

No. 893,802.

PATENTED JULY 21, 1908.

C. W. HOFFMAN.

SAFETY APPARATUS FOR ELEVATORS.

APPLICATION FILED AUG. 22, 1907.

3 SHEETS—SHEET 1.

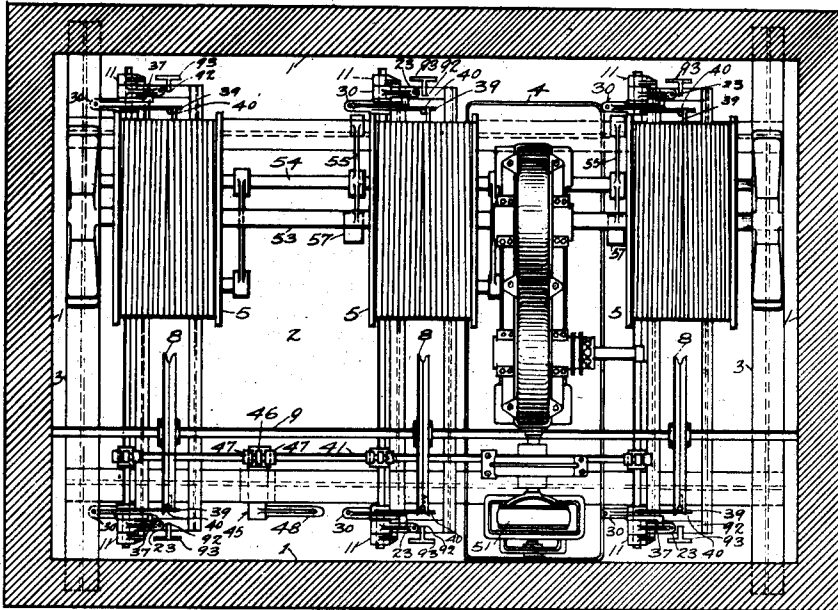


Fig. 1.

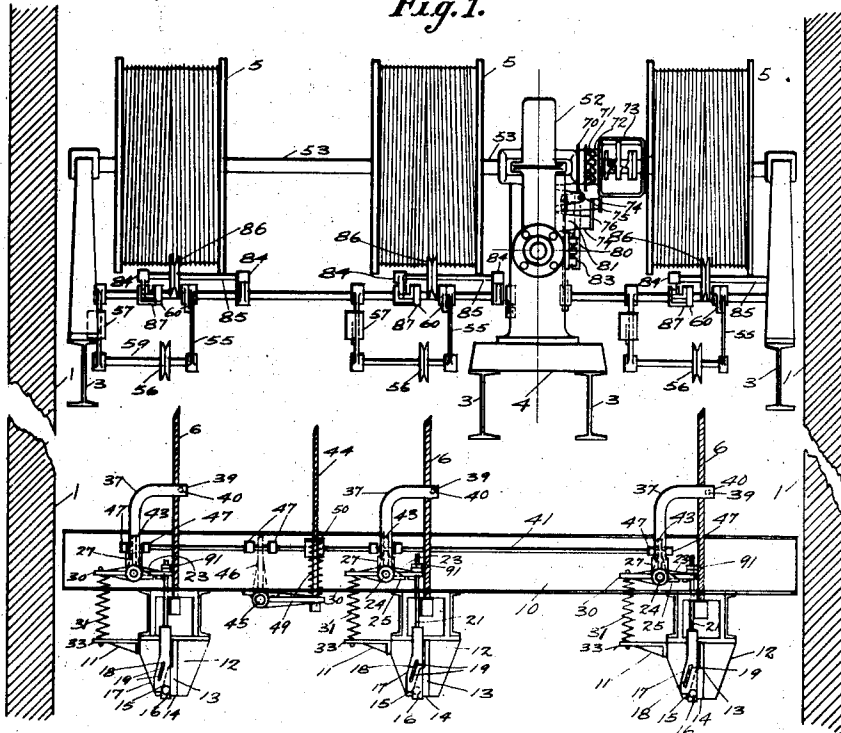


Fig. 2.

