

No. 657,642.

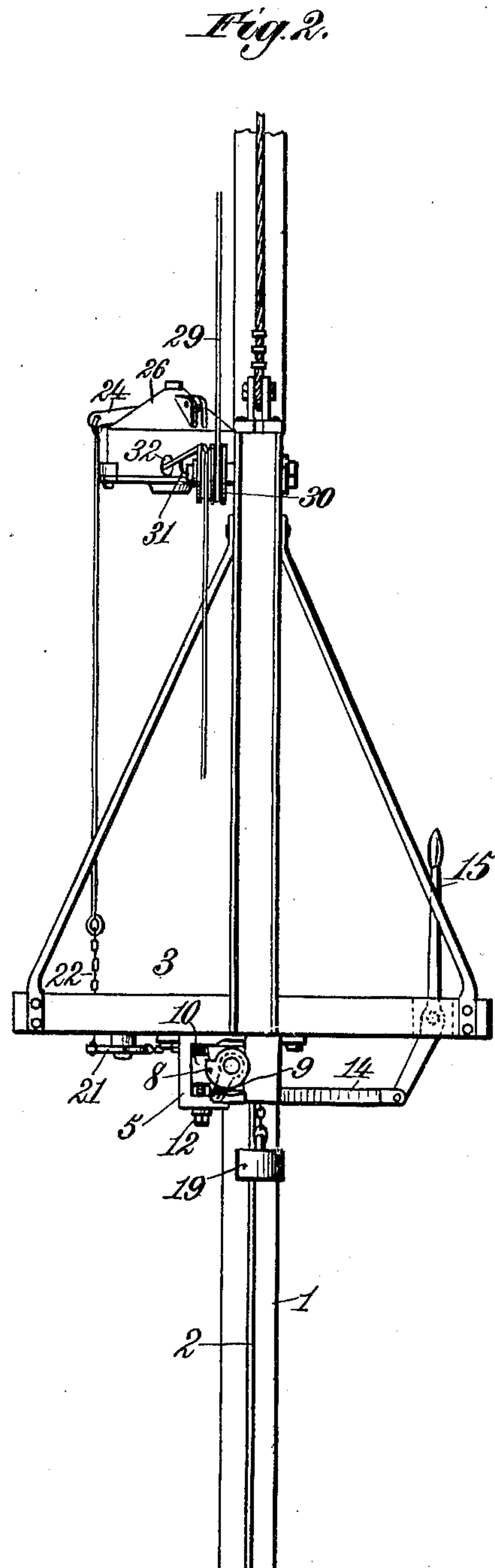
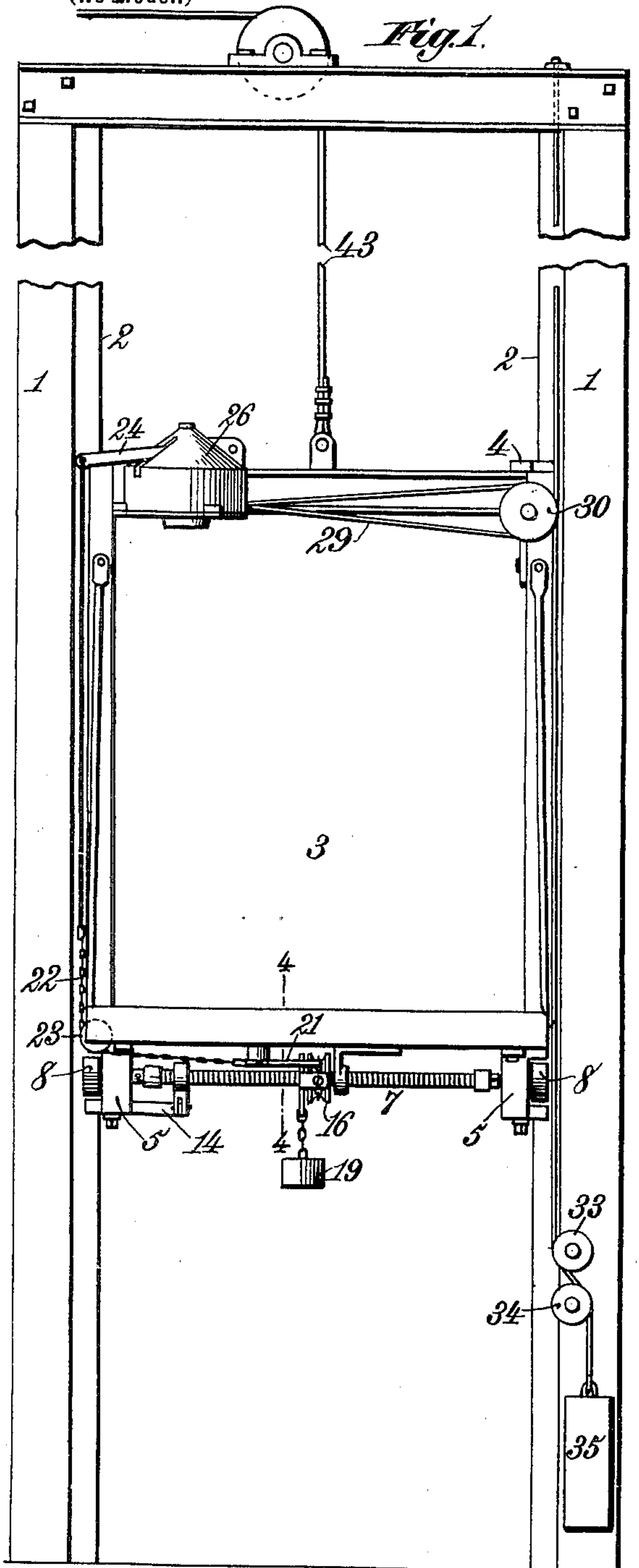
Patented Sept. 11, 1900.

C. L. BUDDENBOHN & W. SPEER.
SAFETY MECHANISM FOR ELEVATORS.

(Application filed Apr. 11, 1900.)

(No Model.)

