

No. 852,048.

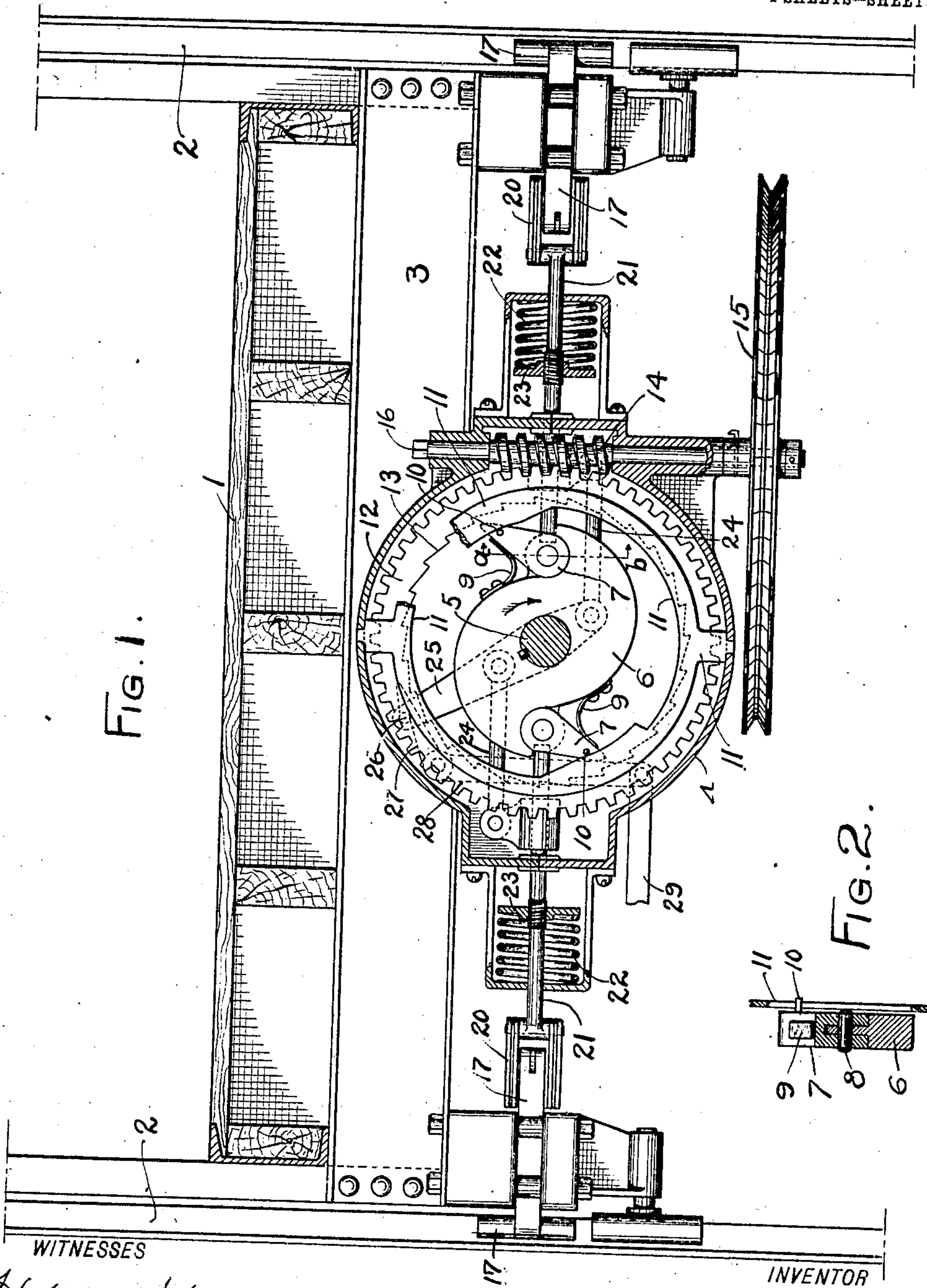
PATENTED APR. 30, 1907.

