

(No Model.)

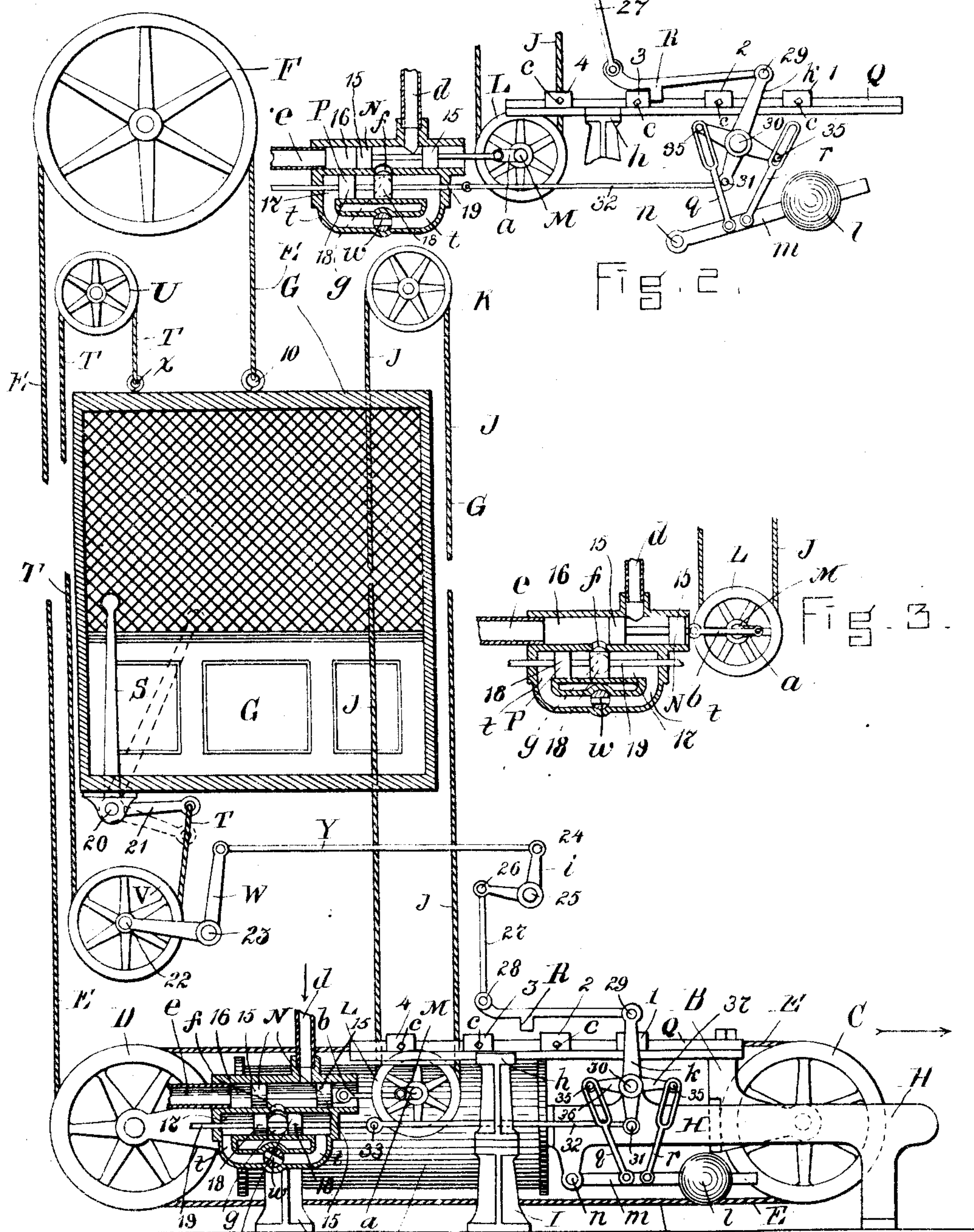
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C. E. MOORE.

CONTROLLING DEVICE FOR ELEVATORS.

No. 502,372.

