No. 755,736. PATENTED MAR. 29, 1904.

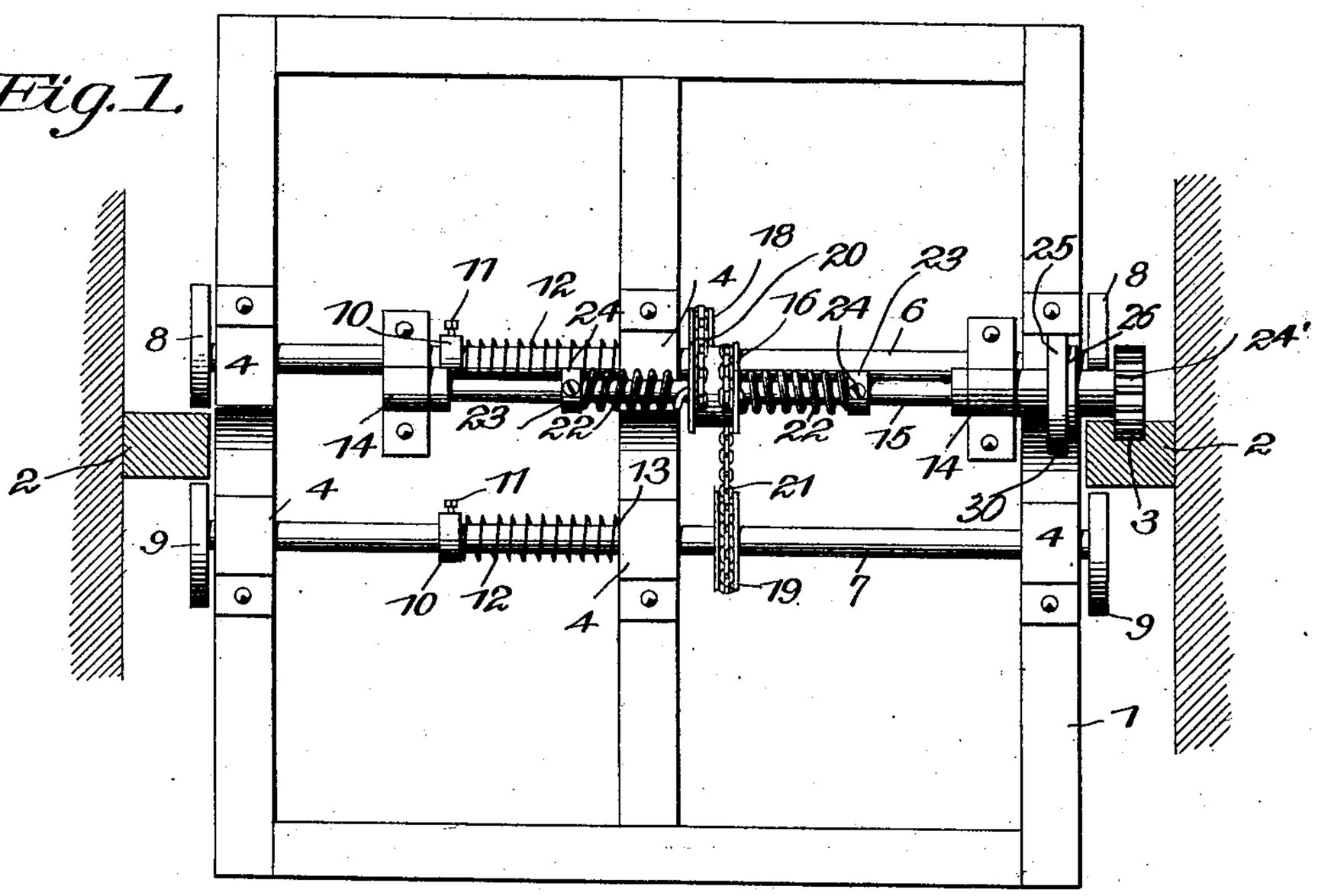
F. BLANDING.

SAFETY DEVICE FOR ELEVATORS.

APPLICATION FILED MAR. 19, 1903.

NO MODEL.

Fig. 1.