M. T. WESTON.

# SAFETY MEANS FOR ELEVATORS.

APPLICATION FILED NOV. 23, 1905.

4 SHEETS--SHEET 1.



**WITNESSES**

INVENTOR

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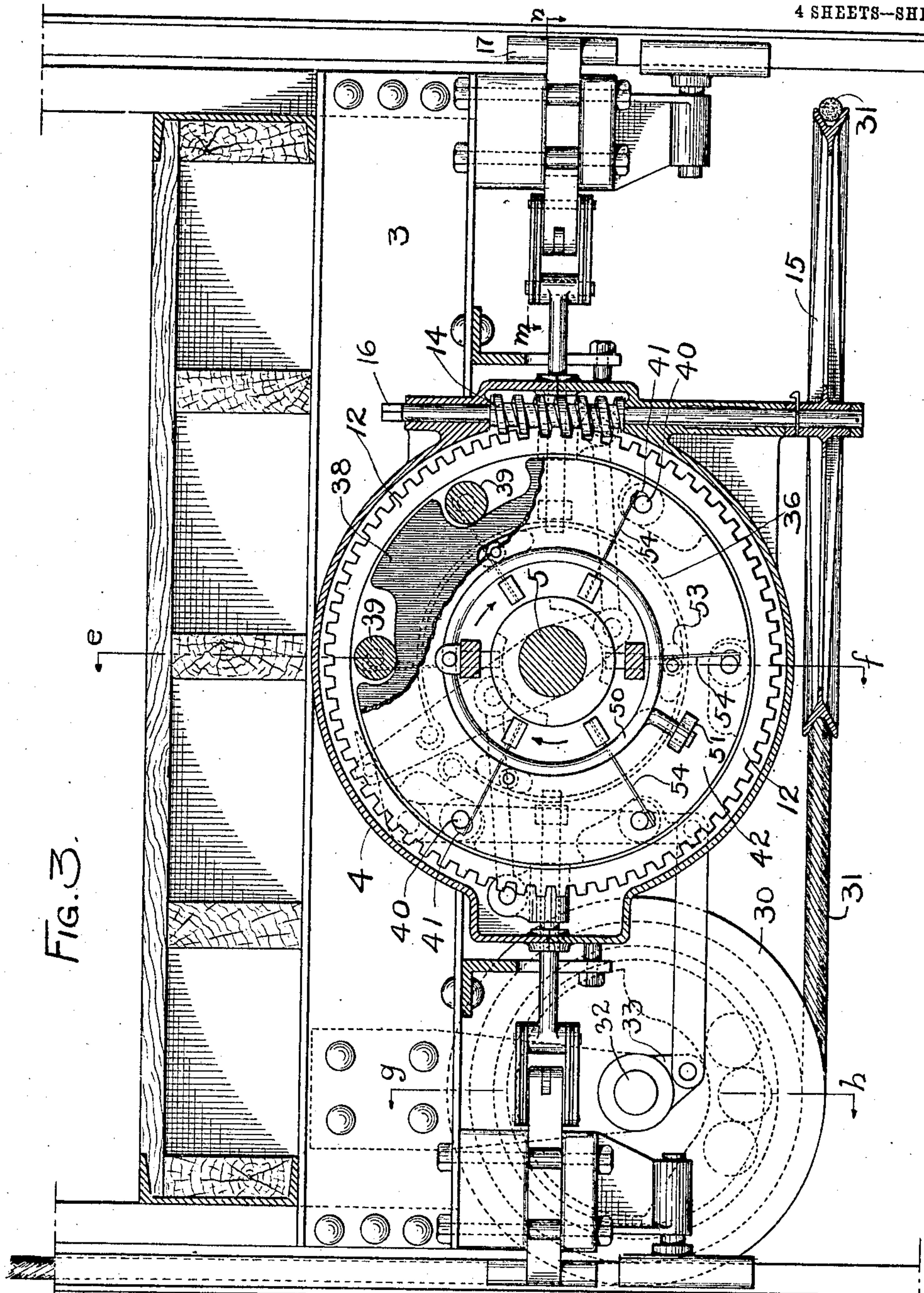
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WITNESSES