Patented Aug. 1, 1893.



WITNESSES

Fig. 1.

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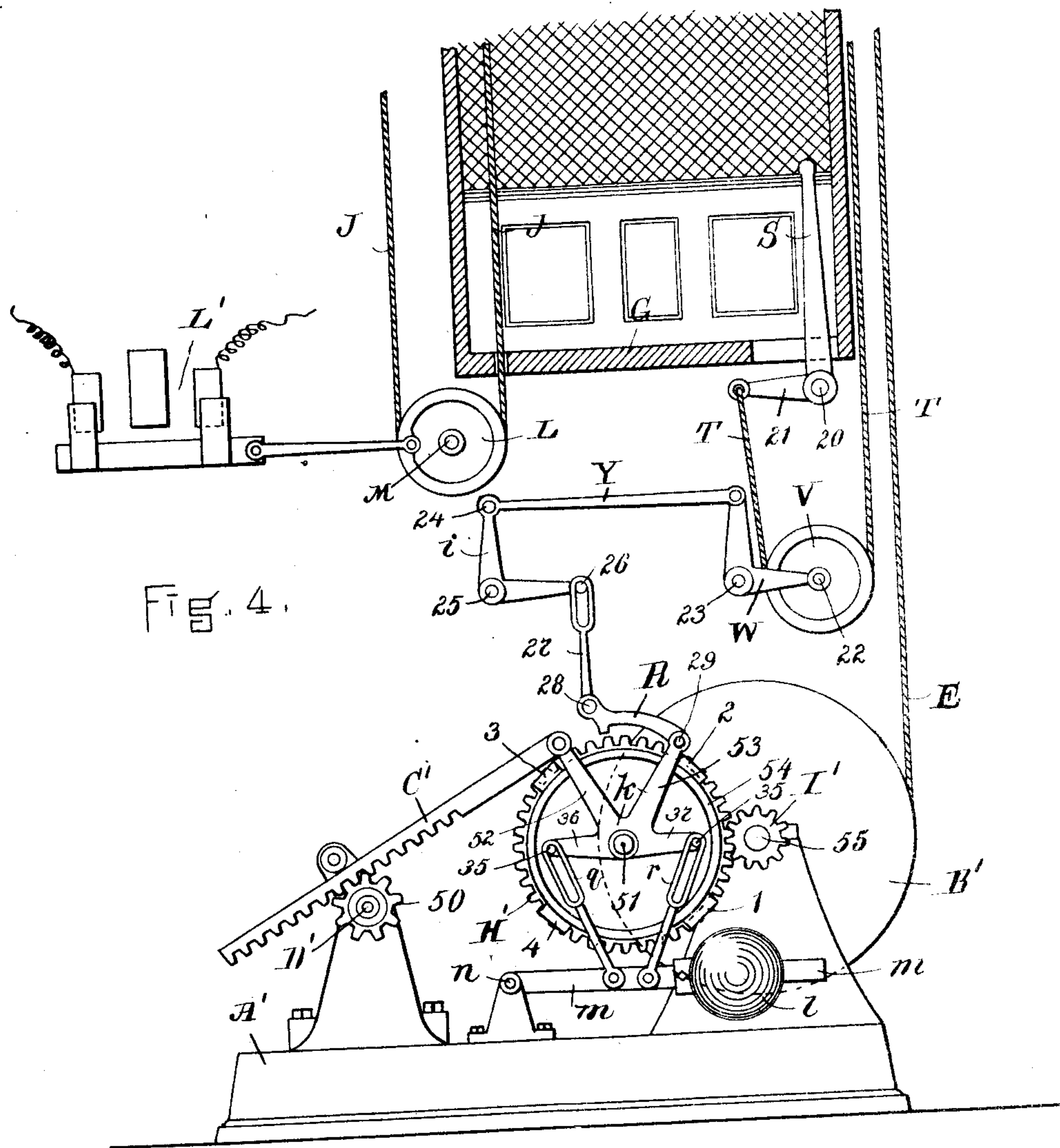
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INVENTOR.