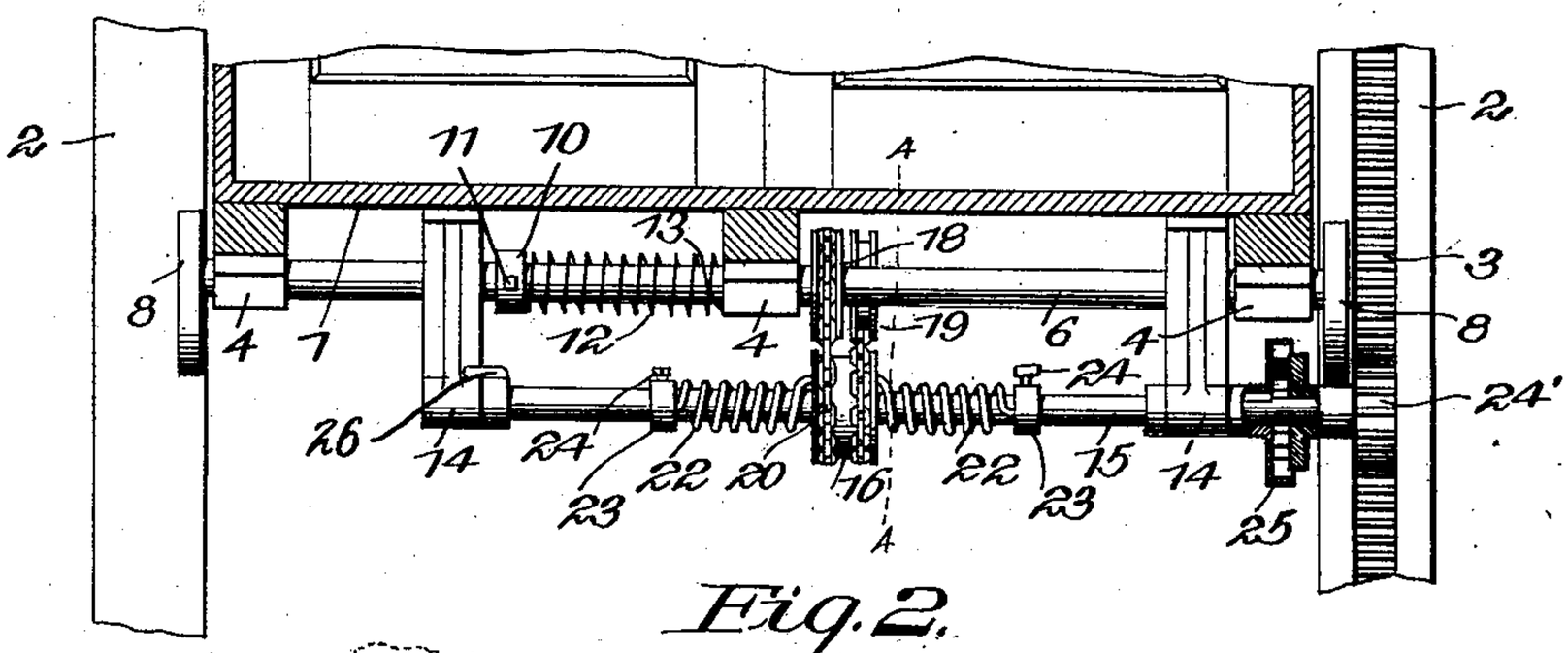


Fig. 2.

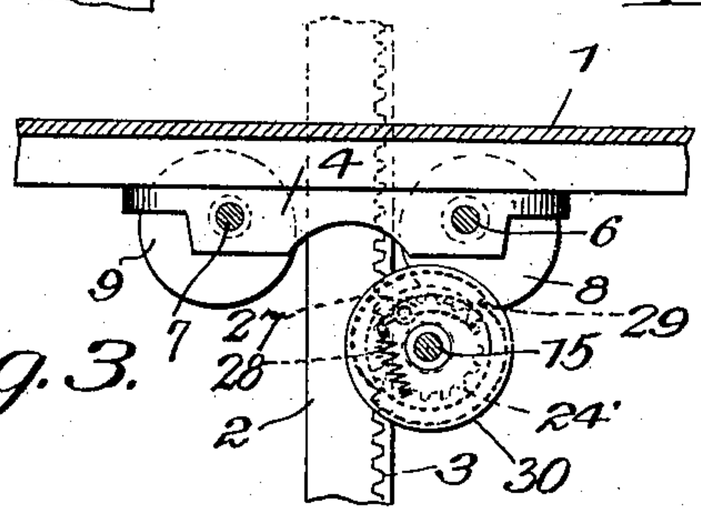


Fig. 3.

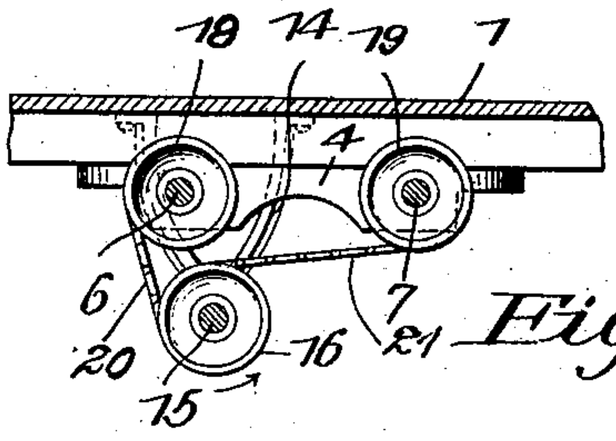


Fig. 4.