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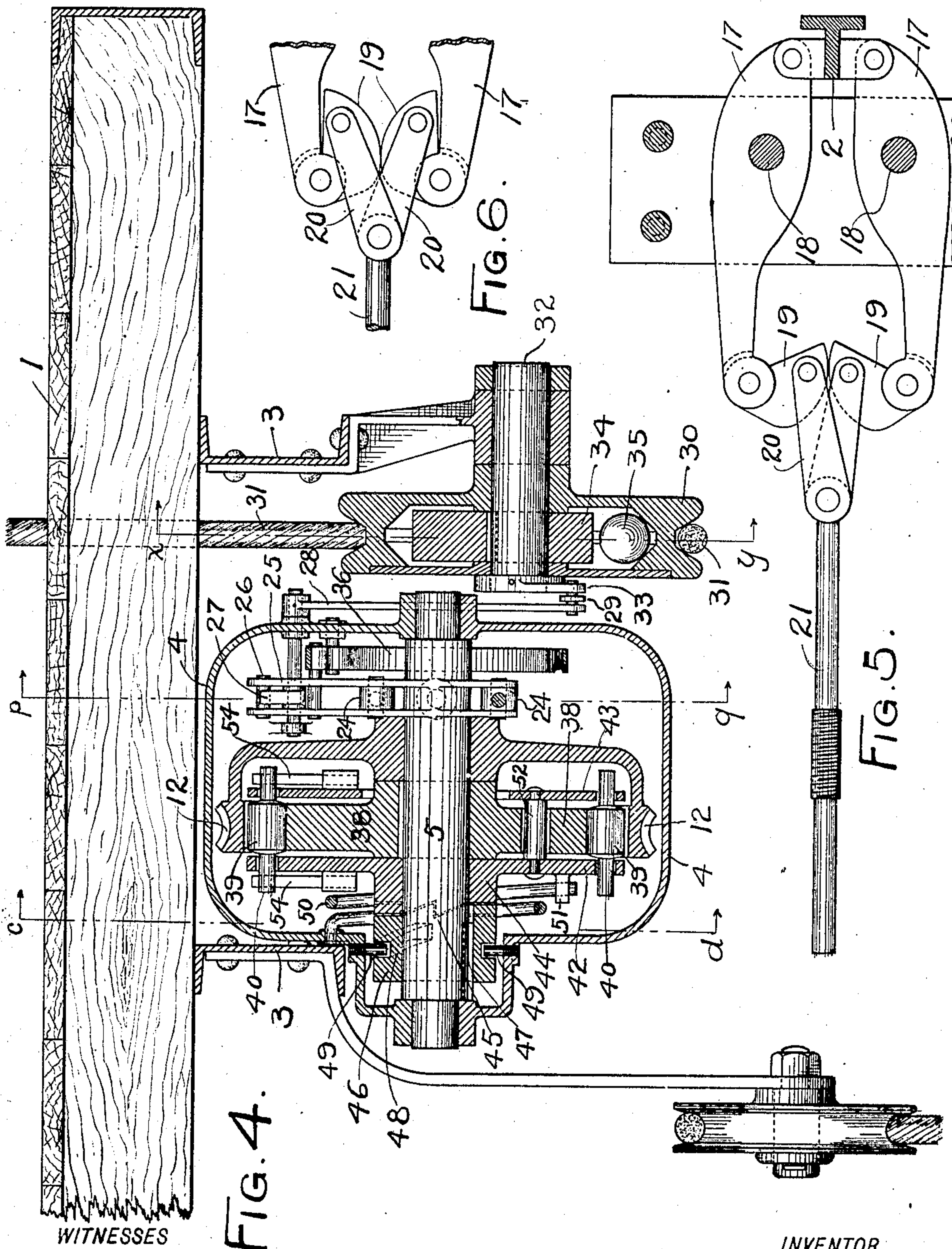
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4 SHEETS—SHEET 3.