2 Sheets—Sheet 1.



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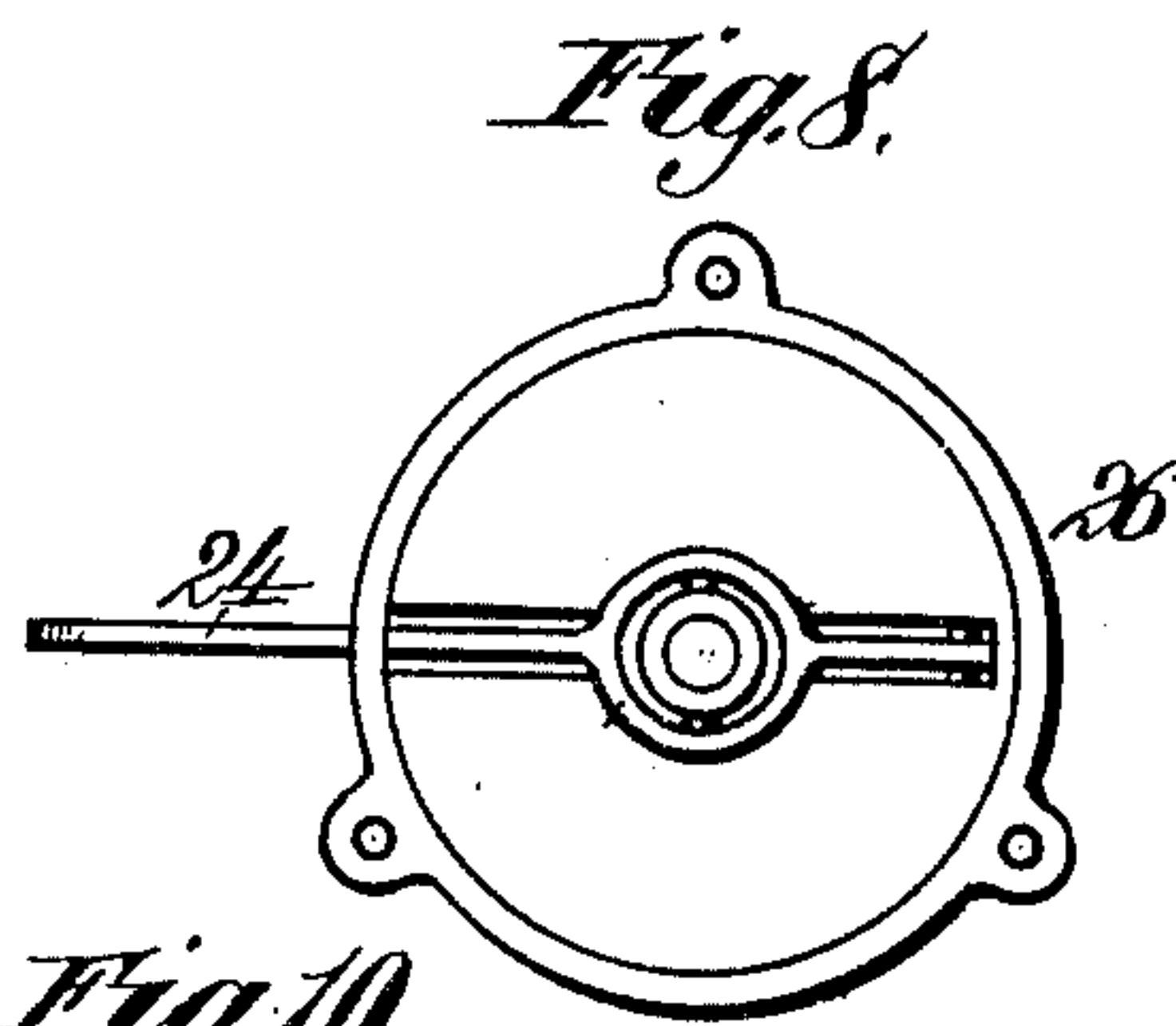