Witnesses
E. F. Stewart
Baxter Morton

F. Blanding, Inventor;
by Cachow & Co
Attorneys

No. 755,736. Patented March 29, 1904.

UNITED STATES PATENT OFFICE.

FRANCIS BLANDING, OF BROCKTON, MASSACHUSETTS.

SAFETY DEVICE FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 755,736, dated March 29, 1904.

Application filed March 19, 1903. Serial No. 148,579. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS BLANDING, a citizen of the United States, residing at Brockton, in the county of Plymouth and State of Massachusetts, have invented a new and useful Safety Device for Elevators, of which the following is a specification.

My invention relates to safety devices for elevators; and it consists in an improvement upon the safety device for elevators patented to me November 8, 1898, No. 613,791.

The safety device described in the above-mentioned patent was found when submitted to the test of commercial usage to be defective in a respect that made it of but little value for the purpose for which it was intended. When ropes, leather straps, or chains were used to connect the gripper-shafts with the actuating-shaft, the sudden strain placed upon the connections in the operation of the device to stop the elevator-car when falling freely down the shaft after the breakage of a cable frequently caused the connections to break, thus rendering the device useless for the purpose for which it was intended. Increasing the size and strength of the connections did not prove a satisfactory means of correcting this defect, for after a time the connections stretched, so as to render adjustment necessary, or after withstanding the strain for some time they would finally break.

The object of the present invention is to avoid completely the defect described, and the means employed in attaining this object consists in the construction and combination of parts hereinafter fully described, shown in the accompanying drawings, and having the novel features thereof set forth in the appended claim.

In the accompanying drawings, in which corresponding parts are designated by the same characters of reference throughout, Figure 1 is a plan view from below of an elevator-car provided with my improved safety device. Fig. 2 is a view in elevation of a portion of the actuating-shaft with the present invention applied thereto. Fig. 3 is a view in elevation showing the gripping-cams, one of the side guides of the elevator-shaft, and the gear of the actuating-shaft in engagement with a rack provided on the side guide. Fig. 4 is a view in section on the line 4 4 of Fig. 2.

Referring to the drawings by reference characters, 1 represents the bottom of the elevator cage or car, 2 represents the parallel vertical guides between which the cage or car is designed to travel, and 3 designates a rack provided on the vertical guide for the safety mechanism. This rack 3 is narrow and is spaced some distance from the outer face of the elevator-guide, so that smooth faces may be left thereon for the engagement of gripper-cams, (indicated at 8 and 9.)

To the lower or under side of the cage 1 are secured two or more shaft-bearings 4, each of which is preferably cast in a single piece of metal and provided with journal-openings, and these bearings are bolted or otherwise secured solidly to the bottom of the car and have the shaft-openings therein alined with each other. The bearings 4 are quite long and are secured to the bottom of the cage to have the openings therein disposed on opposite sides of the vertical plane of the elevator-guides, thus presenting the gripper-shafts in proper relation to the guides for the gripper-cams to bind against the lateral faces of said guides. The gripper-shafts are designated by 6 and 7 in the drawings and are disposed in the same horizontal plane across the bottom of the car, one gripper-shaft lying on one side of the vertical plane of the elevator-guides 2, while the other gripper-shaft is on the opposite side of said plane. The ends of the gripper-shafts project beyond their bearings 4, and to the said projecting ends are secured the gripper-cams 8 on the shaft 6 and the gripper-cams 9 on the shaft 7, said cams being arranged in pairs and disposed or presented oppositely to each other, so as to bind against the side faces of the elevator-guides 2. Under normal conditions the shafts 6 and 7 are maintained by retractors in the form of springs in the position shown in Fig. 3, the cams being out of engagement with the elevator-guides and so permitting the cage to travel freely within the shaft without hindrance from the safety mechanism. The springs 12 are coiled loosely around the gripper-shafts, one end of each spring being se-

curely fastened, as at 13, to one of the bearings 4 and the other end being attached to a collar 10, which may be adjusted in position upon the gripper-shaft by means of a set-screw 11, thus affording means whereby the tension of the spring may be varied as desired. The springs 12 are of course placed under tension when the collars 10 are fitted to the shaft, and the tensions of the springs are so arranged that they act in opposite directions to hold the cams 8 and 9 away from the lateral faces of the guides 2.