Witnesses:
Joseph A. Green
Joseph J. Collins

Charles W. Hoffman Inventor

By *Wm. Duncan* Attorney

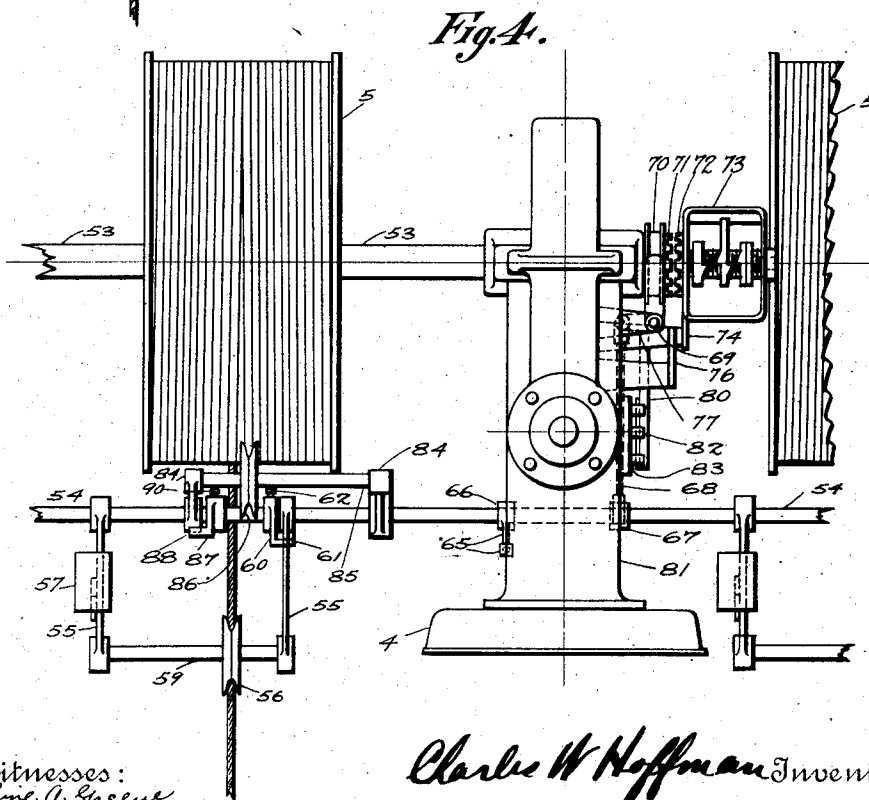
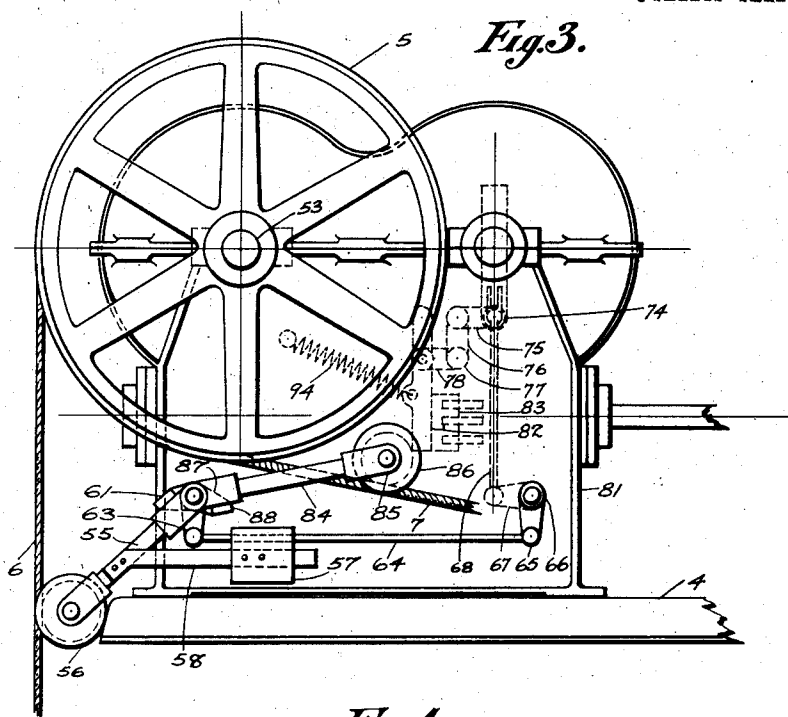
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Witnesses:
Josephine A. Greene
Joseph J. Collins