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UNITED STATES PATENT OFFICE.

CHARLES E. MOORE, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE
MOORE & WYMAN ELEVATOR AND MACHINE WORKS, OF SAME
PLACE.

CONTROLLING DEVICE FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 502,372, dated August 1, 1893.

Application filed April 10, 1893. Serial No. 469,812. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. MOORE, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Controlling Devices for Elevators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a side view of a hydraulic elevator constructed in accordance with my invention, the reversing and operating valves being shown in section. Fig. 2 is a view, partly in section, of the valves and their operating mechanism, showing the positions of the parts when the elevator car is stopped in its ascent. Fig. 3 is a sectional detail, showing the position of the reversing valve when moved to permit the elevator car to descend. Fig. 4 is a view representing a modification of my invention to be hereinafter referred to.

My invention relates to elevator controlling mechanism, and has for its object to start and stop the car gradually, thus avoiding any sudden shock or jar, and also to stop the car automatically with its floor exactly opposite to or even with the several landings, which cannot be accomplished with any degree of certainty when dependent on the judgment of the operator.

To this end my invention consists in an elevator controlling mechanism comprising a detent or pawl adapted to be operated by means located within the car, and connected with the starting and stopping mechanism, a series of traveling stop-blocks or projections, actuated by the elevator-motor and adapted to engage said detent and thereby actuate the mechanism connected therewith to stop the car, and a weight connected with said starting and stopping mechanism and said detent, and adapted to be raised when said detent is actuated by one of said stop-blocks to stop the car, and descend to operate the mechanism whereby the car is set in motion when said detent is thrown out of engagement with said stop-block by the operator in the car, as hereinafter more particularly set forth.

In the said drawings, A represents the

cylinder of a hydraulic elevator, and B the cross head which carries the hoisting-rope wheels C.

D represents the stationary hoisting-rope wheels and E the hoisting-rope, which passes over the wheels C, D, and up the hoistway over a wheel F, and is secured at 10 to the elevator-car G.

H is the cross-head-guide, and I, I, are legs for supporting the cylinder A; all of the parts thus far described being common to all hydraulic elevators of this class, and forming no part of my invention.

J is a rope passing through the car G over a wheel K at the top of the hoistway and down outside the car to and around a wheel L to which it is fastened, said wheel L being secured to a crank-shaft M provided with a crank *a*, to which is pivoted one end of a connecting rod *b*, the opposite end of which is pivoted to the reversing-valve N, consisting of two heads 15 connected by a rod and adapted to reciprocate within a casing 16, to which is connected the inlet pipe *d* through which the water under pressure is supplied to the cylinder A to operate the elevator.

e is the discharge pipe, through which the water escapes from the cylinder A when the car is descending, and *f* is a port leading from the valve casing 16 into the casing 17 of the operating-valve P which consists of two heads 18 secured upon a valve rod 19, and adapted to control a port *g* through which the water passes directly into the cylinder A.

Q is a horizontal bar secured at one end to the cross-head B and supported and guided by a bracket *h*. To this bar Q are adjustably secured by means of set screws *c*, a series of stop-blocks or projections 1, 2, 3, 4, corresponding respectively to the several floors or landings at which the elevator-car is to stop, said blocks traveling backward and forward in a horizontal plane with the bar Q as the latter is reciprocated with the cross-head B when the elevator-car is ascending and descending.

R is a detent or pawl which is adapted to be engaged by either one of the stop-blocks of the bar Q when it is desired to stop the elevator at the floor or landing corresponding to the particular stop-block which engages the

detent. This detent R is operated from within the car G to bring it into engagement with any particular stop-block desired by means of a lever S fulcrumed at 20 and having secured to its horizontal arm 21 a rope T which passes down around a wheel V and thence up outside the car over a wheel U at the top of the hoistway, and down to the top of the car to which it is secured at *x*.