Hangers 14 are rigidly secured to the bottom of the elevator-cage, so as to extend downward below the gripper-shafts, and are provided at their lower ends with alined journal-bearings, which lie between the vertical planes of the gripper-shafts and are adapted to receive a horizontal actuating-shaft 15. The shaft 15 is so situated that it is almost under the gripper-shaft 6, as shown in Fig. 3, being so placed in order that the projecting end of the shaft 15 may lie adjacent to the rack 3, provided on one of the vertical guides. Loosely mounted on the actuating-shaft about midway of its length is a shrouded disk 16, to which are securely fastened by screws or other means the ends of two flexible connections, preferably chains, 20 and 21, which are fastened in similar manner to shrouded disks 18 and 19, which are rigidly fastened to the gripper-shafts 6 and 7, respectively. The chains 20 and 21 pass around the disks 18 and 19 in opposite directions, so that any pull exerted thereon may rotate the disks to which they are attached in opposite directions. The direction of the movement which would be imparted to each of the gripper-shafts by a pull upon the chains 20 and 21 is of course opposed to the tension of the springs 12, described in a preceding paragraph.

The description of the safety device as above given coincides with that given in my Patent No. 613,791 except in one particular—namely, that the disk 16 is described as rigidly attached to the shaft 15, whereas in the improved form of the invention, as above set forth, the disk is said to be loosely mounted on the shaft 15. Now in order to make the device operative I provide two coiled springs 22, which loosely encircle the shaft 15 on either side of the disk 16 and have one end of each securely fastened to the disk 16 and the other end attached to the collars 23, adjustably fastened to the shaft 15 by set-screws 24.

To the protruding end of the actuating-shaft 15 is loosely fitted a driving device, which runs idly on the shaft during the travel of the elevator-cage within the speed limit, and with this driving device is associated a centrifugal clutch mechanism that remains inactive under normal conditions and is only brought into service on an accelerated descent of the cage beyond its speed limit, whereby the driving device and clutch mechanism are actuated automatically to impel the actuating-shaft, which in turn positively moves the gripper-shafts for the cams thereof to bind tightly against the elevator-guides. The driving device is embodied, preferably, in the form of a gear or pinion 24′, arranged to mesh with the rack 3 and to be rotated positively by engagement therewith as the cage travels vertically in its shaft. This pinion 24′ is provided with an elongated hub or sleeve, which is fitted loosely on the shaft 15 to rotate freely thereon. At its inner end this hub or sleeve 25 is provided with one member of a clutch mechanism, preferably comprising a disk 26, bearing a pivoted pawl 27, which is normally held in inoperative position by a spring 28 and is adapted to engage, when the speed of the cage in the shaft exceeds a predetermined limit, a shoulder 29 in a clutch member 30, rigidly secured to the shaft 15 and adapted to coöperate with the first-mentioned clutch member to lock together the pinion 24′ and the shaft 15, thereby causing the rotation of the pinion 24′, caused by its engagement with the rack 3, to be transmitted to the shaft 15 and thence through the springs 22 to the disk 16. The rotation of the disk 16 produced by the accelerated descent of the elevator-cage will be in the direction indicated by the arrow in Fig. 4 and will through the chains 20 and 21 be imparted to the disks 18 and 19 and the gripper-shafts 6 and 7, thereby bringing the gripper-cams 8 and 9 into engagement with the side guides 2 of the elevator-shaft to stop the downward movement of the elevator cage or car. The provision of the springs 22 and the set-collars 23 to connect the disk 16 to the shaft 15 causes the strain upon the chains 20 and 21 to be gradually applied and is effective to prevent the breakage which frequently occurs when the disks 16, 18, and 19 were all rigidly secured to their respective shafts, as described in my Patent No. 613,791; otherwise the operation of the mechanism above described is the same as this disclosed in my said patent, and further description thereof is regarded as unnecessary here.

To provide means for positively preventing the engagement of cams 8 and 9 with the side rails 2 during the ascent of the elevator-car, the dog 26 (shown in Fig. 2) is rigidly mounted upon the actuating-shaft 15, near one end thereof, and is adapted to contact with one of the shaft-hangers 14 to prevent rotation of the actuating-shaft in the direction in which it would be caused to rotate by the upward movement of the elevator-car if the dog 26 or equivalent means for preventing such rotation were omitted.

Having thus described the nature of my invention, what I claim as new, and desire to secure by Letters Patent, is—

The combination in an apparatus of the class described of gripper-shafts, gripper-cams rigidly associated with said shafts, springs asso-

ciated with said gripper-shafts to hold the cams normally in inoperative position, an actuating-shaft, disks rigidly secured to the gripper-shafts, a disk loosely journaled on the actuating-shaft, spiral springs coiled on the actuating-shaft upon opposite sides of the disk and having one end of each attached to the disk, set-collars attached to the other ends of said springs, means for adjusting the position of said set-collars upon the actuating-shaft, flexible connections between the disk on the actuating-shaft and the disks on the gripper-shafts, and a clutch-controlled driving mechanism adapted to have traveling engagement with an elevator-guide, whereby motion may be imparted to said actuating-shaft when the speed of the elevator-car is abnormally accelerated.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

FRANCIS BLANDING.

Witnesses:
FRANK A. FRENCH,
JOSEPH EDWARD BLANDING.