Charles W. Hoffman Inventor
By ^{his} Attorney
Huncan & Duncan

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3 SHEETS—SHEET 3.

Fig. 5.

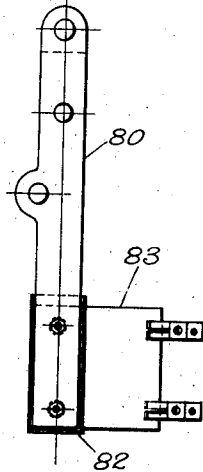


Fig. 6.

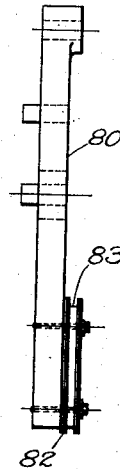


Fig. 7.

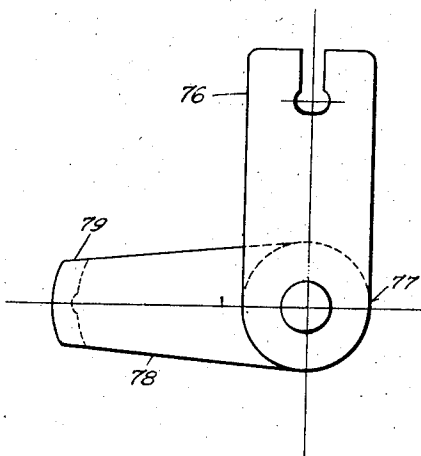
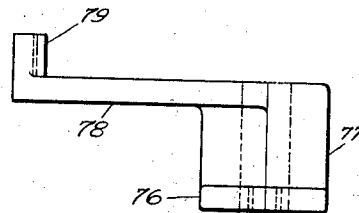


Fig. 8.



Witnesses:
John H. Anderson
William L. Neagle

Inventor
Charles W. Hoffman
By his Attorneys
Duncan & Duncan

UNITED STATES PATENT OFFICE.

CHARLES W. HOFFMAN, OF NEW YORK, N. Y.

SAFETY APPARATUS FOR ELEVATORS.

No. 893,802.

Specification of Letters Patent.

Patented July 21, 1908.

Application filed August 22, 1907. Serial No. 389,655.

To all whom it may concern:

Be it known that I, CHARLES W. HOFFMAN, a citizen of the United States, residing in the city of New York, county and State of New York, have invented a certain new and useful Improvement in Safety Apparatus for Elevators, of which the following is a specification, taken in connection with the accompanying drawings, which form a part of the same.

This invention relates to elevator safety apparatus, and relates especially to safety apparatus for cable winding mechanism where a number of cables are secured to different parts of an elevator car.

In the accompanying drawings showing illustrative embodiments of this invention, and in which the same reference numeral refers to similar parts in the several figures. Figure 1 is a plan view looking down upon the hoisting mechanism at the top of the elevator shaft, showing also the frame-work of the car, the floor being omitted for the purpose of illustration. Fig. 2 is a side elevation of the elevator shaft, the hoisting mechanism and the elevator car, the parts being broken away for the purpose of illustration. Fig. 3 is a side elevation of a portion of one of the winding drums, the tandem gear housing and the slack cable mechanism. Fig. 4 is a front view of the slack cable mechanism the drums and tandem gear casing, the drums for the purposes of illustration being broken away. Fig. 5 is a front elevation of the electric contact mechanism. Fig. 6 is a side elevation of the same. Fig. 7 is a front elevation of the latch mechanism for holding the electric switch in position. Fig. 8 is a bottom plan view of the same.