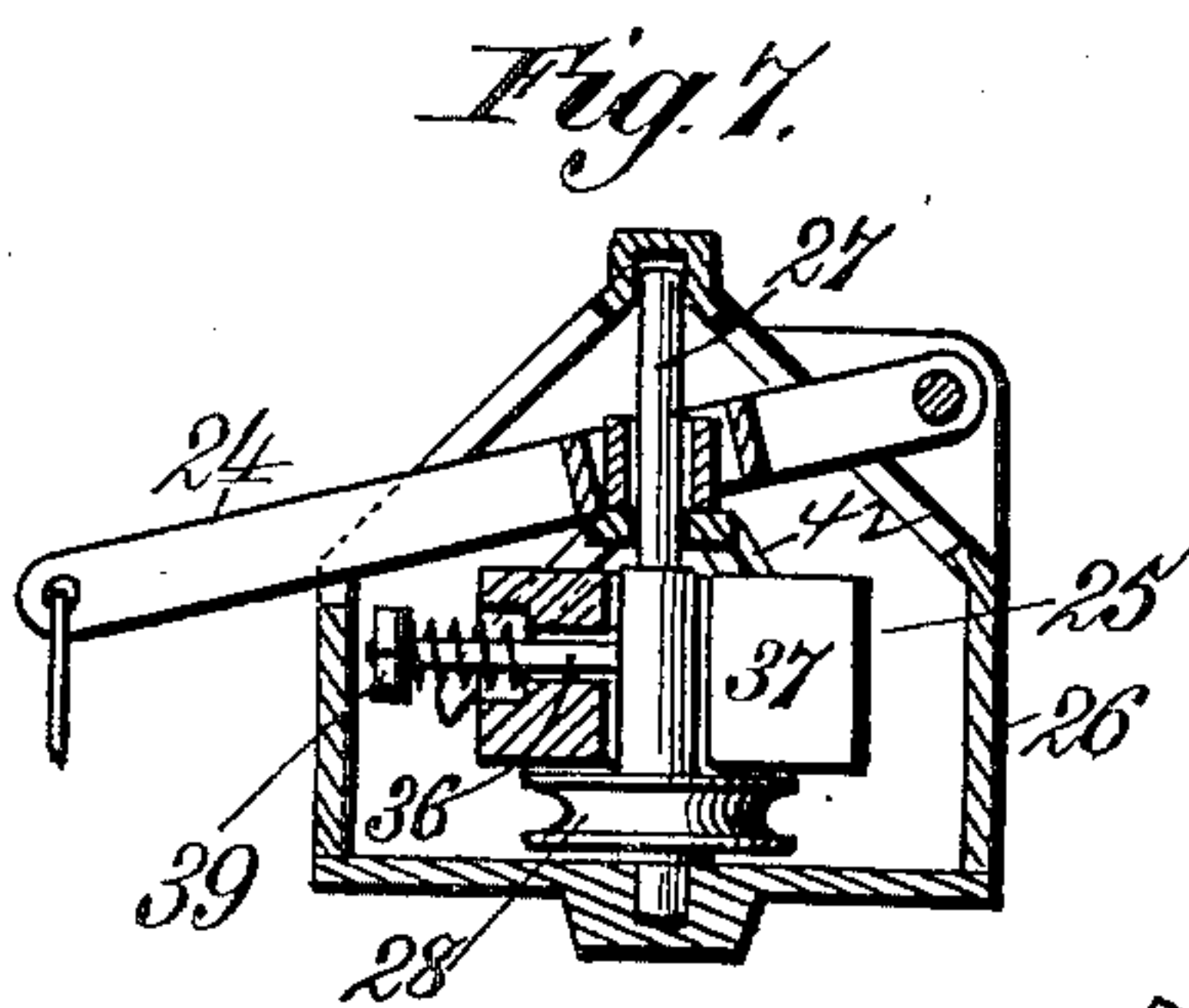
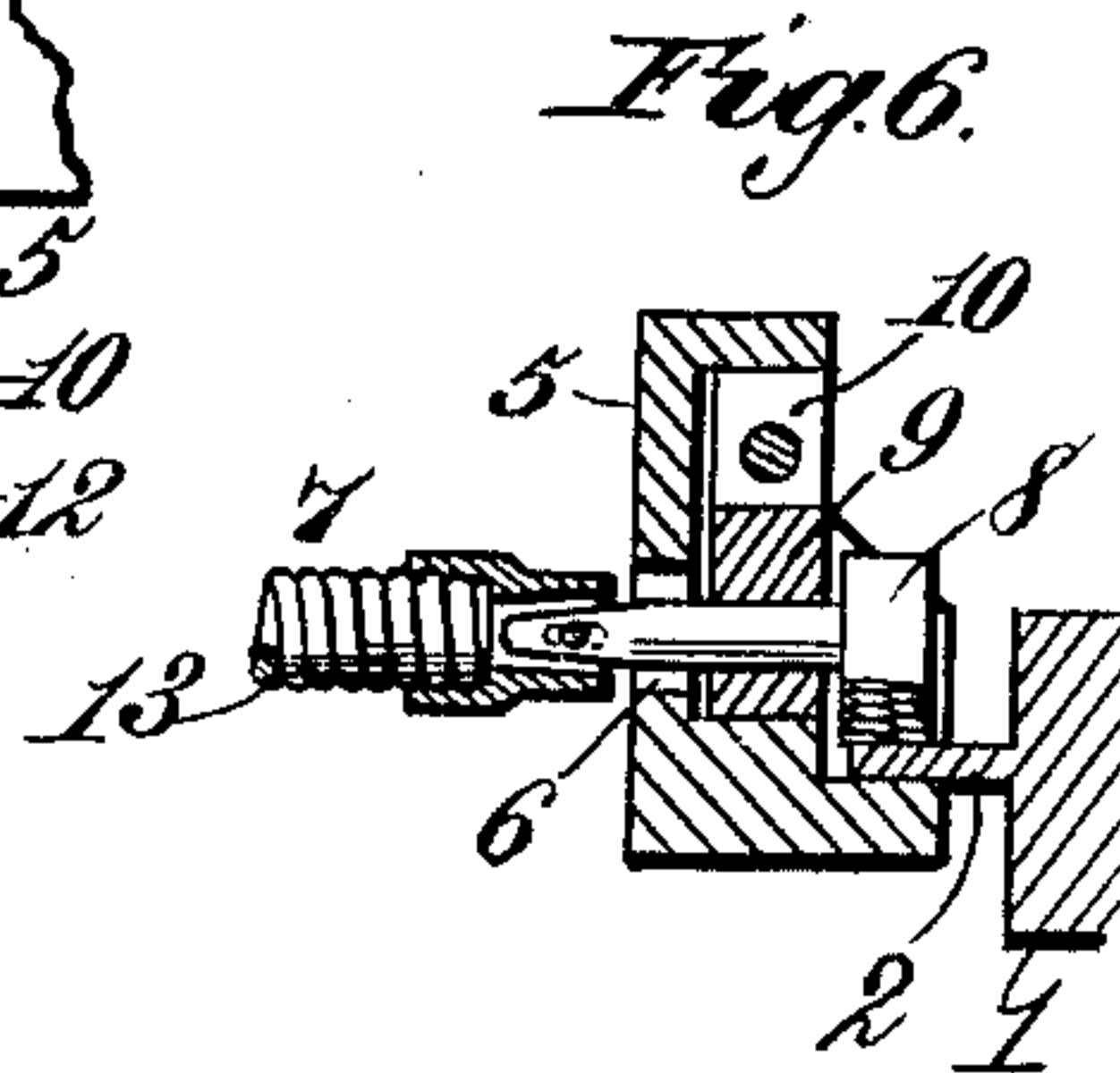
