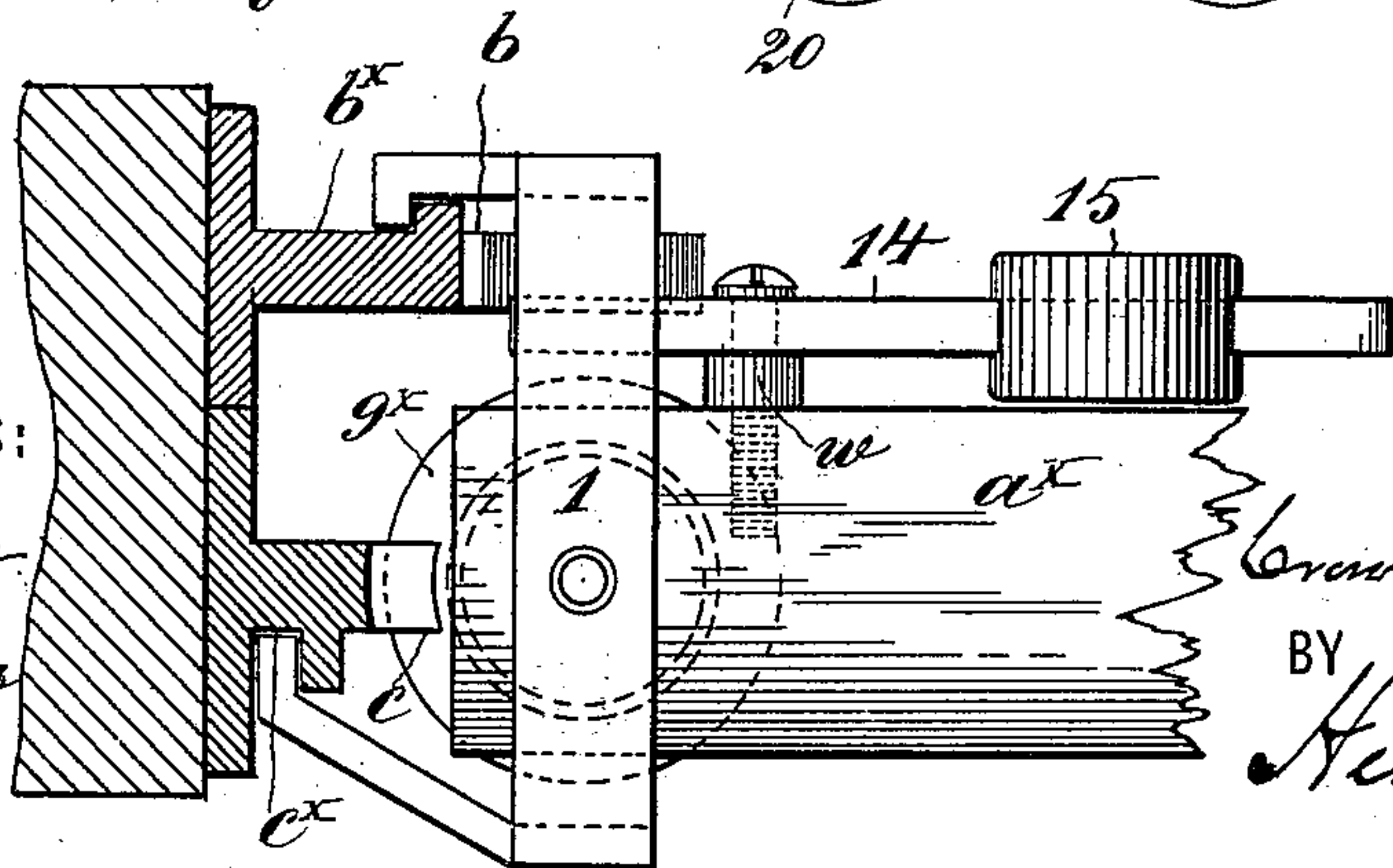


Fig. 7.



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# UNITED STATES PATENT OFFICE.

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TO JOHN GOODCHILD, GUARDIAN, OF SAME PLACE.

## SAFETY DEVICE FOR ELEVATORS OR HOISTS.

SPECIFICATION forming part of Letters Patent No. 614,705, dated November 22, 1898.

Application filed May 4 1898. Serial No. 679,668. (No model.)