In the illustrative embodiments of this invention shown in the drawing, 1 is the side of the elevator shaft 2.

3 are I-beams at the top of the elevator shaft to support the hoisting mechanism 4. This mechanism is of the usual type and as shown consists of a plurality of hoisting drums 5, 5 upon which hoisting cables 6, 6 and 7, 7 are wound, two cables 6 and 7 being wound upon the same drum, the cable 7 passing over sheaves 8 mounted upon a shaft 9 in the ordinary manner. The car 10 has mounted upon it a plurality of safety units 11, 11, as shown, six being used, three on each side of the car. These units are alike so that only one will be described. They consist of a body 12 having a groove 13 for

the reception of the inwardly extending portion 92, of the T-guide 93; there being a separate T-guide for each safety unit, so that in the device as illustrated there are six T-guides to correspond with the same number of safety units.

The lower portion of the guide 13 in the safety unit is enlarged, forming a flared opening 14 having an inclined shoulder 15 upon which plays a roller 16 carried by a vertically and laterally movable carrier 17. This carrier has formed in it an inclined slot 18 to cooperate with pins 19 which pass through it and are fastened to the body 12.

Secured to the upper portion of the carrier is a rod 21 which passes through an arm 23 loose upon the shaft 24, one or more lock nuts 91 being screwed upon the end of the rod 21 above the arm 23 so as to permit this arm 23 rocking, and lifting the rod 21 actuating the carrier 17 for a purpose hereinafter to be described. Upon the same shaft 24, I key an arm 25 having a lug which takes under the arm 23 to operate it in one direction. Upon the other side of the loose member 23 and upon the same shaft 24, I mount loosely a member 27 having an arm similar to the arm, 25 and provided with a lug which also takes under the arm 23. Upon the opposite portion of the loose member 27 I mount an arm 30 which is preferably formed of the same material as the body portion 27; at the outer end of this arm I attach a spring 31 which has its other end connected to a stationary plate 33, the normal action of this spring tending to hold the arm 30 in its depressed or lowered position. Secured to the member 27 in any suitable manner is a bent rod 37, the free end 39 of which is brought over into the path of a hoisting cable 6, or if upon the other side of the car a cable, 7. Upon the end 39 of this member 37, I arrange any suitable member 40 to engage with the side of the hoisting cable 6. As shown, this member is a pin, but it is to be understood that my invention is not limited to such a member as any suitable engaging part would come within the scope of my invention.

Normally the hoisting cable 6 is taut and therefore coacts with the pin 40 to keep the loose member 27 in its inoperative position as against the action of the spring 31. Should, however, this cable 6 be broken by any reason or become slack, the spring 31 would rock or tilt the loose member 27, carrying with it the bent member 37, the slack cable

6 being unable to resist this movement; further movement of the spring 31 pulling the arm 30 downward, causing the lug upon the other arm of the member 27 to press upwardly upon the loose member 23 which in turn coöperates with the nuts 91 upon the rod 21 lifting the carriage 17 together with its roll 16 until the same has engaged with the flange 92 of the T-guide 93, when further downward movement of the car will cause the roll 16 to move up the incline 15 of the enlarged groove 14 in an obvious manner, gripping the T-rail until the body 12, roll 16 and T-rail are locked together when further downward movement of the car is stopped. As previously noted the other safety units operate exactly in the same manner.

I preferably connect all my safety units on one side of the car by means of a rod 41 connected to an arm 43 fast to the shafts 24, one arm 43 being used for each shaft 24. I also connect my safety units on each side of the elevator car with the complementary safety unit upon the opposite side by means of transverse shafts 24, the safety unit mounted at the other end of the shaft operating in exactly the same manner as previously described.