The rope-wheel V runs loosely on a stud 22 at one end of a bell crank lever W, fulcrumed at 23, on a stud projecting from one of the walls of the hoistway or other adjacent stationary part and to the other end of this bell crank is pivoted a rod Y connected at 24 to one end of a bell-crank *z* fulcrumed at 25, on a stud projecting from an adjacent stationary part, and to the other end of this bell crank *z* is pivoted at 26 a rod 27, the lower end of which is pivoted at 28 to the detent R, the latter being pivoted at 29 to the upper end of a lever *k* made in the form of a cross, and fulcrumed on a stud 30 projecting from the cross-head H. To the lower end of this lever *k* is pivoted at 31 a rod 32, the opposite end of which is pivoted at 33 to the valve-rod 19 of the operating valve P, by which the supply of water is admitted to and shut off from the cylinder A. With this construction when the lever S in the car is moved into the position indicated by the dotted lines, the detent R will be lowered into a position to be engaged by the next advancing stop-block, according to the direction in which the bar Q is traveling, thus causing the cross-lever *k* to be swung over to the right or left hand as the case may be, to shut off the water from the cylinder A and stop the car, and when said lever S is thrown back into the position shown in full lines, the detent R will be raised as shown in Fig. 1, out of the path of the traveling stop-blocks which are then free to move without actuating the lever *k*.

l is a weight adjustable on a lever *m* fulcrumed at *n* to the cross-head guide H, and to this lever are pivoted two rods *q*, *r*, slotted for the reception of pins 35 by which they are connected to the lateral arms 36, 37, of the cross lever *k*, whereby when the latter is swung over to one side or the other by the contact of one of the traveling stop-blocks with the detent R, the weight *l* will be raised as shown in Fig. 2, and when said detent is elevated out of engagement with a stop-block, the weight will descend to move the lever *k* into the position shown in Fig. 1, thus opening the valve P to start the elevator-car up or down as the case may be.

The time occupied by the weight *l* in descending to open the operating-valve P is regulated by a suitable retarding device, which consists, in the present case, of a pipe *t* provided with a regulating cock *w*, said pipe communicating with both ends of the casing of the valve P, whereby the water is caused to pass from one end of the casing to the other, according to the direction in which the valve

is moving, the movement of the water through the pipe *t* being regulated by the cock *w*, whereby the valve is caused to move slowly to start the car gradually, and thus avoid any sudden shock or jar.

The operation of the above described mechanism is as follows:—The parts being in the position represented in Fig. 1, with the elevator car ascending, and said car having passed the second landing, if it should be desired to stop at the next landing, the operator moves the lever S in the car to the position shown in dotted lines, which will lower the wheel V and permit the detent R to drop onto the bar Q, which is at that time moving in the direction of the arrow. The stop-block 3 will now engage the detent R and swing the lever *k* over into the position shown in Fig. 2, which causes the port *f* to be closed, thus shutting off the water from the cylinder and automatically stopping the car, the stop-blocks 1, 2, 3, 4, being so arranged or adjusted on the bar Q as to cause the port *f* to be closed at the instant that the floor of the car is even with a landing, and consequently it is impossible for the car to stop either above or below the same, which is an important advantage, as much time is frequently lost in making a trip by the necessity of starting and stopping the elevator to bring the car even with the landing when not originally stopped at the proper level. The closing of the port *f* by the means described when the car is ascending, will cause the weight *l* to be raised into the position shown in Fig. 2. To continue the ascent of the car the operator moves the lever S back to the position shown in full lines in Fig. 1, which raises the detent R, and disengages it from the stop-block 3, when the weight *l* will instantly descend by its own gravity, and, through the connections described, open the port *f* and admit the water to the cylinder A through the pipe *d* and the ports *f* and *g*, as shown in Fig. 1. The car will now ascend, and by moving the lever S back to the position shown dotted, the detent R will be dropped into position to be engaged by the stop-block 4, whereby the car will be stopped even with the fourth floor or landing in the same manner as described for the landings below. It will be obvious that the lever S can be thrown over to stop the car at the next landing, immediately after it starts from the previous landing, or at any time sufficiently soon to insure the engagement of the next stop-block with the detent R before the car reaches the landing at which it is desired to stop. While the car is ascending, the reversing valve N remains open as shown in Fig. 1, only the operating-valve P being used to stop and start the elevator at the several landings. When the car is to descend, the reversing valve N must be moved by means of the rope J and its connections into a position to shut off communication between the inlet or supply pipe *d* and the port *f*, and at the same time bring said port *f* into