*To all whom it may concern:*

Be it known that I, CROWELL M. DISSOSWAY, a citizen of the United States, residing in the borough of Manhattan, city, county  
5 and State of New York, have invented certain new and useful Improvements in Safety Devices for Elevators or Hoists, of which the following is a specification.

This invention relates to the class of devices employed on or in operative connection  
10 with elevators, hoists, and lifts in order to arrest or check the fall of the car should the hoisting-rope or other hoisting means break or give way.

15 The object of the invention is to provide an automatic stop device which shall come in play only when the car starts to move downward by gravity at a speed in excess of the maximum speed set for the car and one which  
20 shall come into action promptly before the car can acquire much momentum.

The invention consists, essentially and broadly, in a rotating spirally-formed detent or worm-gear which moves up and down with  
25 the car, either carried up by the car or by other means, as will be hereinafter described, and which has a limited vertical movement independent of the car, a device which automatically arrests the rotation of said detent  
30 when the car starts to move downward at a speed greater than the maximum speed set therefor and by so doing causes the arrested detent to interlock with fixed projections along the elevator-shaft, and means for rotating  
35 said detent normally at the proper speed.

The important distinction between this safety device and those commonly known resides in the independent character of the detent and the frame in which it is mounted,  
40 these latter being free to move up and down to a limited extent independently of the elevator-car, whereby the car when it drops suddenly does not carry the detent with it, but  
45 closes down on the detent, as will be hereinafter explained.

In the accompanying drawings, which illustrate an embodiment of the invention, Figure 1 is a general view, on a relatively small scale,  
50 showing an elevator-car provided with this invention. Figs. 2, 3, and 4 are detail views

of the safety device on a larger scale, Fig. 2 being a side elevation, Fig. 3 an elevation from the direction indicated by the arrow  $z$  in Fig. 2, and Fig. 4 a horizontal section at  
55 line  $x^4$  in Figs. 2 and 3. Fig. 5 is a view similar to Fig. 3, showing a slightly-modified construction. Fig. 6 is a view illustrating a construction wherein the safety device is carried up and down independently of the car. Fig. 60  
7 is a plan of the safety device on the same scale as Figs. 2, 3, 4, and 5.

Referring primarily to Figs. 1, 2, 3, and 4, which show the invention embodied in the preferred form, A represents in Fig. 1 an ele-  
65 vator-car suspended by a hoisting-rope  $a$  in a shaft, and B B are uprights extending up the respective opposite sides of the shaft. C C represent in this figure as a whole the two like safety devices carried by the car. 70  
These devices are alike, and one of them is illustrated in detail in Figs. 2, 3, and 4. Referring to these figures particularly,  $b$  represents a cog-rack fixed to and extending up the upright B, and adjacent to this rack is a  
75 series of detent projections  $c$ , also fixed to the inner face of the upright B. This series of detent projections will be conveniently made in the form of rack-teeth, and the series will be hereinafter referred to as the "de-  
80 tent-rack" or "worm-gear rack-bar"  $c$ . In Figs. 2 and 3,  $a^x$  represents a cross-beam of the car A.

Suspended or hung on the beam  $a^x$  is a frame 1, provided with a guide-jaw 2, which  
85 takes into a guide-groove  $c^x$  in the detent-rack  $c$ , as clearly shown in Fig. 4, and there is also a similar guide-jaw 3, which engages a guide-groove  $b^x$  in the cog-rack  $b$ . These  
90 guiding devices keep the frame 1 properly alined with the racks as the frame moves up and down with the car.

Mounted rotatively in the frame 1 is a short horizontal shaft 4, on which is fixed a pinion  
95 5, that gears with the cog-rack  $b$ , whereby the movement of the frame up or down rotates said shaft. On the shaft 4 is a bevel gear-wheel 6, which gears with a similar wheel 7 on an upright shaft 8, rotatively mounted  
100 in the frame 1. As here shown, this shaft 8 extends up through a hole in the beam  $a^x$  on the car.