WITNESSES  
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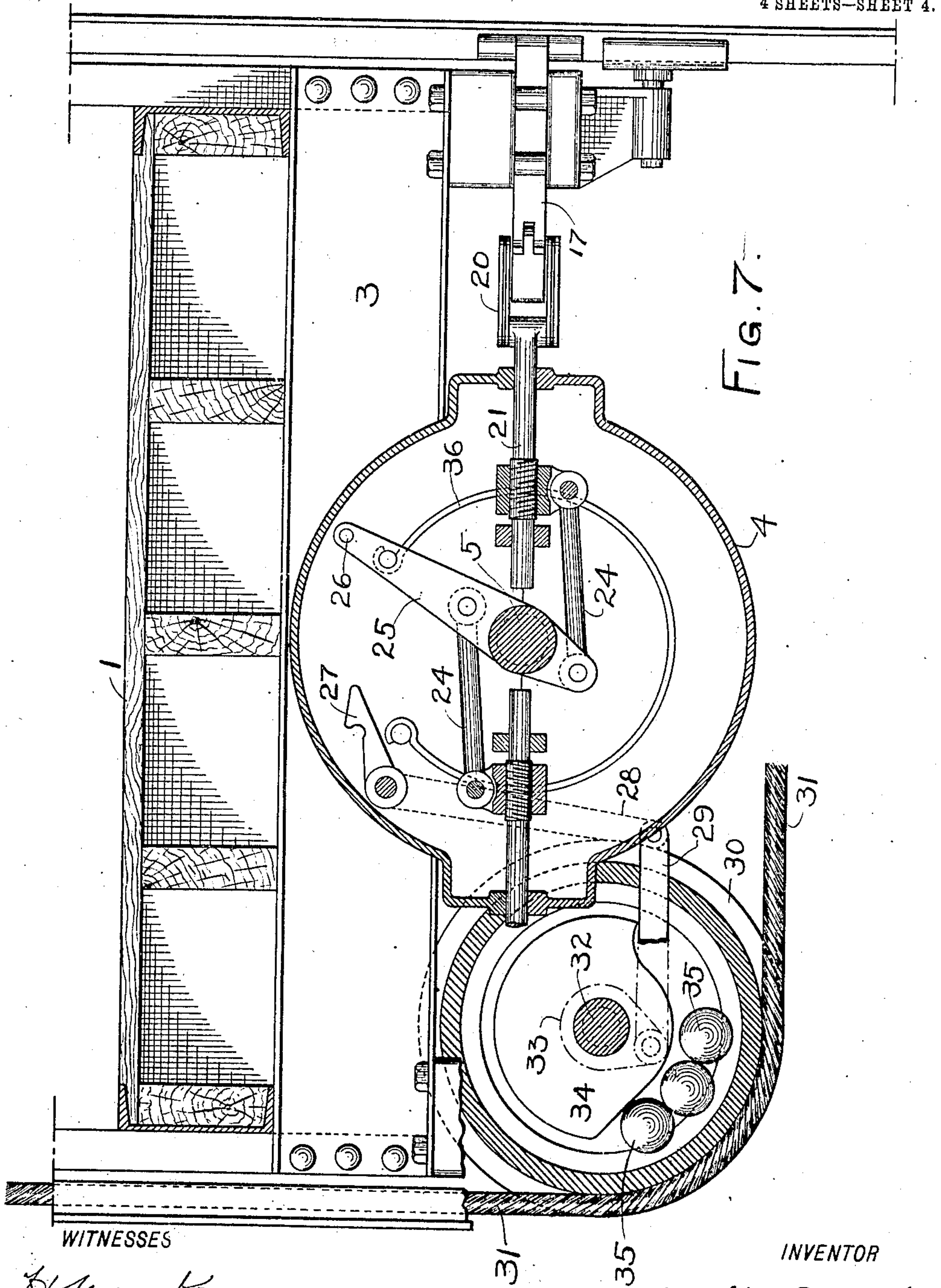
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4 SHEETS—SHEET 4.





# UNITED STATES PATENT OFFICE.

MILTON T. WESTON, OF NEW YORK, N. Y., ASSIGNOR OF ONE-THIRD TO CATHARINE MAHONY AND ONE-THIRD TO ADOLPH A. SCHAEFER, OF YONKERS, NEW YORK.

