No. 693,444. Patented Feb. 18, 1902.

W. A. ROBINSON.

ELEVATOR CLOSING DEVICE.

(Application filed June 11, 1901.)

(No Model.)

Fig. 1.

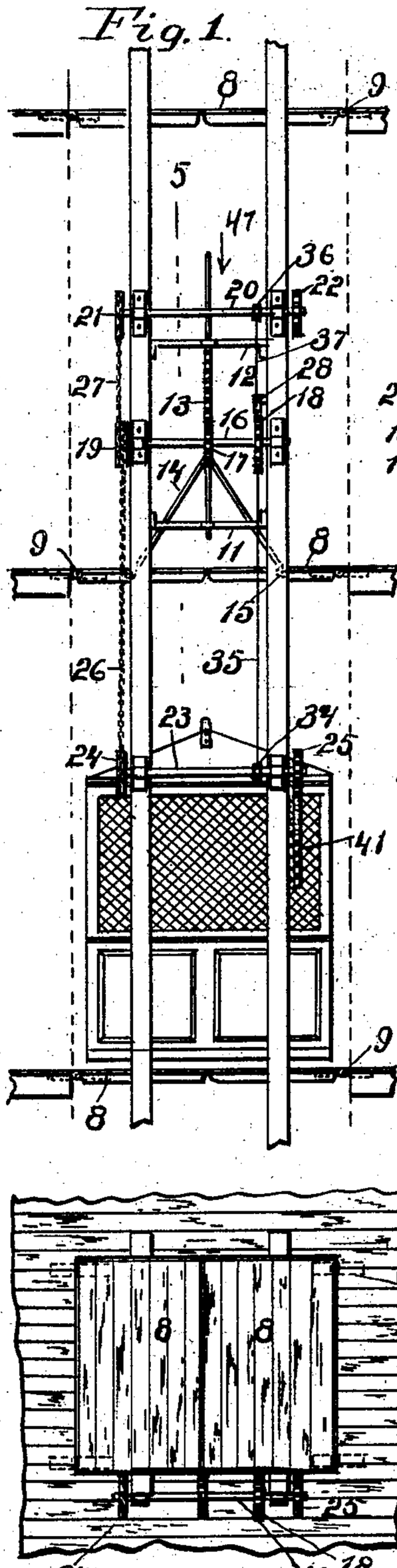


Fig. 2.

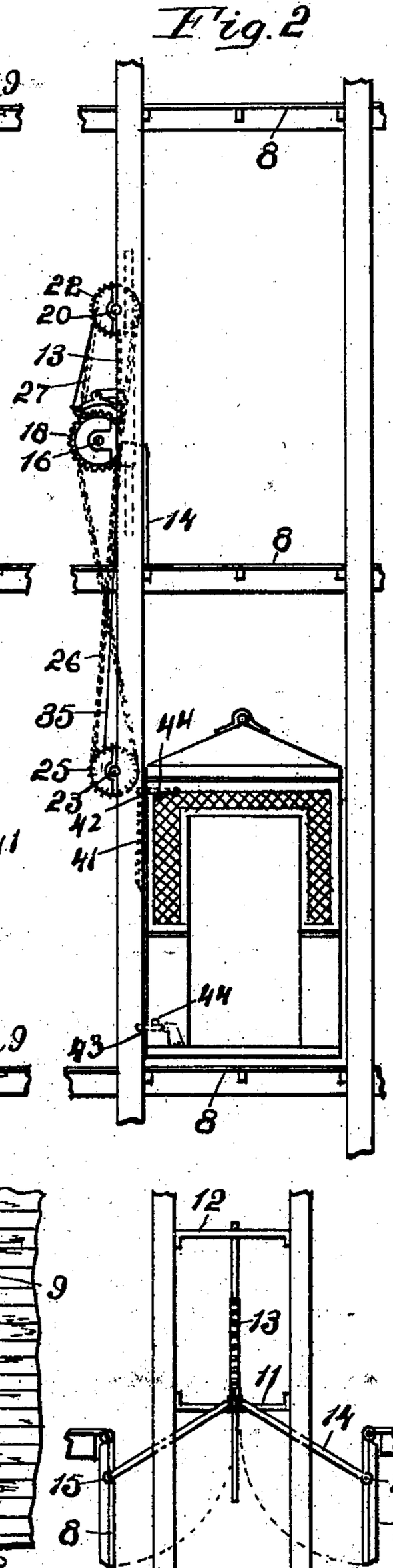
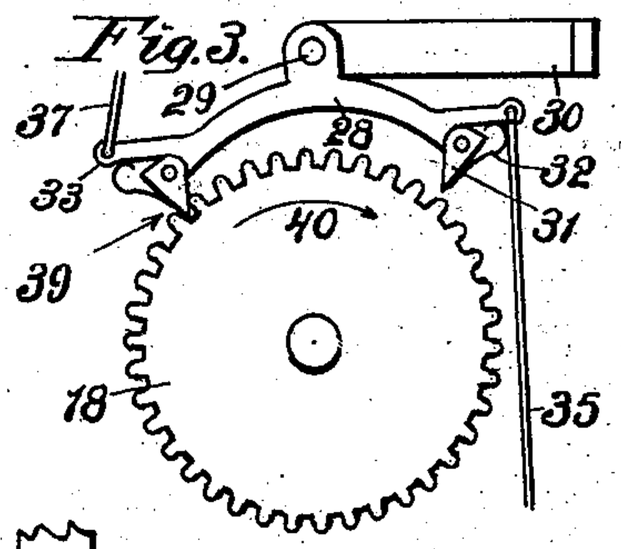