communication with the discharge pipe *e*, as shown in Fig. 3, the operating-valve *P* remaining closed and preventing the escape of the water from the cylinder through the ports *g* and *f*. The operator next moves the lever *S* back into the position shown in full lines in Fig. 1, which lifts the detent *R* and releases the weight *l*, which then descends and moves the valve *P* to open the ports *f*, *g*, when the water will escape from the cylinder through the discharge pipe *e* and permit the car to descend, the car being stopped at the several landings in the same manner as in its ascent. The movement of the bar *Q* when the car is descending is in a direction opposite to that previously described, and the valve *P* will also be moved in the opposite direction to stop the elevator, causing the weight *l* to be raised by the rod *r*, as the cross-lever *k* will then be swung over into a position opposite to that shown in Fig. 2. It will be seen that the operating-valve is opened to start the elevator by the descent of the weight *l*, and closed to stop the elevator by the movement of the stop-bar *Q* acting through the detent *R*; it being merely necessary for the operator to raise or lower the detent *R* by means of the lever *S* as he may wish to start or stop the car, and as the operator has no control of the time at which the operating-valve is opened or closed, it is impossible to start with a sudden jerk or shock or stop above or below the landings.

In Fig. 4 is represented a modification of my invention which represents it as applied to an elevator provided with a hoisting drum which may be rotated by electricity, steam, or other suitable power. In this figure *A'* represents the bed-plate of the elevator; *B'* is the hoisting drum, and *E* the hoisting rope, which is secured to the car *G* in the usual manner. *D'* is the operating shaft connected with the starting and stopping mechanism by which the power is applied or shut off. This shaft *D'* is provided with a pinion 50 with which meshes a rack bar *C'* adapted to turn the pinion and shaft a half revolution in either direction to start or stop the elevator. The rack bar *C'* is pivoted to the arm 52 of the lever *k* fulcrumed on a stud 51 and having pivoted to its arm 53 a detent *R* similar to that shown in the other figures, and adapted to be operated by similar means located within the car. This detent, when permitted to descend, is adapted to be engaged by either one of a series of traveling stop-blocks or projections 1, 2, 3, 4, which, instead of being placed on a horizontally reciprocating bar, as first described, are arranged around the periphery of a flange 54 on a gear *H'*, which is mounted on the stud 51, and is adapted to be rotated by a pinion *I'* on the shaft 55 of the hoisting drum *B'*. The lateral arms 36, 37 of the lever *k* are connected by slotted rods *q*, *r*, with the lever *m*, carrying the weight *l*, which operates in the manner previously described when the detent is raised, causing the lever

in this case to operate the rack bar *C'* to start the elevator, instead of operating a valve as in the construction first described, the rack-bar *C'* being moved in the opposite direction to stop the elevator by the contact of one of the stop-blocks on the gear *H'* with the detent *R* when the latter is permitted to descend by moving the lever *S* in the car. With this construction a dash-pot or retarding device would in practice be applied to the weighted lever *m* to ease it in its descent and prevent a too sudden application of the power in starting the elevator.

The pinion *I'* and gear *H'* are properly proportioned to cause the latter to make a single revolution while the car is ascending or descending, which admits of the stop-blocks being so arranged as to stop the car even with the several landings as required.