## SAFETY MEANS FOR ELEVATORS.

No. 852,048.

Specification of Letters Patent.

Patented April 30, 1907.

Application filed November 23, 1905. Serial No. 288,692.

*To all whom it may concern:*

Be it known that I, MILTON T. WESTON, a citizen of the United States, residing in the borough of Manhattan, city of New York, county of New York, in the State of New York, have invented a certain new and useful Improvement in Safety Means for Elevators, of which the following is a specification.

This invention has relation to an improved means for attachment to elevators or hoists whereby the same are prevented from falling in case the lifting cables break, or through other accident. Where the safety catches or clutches, which are used for this purpose, operate with a degree of force independent of the weight of the car, they frequently fail to operate when a car is over-loaded when it begins to fall.

It is one object of this invention to provide means whereby the holding force exerted in supporting the car is made to a great extent proportional to the weight of the car itself.

Another object of this invention, is to provide means of the character above named, which combine devices, for preliminary advance of the holding jaws, which devices also act to bring into play the main mechanism for final closing of the jaws or clutches.

My safety mechanism can be easily applied either beneath or on top of the car and occupies little room.

I have illustrated this invention in its preferred forms in the accompanying drawings, wherein

Figure 1 is a side elevation, with some parts shown in vertical section, of one form of my device attached beneath the car, Fig. 2 is a sectional detailed view on the plane  $a-b$  in Fig. 1, Fig. 3 is a view similar to Fig. 1, of a modified form of my invention and corresponding approximately to a section on the plane  $c-d$ , in Fig. 4, Fig. 4 is a vertical sectional view of the device shown in Fig. 3 taken on the two planes  $e-f$  and  $g-h$  in Fig. 3, Fig. 5 is a sectional detail on the plane  $m-n$  in Fig. 3, Fig. 6 is a similar view showing the open position of the jaws and Fig. 7 is a sectional view of the device shown in Fig. 4 taken on the planes  $p-q$  and  $x-y$ .

In Fig. 1 the floor of the elevator is shown at 1 and the usual guides for the elevator are shown at 2. Beneath the floor the beams 3 support in any appropriate manner the va-

rious parts of the safety device. This comprises a casing 4, wherein is mounted a central shaft 5, on which there is fixed a carrier 6, supporting one or more pawls 7 which are pivoted to the carrier by means of pins 8, as shown in Fig. 2. Springs 9, bear upon these pawls and tend to pull them outward, but this movement is normally prevented by a pin 10, on each pawl, which bears upon a guard plate 11, fixed to the stationary casing 4. The constantly rotating worm wheel 12, is mounted so as to turn loosely on the shaft 5, and this worm wheel carries an interior ratchet whose teeth revolve outside of and nearly in connection with the outer ends of the pawls 7. This ratchet is shown at 13. The worm wheel is driven by a worm 14, which turns whenever the car moves, being driven in any manner well known for devices of this kind. On the other end of the worm shaft a squared portion 16, is supplied, whereby means may be applied for reverse movement of the worm shaft when the device is to be reset after operation.

The gripping jaws which are intended to hold the elevator when the safety device is applied, are shown at 17, in Figs. 1, 5 and 6. These are all well known constructions, being mounted on strong pivots 18, and supplied with pivoted cams 19, to which are pivoted links 20, on the ends of the tension rod 21. The springs 22, bear upon adjustable disks 23, fixed to the rods 21, and these springs therefore tend constantly to draw the rods toward the shaft 5, and to close the jaws on each side, down upon the guides 2. Each of the tension rods 21, is provided with a parallel offset connecting rod 24 and the inner ends of these connecting rods are pivoted to the lever 25, which is made fast to the shaft 5, so that the two turn together. This is clearly shown in Fig. 7, and is shown in dotted lines in Fig. 1.