Fig. 3.



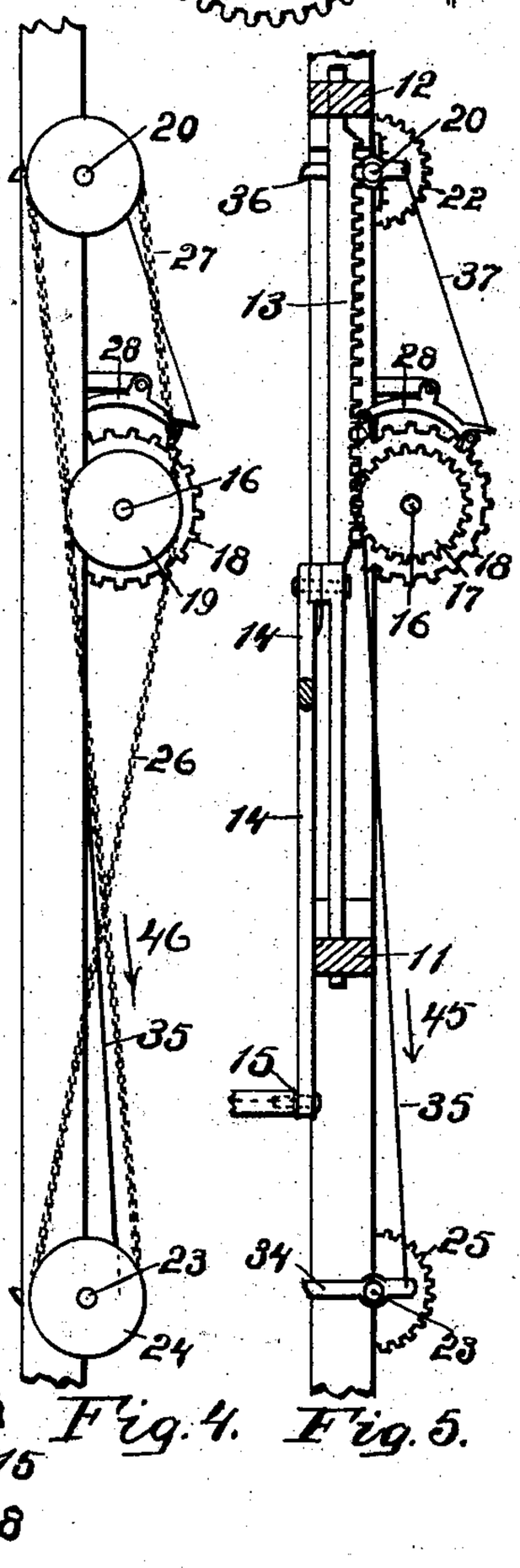


Fig. 4. Fig. 5.

Fig. 6.

Fig. 7.

Witnesses:
C. L. Delany
J. L. Berlin

Inventor:
W. A. Robinson
By J. L. & L. J. Zirk
Attys

UNITED STATES PATENT OFFICE.

WILLIAM ALBERT ROBINSON, OF INDEPENDENCE, IOWA.

ELEVATOR-CLOSING DEVICE.

SPECIFICATION forming part of Letters Patent No. 693,444, dated February 18, 1902.

Application filed June 11, 1901. Serial No. 64,168. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM ALBERT ROBINSON, a citizen of the United States, and a resident of Independence, in the county of Buchanan and State of Iowa, have invented certain new and useful Improvements in Elevator-Closing Devices, of which the following is a specification.