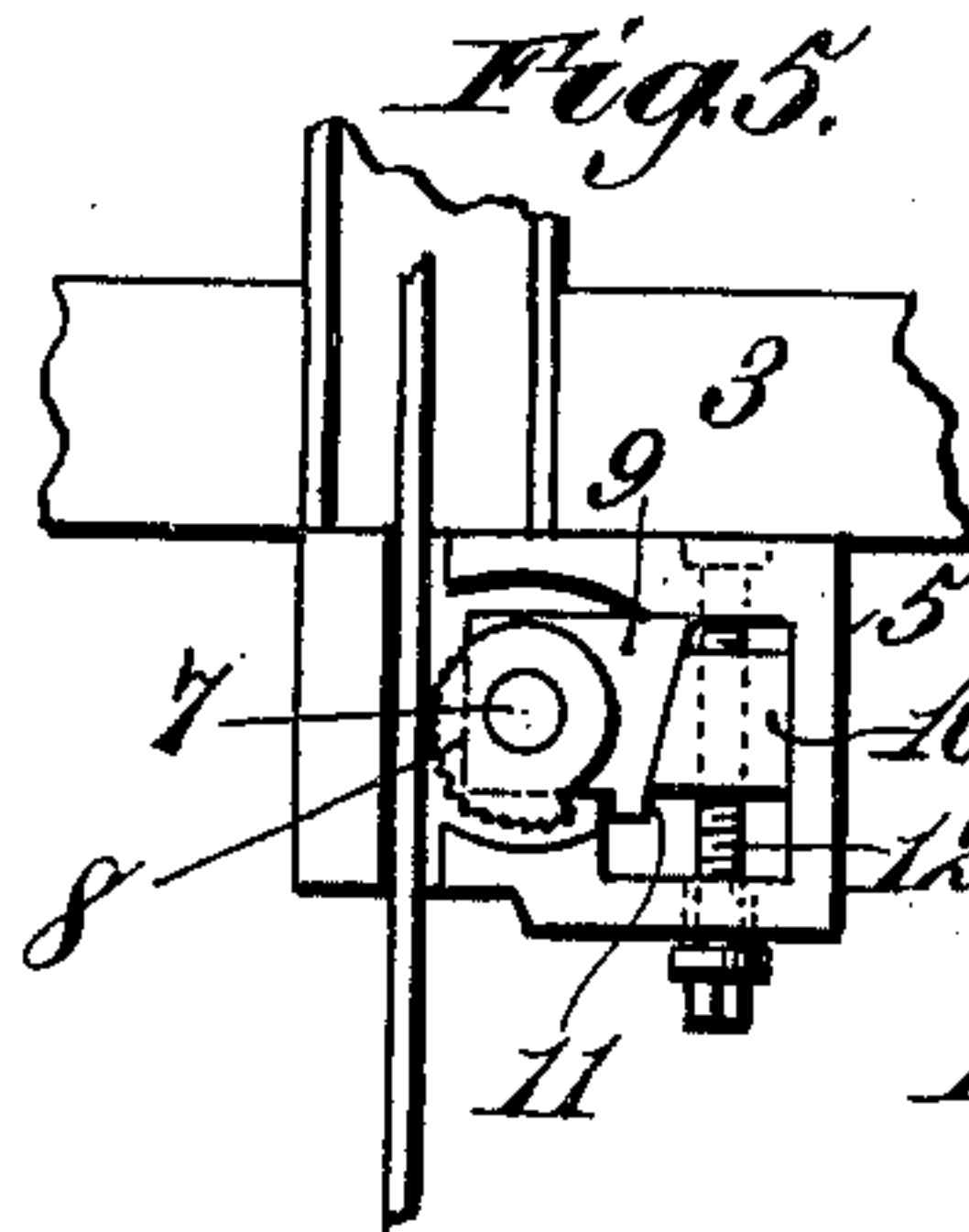
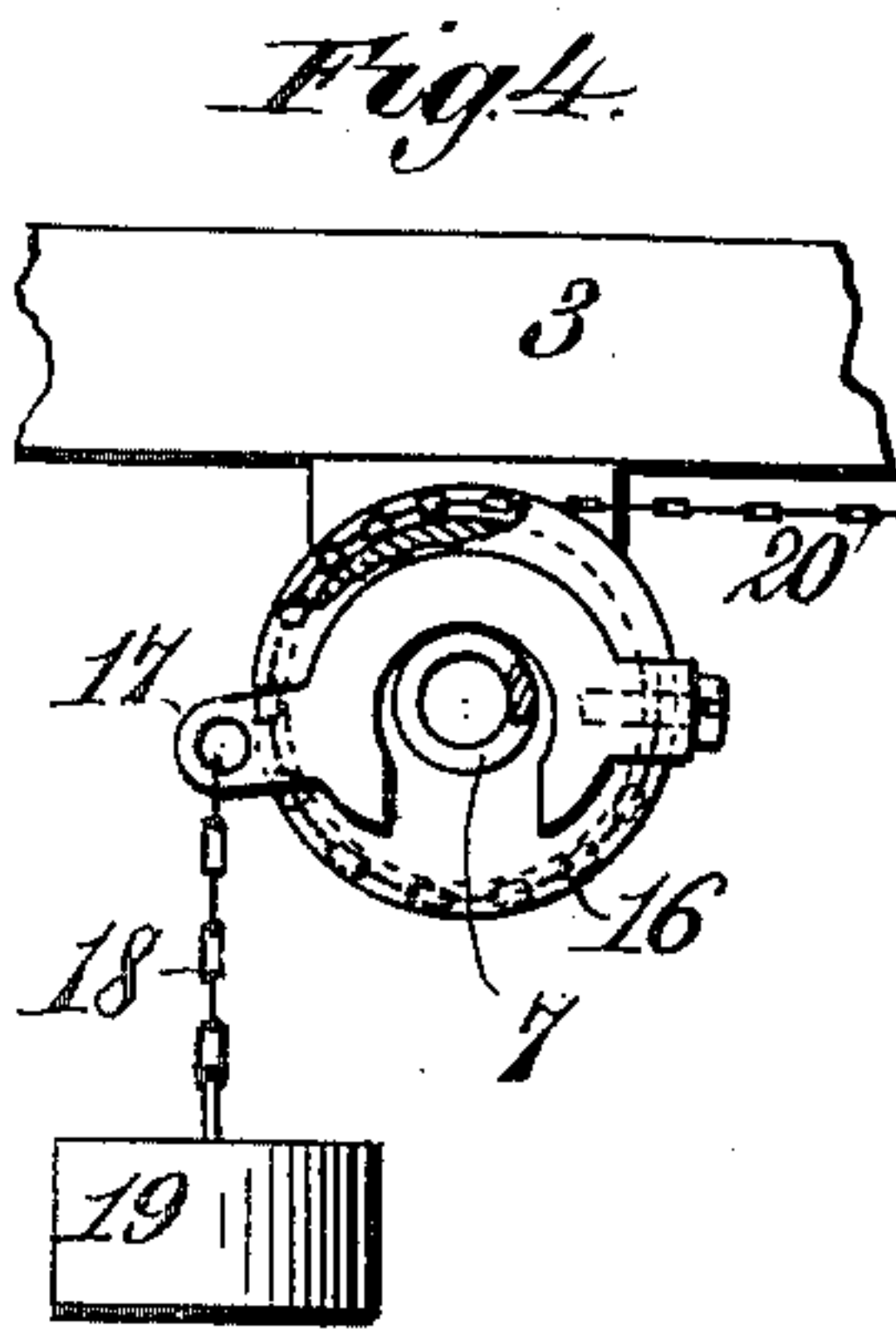