The reversing rope *J* is shown as connected with the current reverser *L'* of an electric motor, but when the elevator is adapted to be driven by steam or other power it would be connected with a belt-shipper or other device for reversing the direction of motion of the machine or motor in a well known manner.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. An elevator controlling mechanism, comprising a detent, means located within the car for operating said detent, starting and stopping mechanism connected with said detent, a series of traveling stop-blocks or projections actuated by the elevator-motor and adapted to engage said detent and thereby actuate the mechanism connected therewith to stop the car, and a weight connected with said starting and stopping mechanism and said detent, and adapted to be raised when said detent is actuated by one of said stop blocks to stop the car, and descend to operate the mechanism whereby the car is set in motion when said detent is thrown out of engagement with said stop-block, substantially as set forth.

2. In an elevator controlling device, the combination, with a car and its hoisting mechanism, of a detent, means located within the car for operating said detent, a lever to which said detent is pivoted, starting and stopping mechanism connected with said lever, a series of traveling stop-blocks or projections actuated by the elevator motor and adapted to engage said detent and thereby move the lever connected therewith to stop the car, and a weight connected with said lever and adapted to move the same to start the car when the detent is released from its engagement with a stop-block, substantially as described.

3. In a hydraulic elevator, the combination, with the car and its hoisting mechanism, of a detent, means located within the car for operating said detent, a lever to which said detent is pivoted, an operating valve connected with said lever, a reciprocating bar connected with and actuated by the hoisting mechanism and provided with a series of stop-

blocks or projections adapted to engage said detent and thereby move the lever connected with the operating valve to stop the car, and a weight connected with said lever and adapted to move the operating valve connected therewith to start the car when said detent is disengaged from a stop-block, substantially as described.

4. In a hydraulic elevator, the combination, with the car, and its hoisting mechanism, of a detent, means located within the car for operating said detent, a lever to which said detent is pivoted, an operating valve connected with said lever, a reciprocating bar connected with and actuated by the hoisting mechanism and provided with a series of stop-blocks or projections adapted to engage said detent and thereby move the lever connected with the operating-valve to stop the car, a weight connected with said lever and adapted to move the operating-valve connected therewith to start the car when said detent is disengaged from the stop-block bar, and a reversing valve adapted to be operated by means located within the car, all operating substantially as set forth.

5. In a hydraulic elevator, the combination, with the car and its hoisting mechanism, of a detent, means located within the car for operating said detent, a lever to which said detent is pivoted, an operating valve connected with said lever, a reciprocating bar connected with and actuated by the hoisting mechanism and provided with a series of stop-blocks or projections adapted to engage said detent and thereby move the lever connected with the operating valve to stop the car, a weight connected with said lever and adapted to move the operating valve connected therewith to start the car when said detent is disengaged from the stop-block bar, a reversing valve adapted to be operated by means located within the car, and a retarding-device

connected with the operating-valve mechanism, whereby the descent of the weight and the movement of the operating-valve is automatically controlled to effect the gradual application of the power in starting the car, substantially as set forth.

6. In an elevator, the combination, with the elevator car and its hoisting mechanism, of the detent R, means located within the car for operating said detent, the lever *k*, starting and stopping mechanism connected with said lever, the latter having the detent R pivoted thereto and provided with the lateral arms 36, 37, the lever *m* with its weight *l*, the slotted rods *q*, *r*, connected with the arms 36, 37, of the lever *k*, and a series of traveling stop-blocks adapted to move in opposite directions and engage the detent R to move the lever *m* and stop the car in its ascent or descent, substantially as set forth.

7. In an elevator, the combination, with the elevator car, of the cylinder A, the cross-head B, the hoisting-rope E, rope wheels C, D, the reciprocating bar Q secured to the cross head B and provided with a series of stop-blocks or projections corresponding to the several landings, the detent R means located within the car for operating said detent, the lever *k* having the detent R pivoted thereto and provided with arms 36, 37, the lever *m* with its weight *l*, the slotted rods *q*, *r*, connected with the arms of the lever *k*, the operating valve P connected to the lever *k* by the rod 19, the reversing valve N and means located within the car to operate the same, and a retarding-device for the operating-valve all constructed to operate substantially as set forth.

Witness my hand this 8th day of April, A. D. 1893.

CHARLES E. MOORE.

In presence of—

P. E. TESCHEMACHER,
R. HENRY MARSH.