The object of my invention is to provide an elevator-closing device, and the design is to so equip the elevator that the elevator-opening in the floors will automatically close as the carriage passes up or down.

It consists, essentially, in providing the guideways for the carriage with two cross-shafts, one above and the other below the floor, each shaft having at one end a toothed gear which engages with a rack on the carriage, and the other end of each shaft has a sprocket-wheel, and intermediate these shafts is a similar shaft having in alinement with the sprocket-wheels on the other shaft a sprocket-wheel, and midway between the ends of this latter shaft a toothed gear which engages with a vertically-movable rack-bar, to which are hinged links that connect with doors which swing downwardly. Chains on the sprocket-wheels transmit motion to the intermediate shaft as the carriage moves in either direction, and in order to hold the doors in position, either open or closed, a locking attachment is provided, which comprises a toothed wheel on the intermediate shaft, having in engagement therewith an escapement-pawl, the coacting teeth of which are hinged so as to form a knife-joint, and the opposite ends of the escapement-lever are connected by rods with trip-levers secured to the guideways, these trip-levers being set by fingers on the carriage, so that as the carriage moves up the escapement-lever is so turned before the doors are swung down that when they are in position they will be locked and thus prevented from swinging into the pathway of the carriage, and when the carriage again returns and the doors are swung up to a horizontal position they are positively held there, all of which will now be set forth in detail.

In the accompanying drawings, Figure 1 is a side view of an elevator-shaft equipped with my closing device. Fig. 2 is a front view of the same. Fig. 3 is a side view, enlarged, of the toothed wheel and escapement. Fig. 4 is a side view, enlarged, of one of the guideways with the sprocket-wheels and connections. Fig. 5 is a vertical section through line 5 of Fig. 1. Fig. 6 is a plan view of one of the floors, showing the doors in position; Fig. 7, a side view of the rack-bar, showing the doors swung down.

It is my design to apply the invention to any construction of elevators; but it is particularly applicable to those carrying freight and for uses of elevators in factory buildings where the shafts are not housed in. The opening for the carriage is provided with a pair of doors 8, hinged, as at 9, to the adjoining floor. Above the floor the guideways 10 are joined by two cross-bars 11 12, through which is placed a vertical bar, having midway between the ends a rack 13, and to the lower end of this rack I hinge a pair of links 14, the lower ends of which are hinged to the ends of the doors at 15. These links are of such length and the cross-bars 11 12 so located that the doors may be permitted to swing down and assume a vertical position, as shown in Fig. 7.

A cross-shaft 16, journaled on the guideways 10, has centrally thereon a toothed pinion 17, which engages with this rack 13, and alongside one of the guideways is also placed on this shaft a toothed wheel 18, for purposes which will be hereinafter explained. The other projecting end of this shaft has a sprocket-wheel 19.

A short distance above the shaft 16 is a parallel shaft 20, also journaled to the guideposts, which has a sprocket-wheel 21 in alinement with the sprocket-wheel 19, while the other projecting end of the shaft has a pinion 22. Below the floor is a cross-shaft 23, also journaled on the guideways, having at one end a sprocket-wheel 24 and at the other end a pinion 25 in alinement with the pinion 22 on shaft 20. A twisted chain 26 connects the sprocket-wheels 19 24, and a chain 27 connects the wheels 19 21, so that the three shafts 16 20 23 turn in unison, the two upper ones, however, in a direction opposite to the lower one.

The toothed wheel 18 on the shaft 16 has above it an escapement-lever 28, centrally

hinged at 29 to an arm 30, which projects from the guide-post. The pawl 31 at each end is hinged to form a knife-joint, and each is provided with a spring 32, so that their points are pressed normally toward each other, and as the lever 28 swings on its pivot only one of the pawls can be in engagement with the toothed wheel 18 at one time. Each end of the lever has a short arm 33. The shaft 20 above and the shaft 23 below have each a lever loosely fulcrumed thereon in line with the toothed wheel 18, the short end of the lower lever 34 being connected by a rod 35 with one of the arms 33 of the escapement-lever 28, while the short end of the upper lever 36 has a rod 37 connecting it with the other arm of the escapement-lever.

It will be observed that the escapement-lever is in such a position—as shown, for instance, in Figs. 3 and 5—that the pawl at 39 holds the doors in their closed position, since the weight of the doors acting through the toothed pinion 17 and shaft 16 tends to turn the toothed wheel in the direction of the arrow 40.