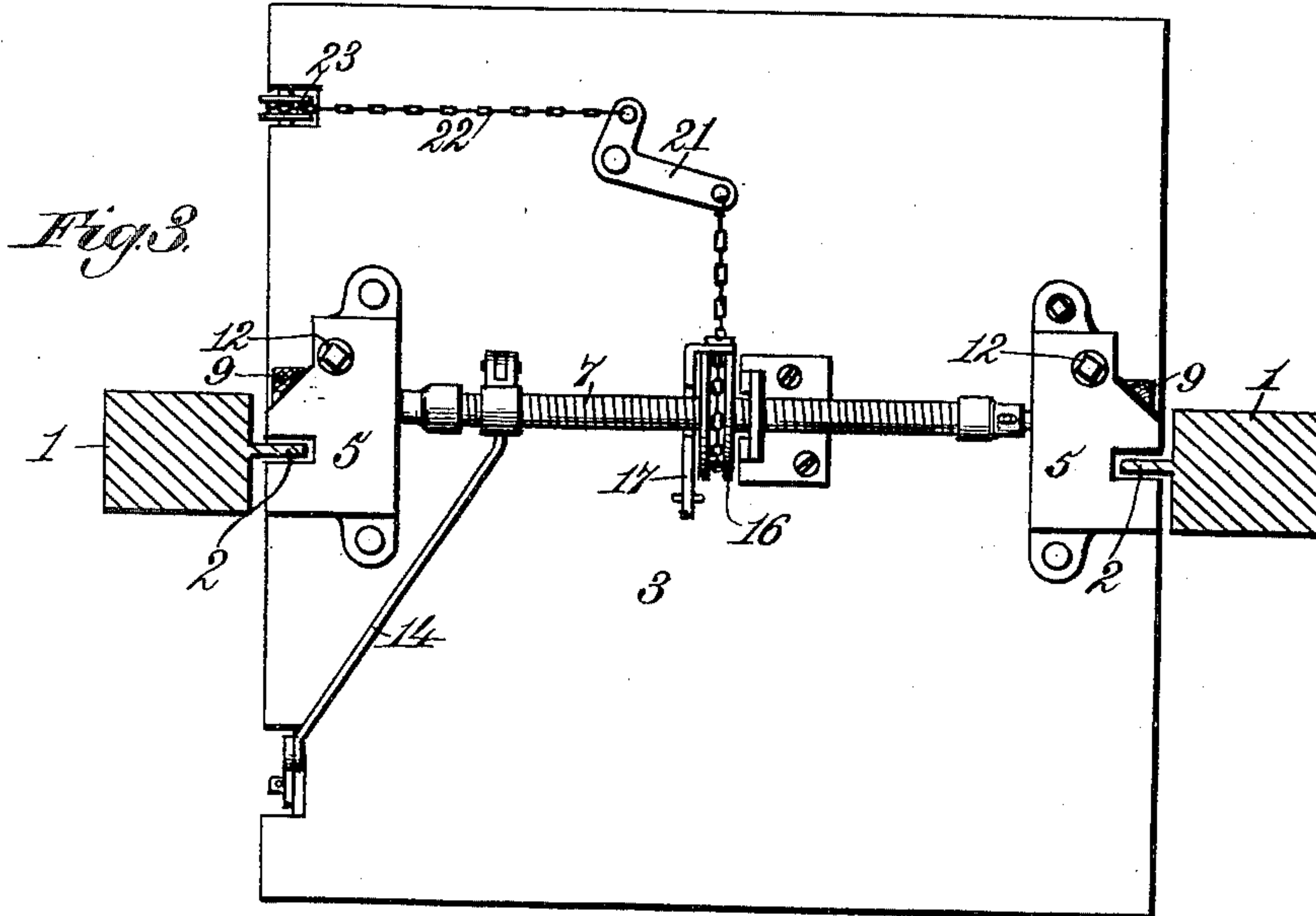
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(No Model.)