To the rod 41 (Fig. 2) I preferably connect the governor rope 44 by means of a bell crank lever 45, one end 46 taking between two nuts 47 adjustably mounted upon the rod 41, the other end 48 of the bell crank lever 45 being apertured for the reception of the end of the cable 44, a spring 49 coöperating with the end 48 of the bell crank lever and with the fixed bent plate 50 fastened to the frame-work 10 of the car, the action of the spring 49 normally operating to keep the safety units in their inoperative position.

Should the car descend too rapidly from any cause the governor (not shown) will grip the governor rope 44 in the well known manner, and as the car descends after the governor rope has been gripped, the bell crank lever 45 will be operated against the action of the spring 49 operating the rod 41 which will in turn simultaneously actuate all of the arms 43 on the shafts 24 upon which are mounted the loose arms 23 and 27 and also the key arm 25 causing its lug, which is located beneath the arm 23, to rock the latter and lift the rod 21 with the carriage 17, throwing into action the roller 16, stopping the further descent of the car, it being understood that by this operation all of the safety units are thrown into operation at the same time.

I have up to this time described the operation of the safety units to prevent the too rapid descent of the car. I will now describe my new and useful cut-out mechanism which is thrown into operation automatically by the slacking of one or more cables or the breaking of one or more cables. In either event the power mechanism is in-

stantly cut out, it of course being understood that if one or more of the safety units is thrown into operation stopping the descent of the car and the power mechanism continues to revolve in a direction to permit the unwinding of the cables they will become slack, owing to the descent of the car being prevented by the safety units. In this event the automatic slack cable cut-out herein shown will be immediately brought into operation, cutting out the power and preventing further unwinding of the cables.

At the top of the shaft I mount a motor 51 with any suitable gears contained within a suitable gear case 52 connected to the shaft 53 upon which the drums 5, 5 are mounted and upon which are wound and unwound the respective cables 6 and 7. In the form of the invention illustrated I arrange a shaft 54 parallel to the shaft 53 and upon this shaft I mount one or more loose arms 55 carrying at their other ends an arbor 59 upon which is mounted loosely a sheave 56, normally adapted to press outwardly against the taut cable 6, this action being insured by means of the weight 57 carried adjustably by an arm 58 attached to the loose arms 55. Upon this shaft 54 and adjacent to one of the arms 55 I key or fasten a sleeve 60 having an outwardly extending lip 61 which is normally adapted to lie over the arm 55, see Figs. 4 and 3.

If the hoisting cable 6 becomes slack from any cause, as breakage or the stopping of the car, the winding mechanism continuing to unwind the cable, or from any other cause, the weight 57 will cause the arm 55 to swing upon the shaft 54 until it engages with the lip 61 of the sleeve 60, and as this sleeve is fastened to the shaft 54 by any suitable means as a screw 62, it will cause the shaft 54 to rock, thereby rocking the arm 63, which is also fastened to the shaft 54, actuating a rod 64 which at the other end is connected to one arm 65 of the bell crank lever 66, the other arm 67 being pivotally connected to a rod 68 connected to another bell crank lever 69 which has its other end connected to the sliding sleeve 70 which is splined to the shaft 53 and carries at one side teeth 71 adapted to coöperate with similar teeth 72 on the flier 73. Further rotation of the drum shaft 53 will through the feather, not shown, actuate the sliding sleeve 70 of the clutch, causing its teeth 72 to rotate the flier 73 which in turn rocks the ear 74 attached to the flier and which is connected to a link 75 (see Figs. 3 and 4) the link being connected with one arm 76 of a bell crank lever 77, the other arm or detent 78 having a lip 79 to coöperate with a pin on the swinging bar 80 which is pivoted to the gear case 81 and which carries at its lower end 82 electrical contact devices 83, see Figs. 5 and 6. This arm 80 with its electrical contacts is normally operated

in one direction by means of a spring 94 to break the electrical contact, the action of the spring being resisted by means of the lip 79 upon the arm 78 of the bell crank lever 77. When this bell crank lever 77 is rocked so as to cause the arm 78 and lip 79 to be moved from engagement with the bar 80 the latter, together with the electrical contacts carried by the same is instantly rocked upon its pivot by means of the spring 94 breaking the electrical circuit and consequently stopping the motor.