Under normal conditions the lever 25 is held in the position in Fig. 1, wherein the pin 26, at the extremity of said lever is engaged by the hook 27 which is intended to be pulled downward at the proper time, through the agency of the lever 28 and connecting bar 29 operated by any appropriate form of governor. One specific form of governor which I prefer to use in this connection is shown in Fig. 7. This consists of a hollow pulley 30,



around which passes the usual safety rope 31, so that the pulley revolves constantly when the car is in motion. The pulley 30, turns loosely upon the shaft 32 and at one end of said shaft, there is an arm 33, shown in dotted lines in Fig. 7 and in full lines in Fig. 3. The connecting bar 29 is pivoted at one end to the outer end of the arm 33. Inside of the pulley 30 there is a jamming plate 34, which is mounted rigidly on the shaft 32 and is shaped substantially as shown in Fig. 7. A number of balls 35 are carried within pulley 30 and, when the pulley 30 turns rapidly enough, the forward ball of this group is jammed between the interior of the pulley 30 and the edge of the plate 34. This causes solid engagement between the pulley and the plate and further revolution of the pulley acts through the plate 34 to rotate the shaft 32 and then to operate through the bar 29 and lever 28 to pull down the hook 27 and release the main lever 26. Of course when the elevator is moving at a normal speed the balls 35 remain out of engagement with the edge of the plate 34, and the pulley 30 runs idly.

When the governor operates as above described, the lever 25, (see Fig. 1), and the springs 22 act at once in the accomplishment of two functions. One effect of the springs is to close the jaws 17, with preliminary pressure on the guides 2. This is merely to take up the small space which is normally left between the jaws and the guides, so as not to impede movement of the car. The second function accomplished is rotation of the shaft 5, by means of the connections 24 and the lever 25, and with the shaft 5, the plate 6 carried thereby. This rotation will be produced in the direction of the arrow in Fig. 1, and, as the pawls 7 are carried with the plate 6, the pins 10 ride down the inclined surface on the fixed plate 11, thus permitting springs 9 to force the pawls outward into engagement with the teeth of the interior ratchet wheel, 13. As, has been already described, this ratchet wheel is continually revolving in the direction of the arrow in Fig. 1 owing to the action of the worm 14 and the worm wheel 12. The consequence is, that the preliminary movement accomplished by the springs 22, when the lever 25 is released from the hook 27, will be at once followed by a final revolution of the shaft 5, due to engagement of the pawls 7, with the ratchet wheel 13. This will cause a strong pressure to be transmitted through the tension rods 21, in closing the jaws 17, and the car will thus be brought to rest by a force continually increasing as long as motion of the car continues, which force will be roughly proportional to the weight of the car and its load.

In Figs. 3, 4 and 7 I have shown another modification of my invention but embodying the same principles of action. In this form of the device the lever 25 is operated when

released by means of a single curved spring 36 instead of by spiral springs 22, and the shaft 5, instead of carrying pawls 7 for operation of the safety clutch, is furnished with a clutching disk 38, which is keyed to the shaft 5, as shown in Fig. 4. The worm wheel 12, surrounds the clutching disk 38, and the latter is cut out at intervals on its periphery, to receive rollers 39, which are provided with pivots 40 extending in both directions through slightly elongated holes 41, in the inner and outer operating plates 42 and 43. The plate 42 is carried by a hub 44, which turns loosely on the shaft 5, and is provided with clutch teeth 45, engaging with similar teeth on the holding clutch 46 which surrounds the shaft 5, and slides longitudinally upon a feather 47, whereby it is keyed to the shaft 5. The holding clutch 46 is provided with spiral peripheral slots 48, one of which is shown in dotted lines in Fig. 4. The pins 49 are fixed to the casing 4, and enter the slots 48. Inside of the casing 4, the spiral spring 50, is attached to the casing and to the fastening 51, on the plate 42, in such manner as to tend to produce rotation of the plate 42, in a direction toward one looking at the drawing on the upper side of the shaft 5 in Fig. 4. As long as the parts are in the position shown in Figs. 3 and 4, the action of the spring 50 is resisted by the teeth 45, since the holding clutch 46 is prevented from turning by the shaft 5, which is held rigid by means of the lever 25 and hook 27. The inner and outer plates 42 and 43 are united by a stud 52, moving in a proper curved slot shown in dotted lines at 53 in Fig. 3. Both of the plates 42 and 43 carry springs 54, which bear against the pivots 40, of the rollers 39. As shown in Fig. 3, the direction of elongation of the holes, 41, through which the pivots 40 pass, is such that the tendency of the springs 54 is to prevent accidental outward movement of the rollers 39, which would produce premature contact with the surface of the constantly revolving worm wheel 12. The spaces for the rollers 39, are narrower at their forward ends than at the rear ends, where they are shown in Fig. 3. The operation of this form of the device is as follows: When the governor 30 moves with dangerous speed, owing to engagement of the usual safety rope 31, the hook 27 is tripped and the lever 25 is released. The spring 36, then throws the lever 25 into the position in Fig. 7, and the shaft 5 turns with the lever 25. The holding clutch 46 being revolved with the shaft 5 and the spiral slots 48 engaging the pins 49, there will be produced a longitudinal movement of the holding clutch 46 toward the left in Fig. 4. This will interrupt the engagement between the teeth 45 on the hub 44, and thereupon the spring 50 will be free to produce rotation of the plates 42 and 43 in the direction of the arrow in Fig. 1.