2 Sheets—Sheet 2.



Witnesses
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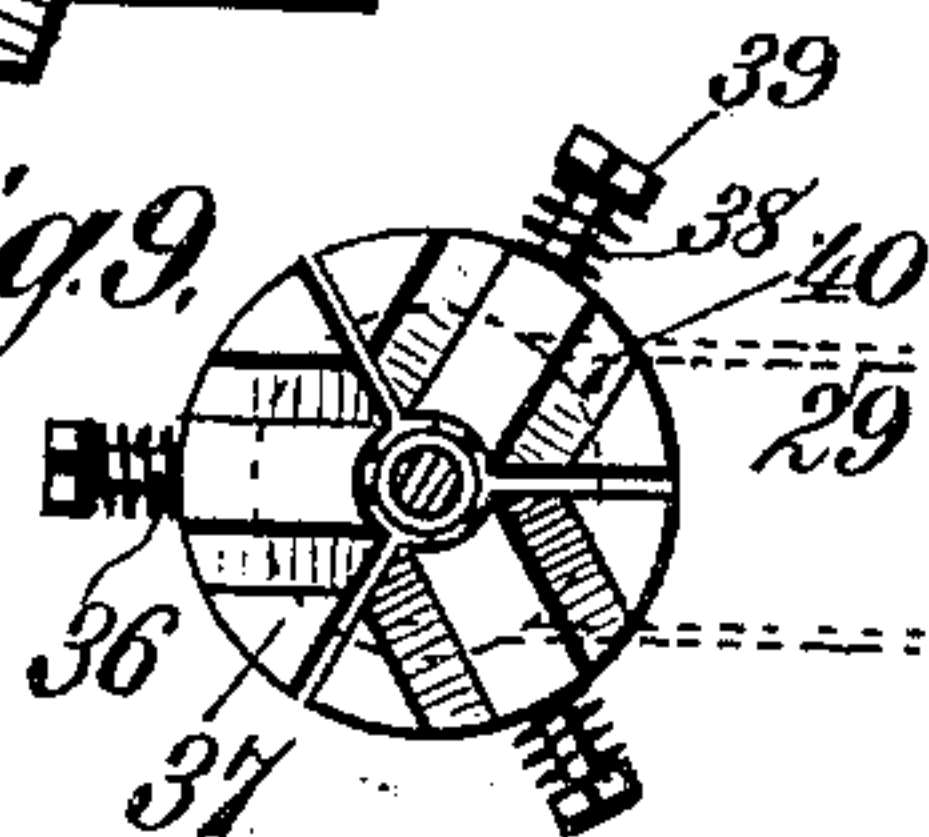
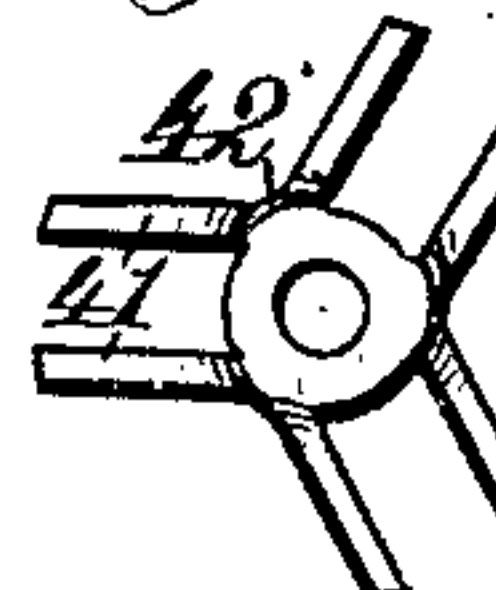


Fig. 10.



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UNITED STATES PATENT OFFICE.

CHARLES L. BUDDENBOHN AND WILLIAM SPEER, OF BALTIMORE,
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SAFETY MECHANISM FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 657,642, dated September 11, 1900.

Application filed April 11, 1900. Serial No. 12,465. (No model.)

To all whom it may concern:

Be it known that we, CHARLES L. BUDDENBOHN and WILLIAM SPEER, citizens of the United States, residing at Baltimore, in the State of Maryland, have invented new and useful Improvements in Safety Mechanism for Elevators, of which the following is a specification.

Our invention relates to safety devices for elevators, one object of the same being to provide means whereby the descent of the elevator-car will be automatically arrested in the event of accident or derangement of parts or when the hoisting-rope breaks.

A further object of the invention is to provide an indicator for showing the condition of the working parts of the safety apparatus and means whereby the locking devices for arresting the descent of the car may be thrown into operation by hand.

Other objects of the invention will hereinafter appear, and the novel features thereof will be pointed out in the claims.

In the drawings forming a part of this specification, Figure 1 is a rear elevation of an elevator embodying our invention. Fig. 2 is a similar view taken at right angles to Fig. 1. Fig. 3 is a bottom plan view of the car. Fig. 4 is a section on the line 4 4 of Fig. 1. Fig. 5 is a detail vertical sectional view through one of the guide-rails, showing the locking-cam cooperating therewith. Fig. 6 is a horizontal sectional view of the same. Fig. 7 is a vertical sectional view of the governor. Fig. 8 is a top plan view of the same, and Figs. 9 and 10 represent details of the governor.

Like reference-numerals indicate like parts in the different views.

The guide-rails 1 1 are located on opposite sides of the elevator-shaft and extend from the top to the bottom thereof. The same are preferably constructed of T-iron, with the central flanges 2 thereof extending inwardly. The car 3 is provided at its upper end with guide-plates 4 4, which are slotted or notched, as shown, for the reception of the flanges 2 of the guide-rails. On the under side of the car 3 are bearing-boxes 5 5, which are also slotted or notched, as shown, for the reception of the flanges 2 of said guide-rails. The said boxes

are located at opposite ends of the car 3 and are provided with elongated slots 6 6, through which pass the ends of a flexible shaft 7, carrying cams 8 upon its extreme outer ends, which cams are provided with roughened peripheries and are adapted to engage the sides of the flanges 2 of the guide-rails. The shaft 7 is mounted in movable bearings 9 in the boxes 5, and said bearings are normally held up toward one end of each of the slots 6 by means of wedges 10 10, which fit within the boxes 5 and engage the inclined faces 11 of said bearings. The said wedges 10 are adapted to be moved vertically for the purpose of adjusting the position of the bearings 9 by means of threaded bolts or screws 12, having polygonal outer ends for the application of a key or wrench, the said bolts or screws extending through corresponding openings in said wedges. The construction just described is for a purpose which will presently appear.

The shaft 7 has its central portion formed of a number of convolutions of spring-wire, as shown at 13, for the purpose of providing for a small degree of independent rotary movement of one of the cams 8 thereon with respect to the other. Connected to an arm on the flexible portion 13 of the shaft 7 and extending along the under side of the car 3 is a bent link 14, to the free end of which is pivoted a lever 15, which extends up into the car and serves as an indicator and also as a means for throwing the cams 8 into operative position by hand, as will hereinafter appear. Also secured to the flexible portion 13 of the shaft 7 is a grooved disk or pulley 16, to which is attached, through the link 17 and chain 18, a weight 19, which tends to normally hold the lever 15 at the limit of its movement in one direction and to maintain the cams 8 on the ends of the shaft 7 out of operative relation to the flanges 2 of the guide-rails. Also secured to the pulley 16 and fitting within the groove in the periphery of said pulley is a chain 20, which when drawn outwardly moves said pulley 16 and the shaft 7, on which it is mounted, in opposition to the weight 19. The outer end of the chain 20 is connected to one arm of a bell-crank lever 21, fulcrumed on the under side of the car 3. The other arm