The carriage has a rack-bar 41 in line with and engaging the pinions 22 25, so that when it moves in either direction it will turn the shafts 16 20 23 through the medium of the intermediate chains 26 27. The carriage has also in line with the fulcrumed levers 34 36 a pair of hinged fingers, the upper finger 42 being adapted to engage and operate the levers 34 36 as the carriage moves upwardly and the lower finger 43 as the carriage moves downwardly, stops 44 being so placed above and below these fingers as to permit them to operate in one direction only. It will thus be seen that as the carriage ascends and the upper finger 42 engages with the long end of the lower fulcrumed lever 34 the action is to draw down the rod 35, Fig. 5, in the direction of the arrow 45. This throws over the escapement-lever 28 by disengaging the pawl 31 on the outer side of the toothed wheel 18, and immediately the rack 41 on the car engages with the pinion 25 on the lower shaft 23, turning same and moving the chain 26 in the direction of the arrow 47, Fig. 1, thus lowering the doors and permitting the carriage to pass through.

When the finger 42 reaches the fulcrumed lever 36 on the upper shaft 20, the escapement-lever 28 is again thrown back or disengaged, so that when the rack 41 engages with the pinion 22 the shafts 16 20 23 are reversed relatively to their former movements and the doors are again closed by the upward movement of the rack 13. It is obvious that the return movement of the car will produce the reverse movement relatively to the lower finger 43, acting on the fulcrumed levers 36 34 to produce the desired effect.

What I claim as new is—

1. An elevator-closing device comprising a carriage having thereon a vertical rack in combination with cross-shafts on the guideway, above and below each floor, a sprocket-wheel and a pinion on each shaft, said pinion engaging said rack, an intermediate shaft having a sprocket-wheel and a central toothed pinion, and sprocket-chains connecting said wheels, and a pair of swinging doors, and links between and hinged to said doors and rack-bar, as set forth.

2. An elevator-closing device, comprising a carriage with a vertical rack thereon, a horizontal shaft above and below the floor each shaft having a pinion at one end to engage with said rack, a sprocket-wheel on the opposite end of each shaft, an intermediate shaft having a sprocket-wheel in alinement therewith, and sprocket-chains connecting said wheels, a pair of downwardly-swinging doors and links hinged between said doors and rack-bar, and a toothed pinion on said intermediate shaft, an escapement-lever coacting therewith and means for operating same by the movement of the carriage, as set forth.

3. An elevator-closing device comprising a carriage having a rack thereon, a horizontal shaft above and below each floor, each shaft having a pinion at one end to engage with said rack, a sprocket-wheel on the opposite end of each shaft, in combination with a cross-shaft on the guideways having a toothed wheel, and sprocket-chains connecting said wheels, an escapement-lever coacting therewith, a fulcrumed lever above and below the floor connected by rods with opposite sides of said escapement-lever, and fingers on a carriage in engagement with said fulcrumed levers, as set forth.

4. An elevator-closing device comprising a carriage having a rack thereon, a horizontal shaft above and below the floor, each shaft having a pinion at one end to engage with said rack, a sprocket-wheel on the opposite end of each shaft, in combination with a cross-shaft on said guideways, having a toothed wheel, and sprocket-chains connecting said wheels, an escapement-lever coacting therewith, said lever having hinged pawls and springs, a fulcrumed lever above and below the floor connected by rods with opposite sides of said escapement-lever, and fingers on a carriage, the upper one of which operates the fulcrumed levers on its upward movement and the lower finger on its downward movement, as set forth.

5. An elevator-closing device comprising in combination, a carriage with a rack thereon, a cross-shaft on the guideways above and below each floor, a pinion on one end of each shaft in engagement with said rack, and a sprocket-wheel on the other end, an intermediate cross-shaft, having thereon a sprocket-wheel, and sprocket-chains connecting said wheels, a central pinion and toothed pinion on the intermediate cross-shaft, a vertically-movable rack in engagement with said

central pinion, an escapement-lever coacting with the toothed pinion, a lever fulcrumed on each of the upper and lower shafts, a rod from each fulcrumed lever to the escapement-lever, and hinged fingers on the carriage in engagement with said fulcrumed levers, as herein set forth.

Signed at Independence, in the county of Buchanan and State of Iowa, this 6th day of June, A. D. 1901.

WILLIAM ALBERT ROBINSON.

Witnesses:

E. M. THOMPSON,

W. G. KUHRKE.