Mounted rotatively on the shaft 8 and so as to slide longitudinally thereon is a spiral detent or worm-gear 9, which consists, as herein shown, of a hollow barrel with bearings in its end pieces for the shaft 8, a spiral screw-thread or rib 9<sup>x</sup>, extending about it externally, and a brake-cone 10 on its upper end. This detent 9 rests on a spiral spring 11 about the shaft 8, having washers 12 interposed between the respective ends of the spring 11 and the lower end of the spiral detent and the transverse member of the frame 1, on which the spring is supported. Normally the spring 11 presses the detent 9 upward elastically, and in so doing puts a clutch member fixed on the bottom end piece of the detent into engagement with a clutch member on the shaft 8, so that the latter carries the detent with it when it rotates. This clutch device may be of any kind; but as herein shown it is composed of a conical male member 13, fixed on the shaft 8 and having teeth or cogs tapered downward toward the lower end of the cone, and a female member 13<sup>x</sup>, formed by recessing the lower end of the spiral detent and providing it with teeth interiorly arranged to interlock with the teeth on the member 13 when the members are pressed together. The spiral rib or thread 9<sup>x</sup> on the detent 9 engages between the teeth or projections on the detent-rack *c*; but normally the rib does not touch said teeth, as the detent rotates, when the car moves up and down, with just the proper speed to keep the spiral rib out of contact.

In or on the beam *a*<sup>x</sup> of the car is a hollow brake-cone 10<sup>x</sup>, into which the cone 10 on the spiral detent 9 is adapted to fit under certain circumstances, which will be hereinafter explained. These brake-cones 10 and 10<sup>x</sup> form a friction-clutch, and any suitable form of friction-clutch may be substituted for that herein shown.

In order to counterbalance wholly or in part the weight of the frame 1 and the various parts mounted in and on it, a lever 14 is fulcrumed at *w* on the beam *a*<sup>x</sup>, the shorter arm of said lever taking under the upper transverse member of the frame, and a weight 15 is hung on the other or longer arm of the lever. This counterweight should suffice to partly balance the weight of the frame and the parts mounted in it.

The operation of the device is as follows: Normally while the car A is running up and down at any speed within the limit fixed, and which cannot be exceeded by the attendant on the car, the detent 9 will merely rotate out of contact with the teeth of the detent-rack *c*; but if the rope *a*, by which the car is suspended, should break and the car drop suddenly by gravity the car will drop away from the frame 1. The member 10<sup>x</sup> of the friction-clutch on or in the beam *a*<sup>x</sup>, Fig. 3, will engage with the member 10 on the spiral detent 9, at the same time forcing the latter down until the spiral rib 9<sup>x</sup> thereon bears upon a

tooth or projection of the rack *c*, at the same time disengaging the members 13 13<sup>x</sup> of the clutch, which fixes the detent 9 to the shaft 8. The detent 9 cannot now rotate, and the downward movement of the car will necessarily be arrested. This result is due to the fact that when the car starts to descend at a speed greater than the normal there are several forces tending to prevent the safety device from following with the same speed. One of these is inertia, another the engagement of the pinion 5 with the rack *b*, and another the counterbalancing device. This latter device, if the normal maximum speed be very slow, will be set to very nearly counterbalance the weight of the frame and its parts; but if the maximum speed be high the approach to a perfect counterbalance will not be so near. When the car drops suddenly from a broken rope, the fulcrum *w* of the lever 14 descends a little, but this does not affect the counterbalancing, and when the spiral detent 9 shall have been pressed to a support on the teeth of the detent-rack *c* the weight of the detent 9 will have been removed from the lever and the detent disengaged from the pinion 5 and its gearing. The member 13 and the cone 10<sup>x</sup> serve to limit the up and down movements of the detent or worm-gear 9 on the shaft 8.

It is not absolutely essential to the operation of the safety device that the spiral detent 9 shall be disengaged from the shaft 8 in case of accident. It may be splined on said shaft, as seen in Fig. 5, so as to rotate with but slide longitudinally on the latter. In this view the clutch members 13 13<sup>x</sup> are omitted from the construction and a spline 16 employed. The advantage of the clutch device 13 13<sup>x</sup> is that at the moment the spiral detent is depressed in case the rope breaks and the car falls the detent will be wholly disconnected from the pinion 5 and the driving-gearing and all strain on these parts is removed.

It is not absolutely necessary that the safety device C shall be carried up and down by the car A, although this latter is the preferred construction. It may be carried by a rope and raised and lowered by said rope and a drum, the latter being driven from the same source as the car in order to obtain uniformity in their motion and speed. This construction is illustrated somewhat diagrammatically in Fig. 6, wherein 17 are the hoisting-ropes of the safety devices C, which wind on and unwind from drums 18, driven from the pulleys over which the hoisting-rope of the car winds. The drums 18 are represented as driven by belts 19 from the sheaves or pulleys 20, Figs. 1 and 6, over which the hoisting-rope *a* is rove. Any means of hoisting the devices C suited to the particular mechanism for raising and lowering the car A may be employed.