of said bell-crank lever has attached to it a chain 22, which passes around a guide-pulley 23 in the edge of the car 3 and is connected with the lever 24, forming part of the governor 25, as clearly shown. The said governor is mounted in a casing 26, secured to the upper or other convenient part of the car 3. The said governor consists of a vertical shaft 27, mounted in bearings in the casing 26 and having a pulley 28 upon it, by means of which said shaft may be rotated. The speed of movement of said shaft is controlled by and is proportionate to the speed of movement of the car 3. The connection by which this is effected consists of a cord 29, secured at one end to the upper part of the elevator-shaft, passing around a pulley 30, carried by the car 3, thence through an opening 31 in the casing 26 of the governor, thence around the pulley 28 on the governor-shaft 27, thence out through the opening 32 in the governor-casing 26, thence around the pulley 30 again, and thence down and around the guide-pulleys 33 and 34 at the lower end of the elevator-shaft, the extreme lower end of said cord 29 being provided with a weight 35, which tends to maintain said cord under tension at all times and insure proper contact between it and the pulleys around which it passes.

The governor-shaft 27 has secured thereto and extending radially therefrom a plurality of arms 36, on which are mounted the slide-blocks 37, which are adapted to be thrown outwardly by centrifugal force during the rotation of said shaft. The outward movement of said slide-blocks is resisted by the springs 38, which surround said arms 36 and engage said blocks at one end and nuts or collars 39 on said arms at the other end. The upper side of each of the slide-blocks 37 is formed with a pair of recesses 40, having inclined bottom walls. In these recesses fit the arms 41 of a vertically-movable slide 42, mounted upon the governor-shaft 27. The lower faces of the arms 41 of the slide 42 are inclined and cooperate with the inclined bottom walls of the recesses 40 in the slide-blocks 37. When said slide-blocks are thrown outwardly by centrifugal force during the rotation of the governor-shaft 27, the vertically-movable slide 42 is elevated and brought into contact with the lever 24, heretofore referred to. This action upon the lever causes, through the connections described, a rocking of the flexible shaft 7 in opposition to or against the force of the weight 19, with the result that the cams 8 on the opposite ends of the shaft 7 are turned into locking engagement with the flanges 2 of the guide-rails 1, and the downward movement of the car 3 is arrested. The hoisting-rope 43 for the elevator-car is constructed and operated in any suitable or well-known way.

Constructed as above described, it is thought that the operation of our device will be readily understood. The cams 8 on the ends of

the shaft 7 are normally held out of locking engagement with the flanges 2 of the guide-rails 1, and the car 3 is free to be raised or lowered at any normal or predetermined speed without turning the shaft 7 sufficiently to throw said cams into effective engagement with the guides. This is done by so adjusting the springs 38 that said lever will not be raised far enough to throw into operation the locking mechanism until a certain predetermined speed of the elevator has been reached. As the rotation of the governor-shaft 27, however, is through the connections described, proportionate to the speed of the car 3, it will be obvious that if the speed of the car materially increases up to or beyond that at which it may run with safety—as, for instance, when the hoisting-rope 43 is broken—the slide-blocks 37 will be thrown outwardly to such an extent that the slide 42 will be elevated so as to lift the lever 24, and, through the connections described, rotate the shaft 7, so as to bring the cams 8 on the ends thereof into locking engagement with the guide-rails 1 and immediately stop the fall of the car. It will thus be seen that the safety apparatus is entirely automatic in its action and may be set to operate at any point desired.

In the case of a heavy or heavily-loaded car or one which has attained a very high speed before the safety device is thrown into operation the cams are brought into such close locking relation to the guide-rails 1 that it is impossible to disconnect the same unless a high degree of power be applied to the under side of said car. To overcome this objection, we have provided the adjustable wedges 10, which in the event of close locking engagement between the cams 8 and the guide-rails 1 may be lowered by turning the screws or bolts 12, and thereby release the bearings 9 of the shaft 7 and permit said bearings, with said shaft 7 and the cams 8 thereon, to move outwardly in the slots 6 away from the flanges 2 of the guide-rails. In this way the said cams may be readily disengaged from said guide-rails and the car released. Of course after said cams are disconnected it is important that the wedges 10 be returned to their normal positions to provide for the further locking action between said cams and guide-rails. By making the shaft 7 flexible, as described, the necessity for accurate adjustment of the cams 8 on the ends of said shaft is removed, as a slight twisting or torsional movement of said shaft is permitted. Further, the danger of breaking said shaft by attempting to release the cams 8 from their locking engagement with the guide-rails 1 through a rearward movement of the lever 15, connected with said shaft, is avoided. The said lever 15, as heretofore stated, serves as an indicator for showing the condition of the safety apparatus—that is to say, by reason of the constant action of the slide 42 on the lever 24 a vibratory motion is imparted to said lever

through the flexible portion 13 of the shaft 7, to which said lever is connected through the link 14. If, therefore, the lever should be moved from its normal position, or if the vibratory movement thereof should cease, the attendant or operator of the elevator would know at once that some derangement of the parts had taken place. Further, in the event of suspected trouble or in the event that the ordinary stopping apparatus of the elevator failed to work the operator could, by throwing the lever 15 to the opposite end of its stroke, turn the shaft 7 independently of the governor 25 and throw the cams 8 into locking engagement with the guide-rails 1. It will thus be seen that our improved safety device is not only adapted to be operated automatically by means controlled by the speed of the car, but may also be operated by hand.

During the movement of the car 3 in both directions the governor-shaft 27 will be caused to rotate through the connection between the cord 29 and the pulley 28 on said governor-shaft, and during the rotation of said governor-shaft the slide-blocks 37 act with varying force to raise the slide 42, which engages the under side of the lever 24. The result is that during the movement of the car a vibratory movement is imparted to the lever 24, which through the connections described imparts a corresponding vibratory or back-and-forth-rocking movement to the flexible shaft 7. This movement of the shaft 7 is what is indicated by the lever 15 and serves to prevent rusting, corrosion, gumming, or the like between the ends of said shaft 7 and the bearings in which it is mounted. The result is that said shaft is always ready to act, and the rocking movement thereof, when it is desired for the purpose of throwing into operation the cams 8, will not be prevented or retarded by friction due to the rusting, corrosion, or gumming of the parts. This point is an essential feature of our invention and one upon which great importance is placed.