3. The rollers 39 will be pressed forward by the springs 54 when the rotation of the plates 42 and 43 takes place, and as soon as these rollers reach the narrow forward portions of the spaces which contain them, they will produce a firm engagement between the constantly rotating worm wheel 12 and the disk 38 by which they are carried. This engagement is absolutely reliable because the greater the force to be transmitted the more tightly are the rollers gripped. The use of the springs 54 is preferred in this connection as it provides an elastic operating means which insures engagement of all the rollers at once. The further forward movement which will thus be imparted by the worm wheel 12, to the disk 38, is transmitted through the shaft 5, and the lever 25 and bar 24 to the jaws 17, thus arresting downward movement of the car as heretofore described.

Many changes may be made in various parts of this device without departing from the spirit of my invention and I am not to be understood as limiting myself to the details hereon shown and described.

What I claim is

1. In combination with the other elements of a safety device for elevators, a main shaft, a constantly moving operating wheel mounted loosely thereon, a lever fast on the shaft, a catching device connected for operation with said lever, a clutch fast on said shaft for producing engagement with said wheel when the shaft is rotated, a spring and catch for said lever and a governor for releasing said catch, substantially as described.

2. In a safety device for elevators, gripping jaws, a main shaft, a lever fast thereon, connected to said jaws, an operating wheel turning loosely on said shaft, a clutch fast on said shaft and operated by movement thereof to connect the same to said wheel, a spring for operating said lever, a catch for said lever and a governor controlling said catch, substantially as described.

3. In a safety device for elevators, gripping jaws, a main shaft, an operating wheel turning loosely thereon, a pivoted pawl carried by said shaft so as to turn therewith, a ratchet on said operating wheel, and a guard plate for holding said pawl out of engagement with said ratchet substantially as described.

4. A safety device for elevators, comprising gripping jaws, a main shaft for operating the same, a constantly moving ratchet wheel, a spring-pressed pawl carried by said shaft and a guard plate for said pawls having its operating surface so inclined as to hold said pawl away from said ratchet in one position of said shaft, and to permit engagement between the pawl and ratchet in another position of said shaft, substantially as described.

5. In safety device for elevators the combination of clutching means on the moving cage and co-operating device extending along the shaft of the elevator with a governor shaft, a hollow pulley turning loosely thereon, a cable fixed at one end and extending along the shaft and around said pulley, means connecting said shaft with said clutching means for operation of the latter, a jamming plate within said pulley and fastened on said shaft and a loose ball within said pulley and under said jamming plate, substantially as described.

6. A safety device for elevators comprising a casing, a pair of gripping jaws, a tension rod connected with said jaws and passing into said casing, a worm wheel and worm within said casing, an exterior pulley moved by motion of the elevator car, for turning said worm, and engaging means within said casing for bringing said tension rod into operative relation to said worm wheel, substantially as described.

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Witnesses:

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