The cut-out mechanism just described is dependent upon the slacking of one or more of the cables 6. It will, however, be also operated by the slacking of the one or more of the cables 7. Upon the shaft 54 I also loosely mount arms 84 carrying at their outer end an arbor 85 upon which is loosely mounted a sheave 86 adapted to rest upon the cable 7. Adjacent to one of the arms 84 I mount a sleeve 87 similar to the sleeve 60 having a lip 88, the sleeve 87 being fastened to the shaft 54 by any suitable means, such as the screw 90. In this arrangement where the slacking of the cables 7 will cut out the power for the motor, I do not need to use a weight, such as 57, as the arms 84, arbor 85 and sheave 86 are sufficient to cause the loose arms 84 to rock upon the shaft 54 until one of the arms 84 comes in contact with the lip 88 of the sleeve 87 when the shaft 54 will be actuated in exactly the same manner as it would be if actuated by the slacking of the cable 6, permitting the sheave 56 to move laterally from the position shown in Fig. 3. It is also, of course, to be noted that the fact that only one of the cables 6 or 7 becomes slack, does not prevent the sheave operating upon it actuating the shaft 54, as by my arrangement there is independent operation of these members.

Having described this invention in connection with an illustrative embodiment thereof, to the details of which disclosure it is not, of course, to be limited, what is claimed as new and what is desired to be secured by Letters Patent is set forth in the appended claims.

1. In safety apparatus for elevators, a series of winding drums and operating mechanism therefor, a plurality of cables on each of said winding drums to be secured to different parts of an elevator car, a stop shaft mounted adjacent said drums, sleeves provided with lips mounted on said stop shaft, arms loosely mounted on said stop shaft and coöperating with said lips when moved in one direction, sheaves loosely mounted on said arms and pressed against their respective cables, a flier, a clutch connected with said operating mechanism and

coöperating with said flier, connections between said clutch and said stop shaft to actuate said clutch on the movement of said stop shaft, a spring-actuated control switch governing said operating mechanism and a detent operated by said flier and normally holding said switch in closed position.

2. In safety apparatus for elevators, a series of winding drums and operating mechanism therefor, a plurality of cables on each of said winding drums to be connected with an elevator car, a stop shaft mounted adjacent said drums, sleeves mounted on said stop shaft, arms coöperating with said sleeves to actuate said stop shaft when moved in one direction sheaves mounted on said arms and pressed against their respective cables, a flier, a clutch connected with said operating mechanism and coöperating with said flier, connections between said clutch and said stop shaft to actuate said clutch on the movement of said stop shaft, a control switch governing said operating mechanism and means operated by said flier to operate said control switch.

3. In safety apparatus for elevators, a series of winding drums and operating mechanism therefor, a plurality of cables on each of said winding drums to be secured to an elevator car, a stop shaft mounted adjacent said drums, sleeves mounted on said stop shaft, arms on said stop shaft coöperating with said sleeves to actuate said stop shaft when said arms are moved in one direction, means on said arms to coöperate with said cables, a control switch governing said operating mechanism and connections between said stop shaft and said switch to operate said switch on the movement of said stop shaft.

4. In safety apparatus for elevators, a winding drum and operating mechanism therefor, cables on said winding drum to be secured to an elevator car, a stop shaft, sleeves provided with lips mounted on said stop shaft, arms coöperating with said lips when moved in one direction, members on said arms each coöperating with one of said cables, said stop shaft being operated by the emergency movement of any one of said members, a flier, a clutch connected with said operating mechanism and coöperating with said flier, connections between said clutch and said stop shaft, a spring actuated control switch governing said operating mechanism and a detent operated by said flier and normally holding said switch in closed position.

CHARLES W. HOFFMAN.

Witnesses:

JOHN N. ANDERSON,
WILLIAM S. WENGLE.