Having now described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination with an elevator-shaft and guide-rails located on opposite sides thereof, of a car movable in said shaft, a rock-shaft mounted on said car, cams on said rock-shaft adapted to engage said guide-rails, a governor for continuously vibrating said rock-shaft during the movement of the car and for rocking said shaft and throwing said cams into locking engagement with said guide-rails, the same including a rotary shaft having radially-extending arms thereon and slide-blocks on said arms adapted to be thrown outwardly by centrifugal force during the rotation of said rotary shaft, a pulley on said car, a cord passing around said pulley and said rotary shaft, and a constant connection between said blocks and said rock-shaft for operating the latter from the former, as and for the purpose set forth.

2. The combination with an elevator-car and locking devices therefor, of a governor mounted on said car for throwing said locking devices into operation, the same comprising a lever connected with said locking devices, a rotary shaft having radially-extending arms thereon, slide-blocks on said arms adapted to be thrown outwardly by centrifugal force during the rotation of said shaft, and a slide on said shaft adapted to be thrown into engagement with said lever by said blocks, and connections between said shaft and said car, whereby said shaft will be rotated therefrom and the speed thereof will be controlled by the speed of movement of said car.

3. The combination with an elevator-car and locking devices therefor, of a governor mounted on said car for throwing said locking devices into operation, the same comprising a lever connected with said locking devices, a rotary shaft having a pulley thereon, radial arms on said shaft, slide-blocks on said arms adapted to be moved outwardly by centrifugal force during the rotation of said shaft and provided with recesses having inclined bottom walls, springs surrounding said arms for resisting the outward movements of said blocks, a slide loosely mounted on said shaft having wings or extensions lying within said recesses and provided with inclined walls adapted to be engaged by the inclined bottom walls of said recesses, the said slide being adapted to be moved into engagement with said lever when said slide-blocks are moved outwardly, a pulley on said car, and a cord secured at one end, passing around the pulleys on said car and on said shaft and having a weight at its free end, whereby said shaft will be rotated from said car and the speed of rotation thereof will be controlled by the speed of movement of said car.

4. The combination with an elevator-shaft and guide-rails located on opposite sides thereof, of a car movable in said shaft, a rock-shaft mounted on said car, cams upon the ends of said shaft adapted to engage said guide-rails, and an automatic governor in constant connection with said shaft for continuously vibrating the latter during the movement of the car and for rocking said shaft and throwing said cams into locking engagement with said guide-rails when the speed of the car increases beyond a certain predetermined limit.

5. The combination with an elevator-shaft and guide-rails on opposite sides thereof, of a car, a rock-shaft mounted thereon, cams on the ends of said shaft adapted to be moved into locking engagement with said guide-rails, means for normally holding said shaft at the limit of its movement in one direction and for maintaining said cams out of locking engagement with said guide-rails, a governor in constant connection with said shaft for continuously vibrating the latter during the movement of the car and for moving the latter in opposition to said holding means and thereby throwing said cams into locking engagement

with said guide-rails when the speed of the car increases beyond a certain predetermined limit.

6. The combination with an elevator-shaft and guide-rails on opposite sides thereof, of a car movable in said shaft, a rock-shaft mounted on said car, cams on the ends of said shaft adapted to engage said guide-rails, a weight connected with said shaft for normally maintaining it at the limit of its movement in one direction and for holding said cams out of engagement with said guide-rails, a pulley on said shaft, a bell-crank lever on said car, flexible connections between one arm of said bell-crank lever and said pulley, a governor and connections between said governor and the other arm of said bell-crank lever, whereby said shaft will be moved by said governor in opposition to said weight for throwing said cams into locking engagement with said guide-rails when the speed of movement of the car increases beyond a certain predetermined limit.

7. The combination with an elevator-shaft and guide-rails on opposite sides thereof, of a car movable in said shaft, a rock-shaft mounted on said car, cams upon the ends of said shaft adapted to engage said guide-rails, a governor, in constant connection with said rock-shaft for continuously vibrating the latter during the movement of the car and for moving said cams into locking engagement with said guide-rails when the speed of the car increases beyond a certain predetermined limit, and a lever being vibrated by said shaft and connected with said shaft and extending up into the car, the said lever serving as an indicator and as a means for rotating said shaft and throwing said cams into locking engagement with said guide-rails by hand.

8. The combination with an elevator-shaft and guide-rails on opposite sides thereof, of a car movable in said shaft, a flexible rock-shaft mounted on said car, cams on the ends of said rock-shaft adapted to engage said guide-rails, a governor, connections between said governor and said shaft for automatically rocking the latter and throwing said cams into locking engagement with said guide-rails,

and a lever connected with a flexible portion of said shaft and extending up into the car, as and for the purpose set forth.

9. The combination with an elevator-shaft having guide-rails on opposite sides thereof, of a car movable in said shaft, a rock-shaft on said car, cams on said rock-shaft adapted to be moved into locking engagement with said guide-rails, and means for shifting said rock-shaft bodily to move said cams away from said guide-rails when they are in locking engagement therewith.

10. The combination with an elevator-shaft having guide-rails on opposite sides thereof, of a car movable in said shaft, boxes secured to said car having elongated slots therein, a rock-shaft extending through said slots and mounted in bearings movable in said boxes, cams on the ends of said rock-shaft adapted to be moved into locking engagement with said guide-rails, wedges engaging the bearings of said shaft, and means for moving said wedges to change the position of said bearings, as and for the purpose set forth.

11. The combination with an elevator-car and braking mechanism therefor, of a rock-shaft for throwing into operation said braking mechanism, and means for imparting to said shaft a vibratory or back-and-forth-rocking movement during the movement of said car.

12. The combination with an elevator-car and braking mechanism therefor, of a rock-shaft for operating said mechanism, a governor for rocking said shaft to throw said braking mechanism into operation, and means thrown into operation by said governor for imparting to said shaft a constant vibratory or back-and-forth-rocking movement during the movement of the car.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

CHAS. L. BUDDENBOHN.
WILLIAM SPEER.

Witnesses:

HENRY H. MEYER,
JOHN C. LOUIS.