It is preferred to employ two safety devices, one at each side of the car, but one



would serve and the invention is not restricted to two. Preferably, also, the clutch device or brake which arrests the rotation of the spiral detent will be a non-positive or friction clutch, but an ordinary positive clutch will serve, or such, for example, as the clutch 13 13<sup>x</sup>.

It will be understood that any form of counterbalance for the safety device may be used. The lever and weight device is illustrated somewhat diagrammatically in the drawings. It will be obvious that a cord over a pulley on the beam  $\alpha^x$  and a weight attached to the cord will serve the purpose.

Having thus described my invention, I claim—

1. The combination with an elevator-car, means for operating the same and an upright detent-rack in the shaft in which the car travels, of a safety device which travels normally with the car, said safety device comprising a spiral detent rotatable on an upright axis and having a spiral thread loosely engaging the teeth of the detent-rack, means for rotating said detent at a speed proportioned to the speed of the car, and a clutch, one member of which is carried by said detent and the other, directly over it, carried by the car, whereby when the car starts to descend at a speed greater than the maximum, the sudden descent of the car closes the clutch and arrests the rotation of the detent, substantially as set forth.

2. The combination with an elevator-car, means for operating the same, an upright detent-rack, and an upright cog-rack, both in the shaft in which the car travels, of a safety device which travels normally with the car, said safety device comprising a frame, an upright shaft therein, a pinion gearing with the cog-rack and mounted in the frame, intermediate gearing between said pinion and upright shaft, whereby the former drives the latter, a spiral detent on the upright shaft, said detent having a thread loosely engaging the teeth of the detent-rack, and a clutch, one member of which is carried by the detent and the other by the car, the latter being directly over the former and adjacent thereto, whereby when the car starts to descend too rapidly the said clutch members engage and arrest the rotation of the detent, substantially as set forth.

3. The combination with an elevator-car, means for operating the same, an upright detent-rack in the elevator-shaft, and a cog-rack also in said shaft, of a safety device C, comprising a frame 1, hung on a part of the car,

an upright shaft 8, in the frame, a pinion 5, gearing with the cog-rack and mounted in the frame, gearing between said pinion and the shaft 8, a spiral detent 9, mounted on the shaft 8 and free to move longitudinally thereon, a spring 11 under said detent, the spiral thread of which detent loosely engages the detent-rack, a friction clutch or brake, the member 10 of which is carried by the detent and the member 10<sup>x</sup>, carried by the car and arranged directly over the member 10, and a counterbalance device all arranged to operate, substantially as set forth.

4. The combination with an elevator-car, means for operating the same, an upright detent-rack in the elevator-shaft, and a cog-rack also in said shaft, of a safety device C, comprising a frame 1, hung on a part of the car, an upright shaft 8, in the frame, a pinion 5, gearing with the cog-rack and mounted in the frame, gearing between said pinion and the shaft 8, a spiral detent 9, mounted on the shaft 8 and having a thread loosely engaging the detent-rack, the clutch member 13 on the shaft 8, a clutch member 13<sup>x</sup> on the detent to engage therewith, a spring 11 under the detent and operating as described, a brake-cone 10, on the detent 9, a corresponding hollow cone 10<sup>x</sup> on the car directly above the cone 10 and adjacent thereto, and the counterbalance device, all arranged to operate, substantially as set forth.

5. The combination with an elevator-car, means for operating said car and an upright detent-rack adjacent to the path of the car, of a safety device to arrest the sudden descent of the car in case of accident, said device comprising an upright, spiral detent provided with a spiral thread loosely engaging the teeth of the detent-rack, said spiral detent, which moves up and down normally with the car, being free to move vertically to a limited extent independently of the car, means for rotating said detent, normally, at a speed proportioned to the speed of the car, and means carried by the car for arresting the rotation of said detent when the car drops suddenly and independently of said detent, substantially as set forth.

In witness whereof I have hereunto signed my name, this 2d day of May, 1898, in the presence of two subscribing witnesses.

CROWELL M. DISSOSWAY.

Witnesses:

HENRY CONNETT,  
PETER A. ROSS.